National Park Service

U.S. Department of the Interior

Congaree National Park

South Carolina

Fire Management Plan

Environmental Assessment

March 2017

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Fire Management Plan

Environmental Assessment

Public Comment

Public scoping for the FMP update and EA was pursued through the distribution of an informative brochure, including distribution to the Park's stakeholders via mail and email. In addition, a press release was sent to local and regional media; information was posted on the Park website; and the project was set up for review and comment in the NPS Planning, Environment, and Public Comment website (PEPC). Two open house style meetings were also conducted to offer further opportunities for the public and various agencies to gather information of the proposed addition of the use of fuel treatments, targeted herbicide application, and planting of native plants as fire management tools, and to solicit feedback for direction in the EA.

If you wish to comment on the environmental assessment, you may mail comments to the name and address below or post comments online at http://parkplanning.nps.gov/CONG. This environmental assessment will be open for public review for 30 days. Before including your address, phone number, email address, or other personal identifying information in your comments, you should be aware that your entire comment—including your personal identifying information—may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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Purpose and Need

Introduction

Congaree National Park (CONG or park) is located in Richland County in central South Carolina (Figure 1) and contains varied forest communities ranging from upland longleaf pines to wetland cypress (*Taxodium* spp.) and tupelo gum (*Nyssa* spp.). The park borders the north side of the Congaree River and the west side of the Wateree River. The park encompasses approximately 26,000 acres of mostly floodplain of which 11,000 acres are old growth bottomland hardwood forests (NPS 2014). These 11,000 acres represent the largest contiguous tract of southern old growth bottomland forest remaining in the United States. Originally established in 1976 as Congaree Swamp National Monument, the park was created "to preserve and protect…outstanding example of a near-virgin southern hardwood forest situated in the Congaree River floodplain" (Public Law 94-545). In 2003, Congress redesignated the monument as Congaree National Park (Public Law 108-108).

The National Park Service (NPS) is proposing to develop a new Fire Management Plan (FMP) to replace the 2004 FMP that Congaree National Park currently uses to suppress wildfires and conduct prescribed fire treatments. This Environmental Assessment (EA) evaluates three alternatives for fire management activities at the park. This EA assesses the impacts that could result from continuing current fire management (No-Action Alternative) or implementation of two action alternatives. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA), NPS Director's Order 12, and 2015 NPS NEPA Handbook.

Purpose of and Need for Action

Purpose

The purpose of the proposal is to revise and update the FMP for the park to comply with Director's Order 18 (DO-18) (NPS 2008) and Reference Manual-18 (RM-18), which states that "all parks with burnable vegetation must have an approved fire management plan" (NPS 2014a). In addition, the purpose of the revision is to allow for the use of unplanned ignitions for multiple objectives, including resource benefits and to allow the use of mechanical fuel treatments, targeted herbicide application, and planting of native plants to support resource management objectives. Unplanned ignitions are wildland fires that are unplanned, regardless of cause, including unauthorized human or lightning caused fire.

Need for Action

The 2004 FMP for the park needs to be revised to meet current NPS policies. Since the 2004 FMP was written, the NPS has made revisions and updates to RM-18 (NPS 2014a) to comply with the 2009 Guidance for Implementing Federal Wildland Fire Management Policy (U.S. Department of the Interior and U.S. Department of Agriculture 2009). The revision of the CONG FMP is needed to allow the use of wildland fire management activities to accomplish resource objectives.

Currently, the CONG fire management program suppresses all wildfires, allows prescribed fires (planned ignitions for resource management objectives), and allows creation of defensible space within 50 feet of park buildings. Through observation, monitoring, and research, the CONG fire staff has learned that prescribed fire alone cannot effectively achieve forest restoration objectives for fire-dependent communities located in the upland areas above the low bluffs on the north side of the park. Historically, the uplands were a fire-adapted ecosystem consisting mostly of open stands of native longleaf pine (*Pinus palustris*) with grass and forb understories. The longleaf pine communities burned every 1–3 years, mostly with low intensity surface fires ignited by lightning (Frost and Wilds 2001). Prior to creation of the park, past land practices such as logging, replanting of loblolly pines (*Pinus taeda*) plantations, agricultural practices, and fire suppression have resulted in the loss of native open, longleaf pine communities in the park uplands (approximately 1,460 acres). Once common throughout the southeast United States, longleaf pine forests have declined by 98% with less than 3.8 million acres remaining (Landers et al. 1995).

The current upland forests in the park consist of dense loblolly pine with sweetgum (*Liquidambar styraciflua*), oaks (*Quercus* spp.), and a variety of other hardwoods. Isolated patches of longleaf pine remain in the park uplands. Deciduous hardwoods have replaced longleaf pine in some areas that were logged or cleared with fast growing sweetgum saplings out-competing longleaf pine seedlings. While prescribed fire has generally improved upland pine forest conditions, prescribed fire treatments alone have been ineffective at permanently reducing sweetgum density. The original idea in the 2004 FMP to use prescribed burning to reduce sweetgum saplings and thin loblolly forests has proven impractical as mature loblolly pine and larger sweetgums have grown above the height or developed thick bark that could be effectively reduced by surface prescribed fire alone. Typically, larger sweetgums are top-killed by prescribed fires and re-sprout prolifically (Waldrop et al 1987).

The herbaceous understory, once dominated by grasses and forbs, is now sparse to bare due to the closed over story and mid-story. There are isolated open patches where longleaf pine recruitment with grass and forb herbaceous understory occurs.

Restoring the longleaf pine forest community at the park would contribute to the recovery of the globally threatened forest community, as well as associated plants and animals, including the red-cockaded woodpecker (*Picoides borealis*). Additionally, the current successional forests with closed upper and mid-story canopies, thick tree and shrub understories, and greater stems per acre have created higher ground and ladder fuels, increasing threats from pests (e.g. Southern pine beetle) and increased risk of severe wildfires. These conditions promote wildfires that may become larger in size and intensity than historic fires that occurred in the region. These wildfires are more difficult to control and may become more frequent during drought conditions and projected climate change. This could lead to permanent changes in forest conditions in this area.

The current FMP also does not adequately reflect updated fire management techniques, strategies, and fire terminology. An updated FMP would provide a management framework for all CONG wildland fire activities, both planned and unplanned, that would best meet overall resource management and human value protection goals.

Objectives in Taking Action

Objectives are purpose statements that describe what should be accomplished for the action to be considered successful (NPS 2011). Based on consideration for the purpose and need for action, the park's enabling legislation, other park planning documents, and the NPS mission and policy guidance, the following fire management objectives were developed with park staff during internal scoping:

1. Prioritize protection of firefighters, staff, and the public in all fire management activities.

2. Facilitate the protection of park cultural resources, infrastructure, recreational values, other fundamental resource values, and the protection of adjacent private property from park wildland fires.

3. Promote restoration and enhancement of park natural resources and processes, and help sustain a diverse and healthy ecosystem. This includes forest and plant communities, watersheds, and native wildlife.

4. Support preservation of CONG's wilderness character; all planning and implementation activities would include the minimum requirements analysis process.

5. Use wildland fire management strategies that consider the reduction of hazardous fuels and the promotion of park resource objectives when/where feasible.

6. Encourage and support fire related monitoring and research and allow for flexible management within the scope of environmental and cultural compliance.

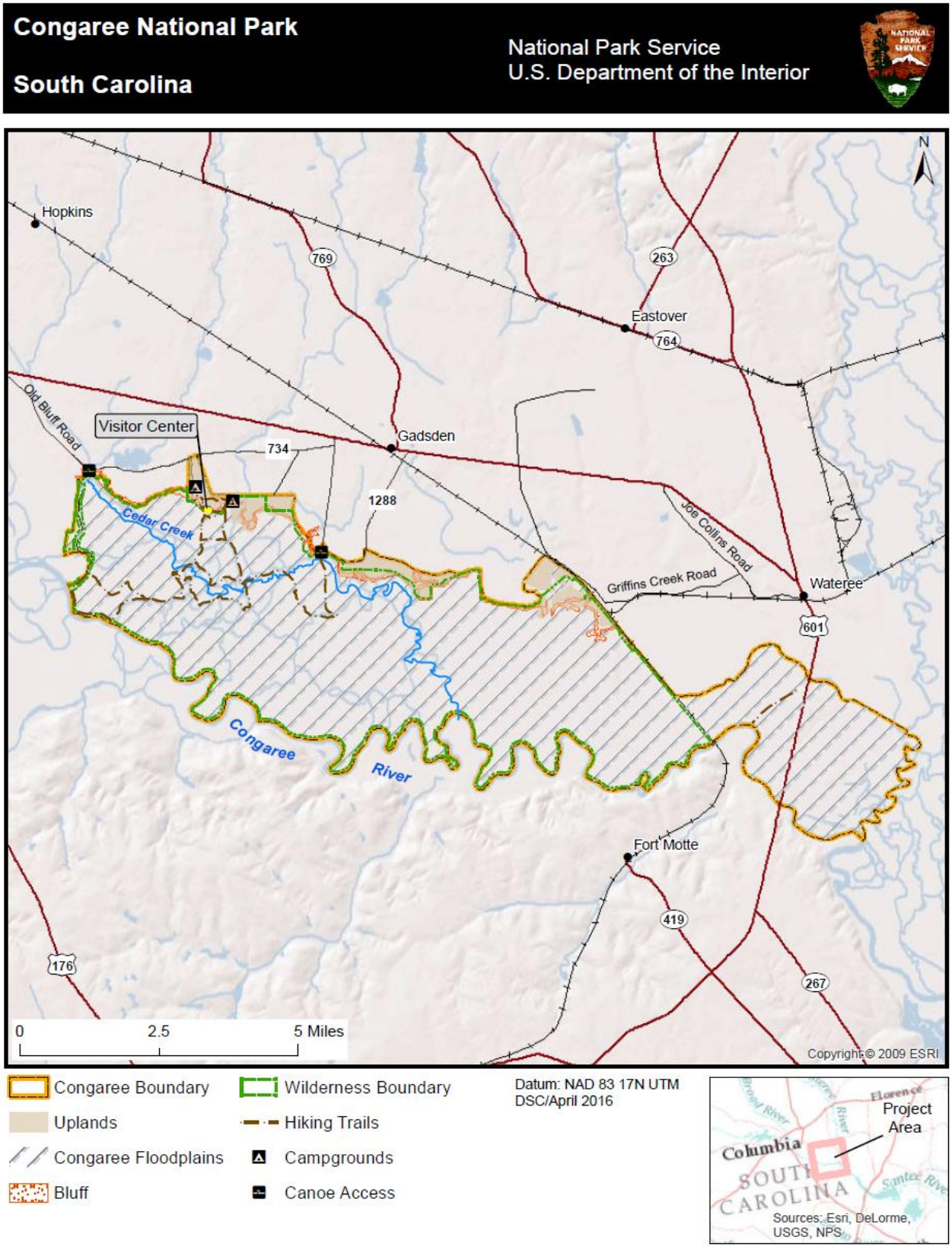

FIGURE 1. CONGAREE NATIONAL PARK FIRE MANAGEMENT PLANNING AREA

Relationship to Other Laws, Regulations, and Policies

Numerous laws, regulations, and federal policies guide the decisions and actions regarding this EA. The primary legal and regulatory requirements that relate to fire management in the park include the following listed below.

In accordance with the *NPS Management Policies 2006*, the wildland fire management program will be designed to protect natural and cultural resource objectives; address potential impacts on public and private land adjacent to the park; protect public health and safety; and provide for safety considerations for visitors, employees, and developed facilities.

Director's Order 18 (DO-18; NPS 2008) states that "Each park with burnable vegetation must have an approved Fire Management Plan that will address the need for adequate funding and staffing to support its fire management program." DO-18 defines what an approved FMP must include, emphasizing that firefighter and public safety is the first priority and that NPS should seek an interagency approach to managing fires on an ecosystem basis across agency boundaries. DO-18 also directs parks to identify, manage, and where appropriate, reduce hazardous fuels. Reference Manual 18 (RM-18) is derived from DO-18 and provides comprehensive, more detailed guidance and policy for NPS fire management programs.

Director's Order 28 (DO-28) requires the consideration of impacts on historic properties that are listed or eligible to be listed in the National Register of Historic Places (NRHP). DO-28 states that FMPs should address cultural resource concerns and protect archeological sites, historic structures, and cultural landscape features.

Director's Order 41 (DO-41; NPS 2013a) provides requirements and guidance for the management of wilderness areas. It provides accountability, consistency, and continuity with respect to the NPS wilderness program and guides NPS efforts in meeting the letter and spirit of the Wilderness Act of 1964. Furthermore, Section 6.7 of Director's Order 41 states that "In many NPS wilderness areas fires resulting from natural ignitions are considered a natural process that contributes to ecosystem function and are necessary to maintain wilderness in an unimpaired condition. As a result of many factors, including past fire management actions within wilderness, and the need to control wildfires on adjacent lands, fire is not adequately functioning as the natural change agent that would have been present in the ecosystem in the past. In those cases, augmenting natural ignitions with prescribed fire or other fuel treatments within wilderness may be necessary to restore or maintain ecological function."

Authority for implementing a fire management program at the park originates with the Organic Act of the National Park System (1916). The Organic act mandates that NPS "…promote and regulate the use of Federal areas known as national parks, monuments, and reservations…by such means and measures as to conform to the fundamental purpose of said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife 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 (6 U.S.C. 1)."

Issues and Impact Topics

This section identifies the impact topics that could be affected by the alternatives. Impact topics are derived from issues identified during internal and public scoping. When determining whether to retain an issue for more detailed analysis in this EA, the interdisciplinary team considered, among other things, whether or not:

- the environmental impacts associated with the issue are central to development of a fire management plan or are of critical importance;

- a detailed analysis of environmental impacts related to the issue is necessary to make a reasoned choice between alternatives;

- the environmental impacts associated with the issue are a big point of contention among the public or other agencies; or

- there are potentially significant impacts to resources associated with the issue.

Ultimately, it is important for decision makers and the public to understand the impacts that each of the alternatives under consideration would have on specific resources. Therefore, the NPS uses "impact topics" as headings to indicate which resources would be affected and to organize the discussions of the affected environment and environmental consequences section.

The impact topics carried forward for analysis in Chapter 4 in this EA include:

- Air quality
- Soils
- Vegetation (including invasive species)
- Water resources (including wetlands)
- Wildlife (including invasive species)
- Special status species
- Cultural resources
- Wilderness character
- Visitor use and experience
- Human health and safety

Impact Topics Dismissed from Further Analysis

Using the same considerations noted previously, the following impact topics were initially considered but were subsequently dismissed from analysis.

Soundscape. The NPS 2006 Management Policies and Director's Order 47 states the preservation of natural soundscapes associated with National Park units as an important component of NPS's mission. The natural ambient soundscape is the aggregate of all the natural sounds that occur in park units, together with the physical capacity for transmitting natural sounds. The frequencies, magnitudes, and durations of human-caused sound considered acceptable vary throughout each park unit, being generally greater in developed areas and less in undeveloped areas.

Although local soundscapes may be temporarily affected by vehicles, equipment, and aircraft during fire management activities, these effects are expected to be minimal. Nor would the temporary increase in noise be expected to impact the overall tranquility and solitude associated with the park, thus, this topic was dismissed from further consideration as a standalone topic.

Indian Trust Resources. Secretarial Order 3175 mandates any anticipated impacts to Indian trust resources from proposed project or action by the Department of Interior agencies be explicitly addressed in environmental documents. The federal Indian trust responsibility is a legally enforceable fiduciary obligation on the part of the United States to protect tribal lands, assets, resources, and treaty rights, and it represents a duty to carry out the mandates of federal law with respect to American Indian and Alaska Native tribes. The NPS consulted with the affiliated Native American tribes to determine whether any trust resources could be impacted by implementing a fire management plan at the park. Following consultation, NPS has determined that there are no Indian Trust resources that would be affected by fire management activities. Therefore, Indian Trust Resources was dismissed as an impact topic carried forward for analysis in this EA.

Environmental Justice. Presidential Executive Order 12898, "General Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (1998) requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing the disproportionately high and/or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

According to the Environmental Protection Agency, environmental justice is the fair treatment and meaningful involvement of all people, regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies. The goal of 'fair treatment' is not to shift risks among populations, but to identify potentially disproportionately high and adverse environmental effects, and identify alternatives that may mitigate these impacts.

Richland County contains both minority and low-income populations. Both population types are prevalent in lower Richland County in the area surrounding the park. Nevertheless, environmental justice was dismissed as an impact topic for the following reasons:

- The park staff and planning team actively solicited public participation as part of the planning process and gave equal consideration to all input from persons regardless of age, race, income status, or other socioeconomic or demographic factors.
- Implementation of any alternative would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect adverse effects on any minority or low-income population.
- The environmental impacts associated with implementation of any alternatives would not disproportionately affect any minority or low-income population or community.
- Implementation of any alternatives would not result in any identified environmental effects that would be specific to any minority or low-income community.
- The economic impacts resulting from implementation of any of the alternatives may be adverse, but they would not disproportionately affect minority or low-income populations. In addition, the park staff and planning team do not anticipate that the impacts on the socioeconomic environment would alter the physical and social structure of nearby communities.

Based on this rationale, environmental justice was dismissed and not carried forward for analyses in this EA.

Socioeconomics. The NPS is directed to collaborate with community and tourism professionals to promote sustainable and informed tourism that incorporates socioeconomic and ecological concerns and supports long-term preservation of park resources and quality visitor experiences. Fire management, through wildfire management, suppression or prescribed burning is not expected to impact the local or regional population, income, or employment. Fire management activities could require employment and/or outside visiting fire crews utilizing community services. The impacts to socioeconomics is not likely to be significant, thus socioeconomics was dismissed from further analysis.

Alternatives

This section describes the three alternatives (two action alternatives and the no-action alternative) that the NPS is considering for fire management in the park. Alternatives represent different means for meeting the purpose, need, and objectives described in Chapter 1. A range of alternatives were developed that includes a set of reasonable alternatives as well as other alternatives considered but eliminated from detailed analysis. A reasonable alternative is one that is technically and economically feasible as well as meets the project objectives to a large degree. A summary table of the key components of each alternative can be found in Table 1.

Three alternatives, described below, were developed through internal and external scoping and will be examined in this EA for fire management in the park:

- Alternative A—Continue Current Fire Management (No-Action Alternative)
- Alternative B—Comprehensive Ecological Restoration and Management Strategies
- Alternative C—Comprehensive Ecological Restoration and Management Strategies Except No Use of Wheeled/Tracked Equipment in Wilderness

Elements Common to All Alternatives

Fire management related activities that already occur at the park and may affect or contribute to fire management, fire preparedness, and/or defensible space are described below.

These activities are allowed under the 2004 CONG FMP EA (NPS 2004). Some of these activities also occur under the authority of categorical exclusions (CE) under the National Environmental Policy Act (NEPA) as outlined in 40 Code of Federal Regulations (CFR) §1508.4 (DOI), 43 CFR §46.205 (DOI), 43 CFR §46.210 (DOI), 43 CFR §46.215 (DOI), and 516 DM 12 (NPS).

All fire management activities, regardless of what alternative is selected, would comply with Section 7 of the Endangered Species Act (ESA) and Section 106 of the National Historic Preservation Act (NHPA) and would be compatible with applicable laws and National Park Service (NPS) policies, plans, and regulations. In particular, all activities affecting designated or potential wilderness would be undertaken in a manner consistent with the "minimum requirement concept" for protecting wilderness character. (The "minimum requirement" is the least-impacting tool/technique appropriate for accomplishing an objective in wilderness.) See Section 6.3.5 of NPS *Management Policies* and discussion below.

Wildfire Management/Suppression

Wildfires occurring within the boundaries of the park have been suppressed at minimum cost, considering firefighter and public safety, and weighing values to be protected consistent with CONG resource objectives. Under the 2004 CONG FMP, wildfires may not be managed solely for resource objectives, but resource objectives may be considered when selecting suppression actions and tactics.

Consistent with Federal Wildland Fire Management Policy, wildfire response is now described differently from the suppression- focused language used in the past. Today, all wildfires receive a response and are managed for multiple objectives. These objectives include firefighter and public safety, minimizing costs, protecting values-at-risk (e.g., structures, private property, cultural sites, threatened and endangered species habitat), and others depending on the location of the fire and its projected movement. When managing a wildfire for multiple objectives, fires may be managed differently on different sections of the same fire. For example one flank may be actively suppressed where it approaches private property, whereas another flank may not receive suppression action where it is burning into the wilderness and confined by natural barriers. This objective based management can change over time. For example, an aggressive suppression response maybe abandoned when a tropical storm comes into the fire area and is likely to put the fire out.

Fire management and suppression tactics may include, but are not limited to, application of water, and/or foam/retardant (Superintendent approval required) by ground equipment or aircraft; use of motorized equipment such as chainsaws, leaf blowers, portable pumps; use of hand tools such as shovels, pulaskis,

flappers, pruners; off-road use of all-terrain or utility task vehicles (ATVs or UTVs; Superintendent approval required) outfitted with pumps, hoses and fire support tools and equipment; use of wildland fire engines from roads; cutting of vegetation in advance of the fire front by chainsaws and/or tracked/wheeled equipment (mowers, masticators) to construct firelines or create defensible space; "burning out" from firelines or roads; and potential use of heavy equipment, such as bulldozers or fireplows (Superintendent approval required). All use of motorized equipment or mechanized transport in wilderness requires prior Superintendent approval in the form of a signed minimum requirements analysis (MRA) document.

Foam/retardant and bulldozers/fireplows are unlikely to be used in the park. Retardant use is rarely considered due to the threat of surface water contamination, high cost, and availability of other more effective strategies; aviation drops must be at least 300 feet from surface waters. Dozers/fireplows could easily cause excessive resource damage in the swampy ground; use is only considered if other options are ineffective, if fires pose serious risk to life and property, and where there is a reasonable chance of effective use of the equipment. Use of UTVs might be allowed to travel short distances off-road for essential fire-fighting missions, but not routine and frequent use. An example might be to transport a pump off-road to a pond to allow use of water in hoses for holding on firelines.

Wildfires that pose no threat due to unfavorable burning conditions (wet conditions) may be monitored and "suppressed" by location or environmental conditions; this is often termed a confinement strategy. Monitoring is used to provide up-to-date intelligence on fire behavior and location to aid fire managers in decision-making. Fires where the risk to firefighters is unacceptable may not receive direct attack, but would be monitored while other strategies are developed. All suppression activities may be restricted in wilderness, but possibly allowed depending on risk to other values, and conditions per NPS policy.

Throughout the park firefighters must consider Minimum Impact Suppression Techniques (MIST) in all fire management activities. Tactics often involve the use of natural barriers, vegetation changes, creeks, roads, and trails for firelines. Other low impact techniques should minimize fire management damage to natural and cultural values.

Indirect and direct attack tactics are often used to suppress wildfires, dependent on conditions and resources available. Direct attack methods include extinguishing the fire edge with water from engines or pumps, dropping water from aircraft on the burning edge of the fire, and/or building firelines against the edge of the fire. Direct attack is infrequently used at the park due to continuous and thick vegetation, lack of safety zones, few roads, swampy and inaccessible terrain, and few available hand crews. Direct attack is mainly used on upland fires with better access and mild fire behavior.

Indirect attack methods could include but are not limited to mowing or masticating around buildings before the fire arrives to reduce fire intensity (defensible space work), or intentional burning out of vegetation along selected roads or other barriers to reduce fuels in advance of the fire front.. In addition, point protection could be used, which focuses on protecting a specific value site from fire damage, while the fire passes. Specific values might include structures, habitat location of an animal or plant species of management concern, a historic site, or a power line. Indirect attack utilizing burnout tactics is frequently used by firefighters at the park.

Wildfire management/suppression success and effectiveness in protecting the park resources and local values depends on fire behavior, fuel buildup, firefighter risk, fuel moistures, surface water levels, seasonal trends, availability of firefighting resources, and other circumstances that vary by fire timing and location. Main themes involving CONG wildfire management are discussed above, but fire response options and guidance are also based on Federal Wildland Fire Management Policy (Interagency Standards for Fire and Fire Aviation Operations 2016, Chapters 9–12).

Prescribed Burning

Prescribed burning (planned ignitions) has been used to reduce fuels and initiate ecological restoration in the CONG uplands. It has been used primarily to reduce hazardous upland fuels, to emulate natural fire frequency (1–3 years) and fire effects (e.g., natural succession, soil nutrient cycling), reduce hardwoods and create openings, promote wilderness conditions, to control undesirable and non-native plant species, and enhance wildlife habitat. Prescribed fire is currently allowed by the 2004 CONG FMP EA and FONSI. The equipment

often used for park prescribed fires includes engines (near roads), pumps, hand-operated motorized equipment (chainsaws), UTVs in certain circumstances, mowers along roads, hand tools, and firing and ignition equipment. Aviation use is allowed, but has been rarely used at the park. Use of some equipment in park wilderness is limited by the Minimum Requirements Analysis included as part of the 2004 CONG FMP.

CONG staff and resource experts have come to realize that prescribed burning as the sole fuel/vegetation management technique in the park uplands is insufficient to allow for successful ecological restoration, and may need to be combined with other techniques that are currently not allowed under the 2004 EA/FMP. Other techniques could include mechanical and herbicide work, planting of native trees such as longleaf pine (*Pinus palustris*), and/or collection and planting of other native plants, such as grass seeds.

Past research/study on historical vegetation species mixes has helped the park to better understand the composition and structure of the historic upland pine forests compared to the current conditions of the upland pine forests (Frost and Wilds 2001). Additional research will help the park to reestablish more diverse vegetation associations representative of the longleaf pine forest stands (structure, species composition) (Frost and Wilds 2001). Prescribed burning frequencies may need initial modification to protect seedling and rocket stage longleaf pine. Utilizing the bluff edge as the boundary for prescribed fire units may be reconsidered during drought periods, where fire is more likely to penetrate further into the floodplain, or pose a risk to other values (e.g., champion trees) or potential escape from the park boundaries.

The actual annual acreage burned in prescribed fires depends on many factors including environmental conditions, funding, staff turnover, difficulty and complexity of burn units, and past treatment history. Ideally, CONG would burn about 600 acres annually, but this could vary from about 100–1,000 acres in a given year.

Limited Mechanical Activities

Per the 2004 FMP EA, defensible space work by mechanical equipment is limited to creating defensible space within 50 feet of park buildings. Mechanical equipment could include the use of wheeled or tracked equipment (e.g. mowers, masticators, choppers, skidders), hand tools, and/or handheld motorized equipment (e.g. weed eaters, chainsaws, hand-held brush cutters, leaf blowers); the park mainly uses hand tools and handheld motorized equipment. This work is limited to small-scale removal of brush, litter, and dead and down trees. Although allowed, clearing and thinning near structures has rarely been done as the park has sought to balance protection of structures with the natural scene, while providing necessary defensible space.

Maintenance Activities

Routine NPS vegetation management maintenance procedures at the park occur for park operational reasons and are performed regularly as needed independently of fire management staff. However, this work may contribute to fire management readiness or creation of defensible space. Examples include mowing and cutting of brush along roadsides, and removal of fallen trees and debris in developed areas or on trails. These activities occur around buildings, infrastructure, campgrounds, and picnic areas; along roadsides, hiking trails, fences, and boundaries; and on primitive roads used for firelines or administrative access. Activities along park roadways or primitive roads are authorized under CEs and therefore are not analyzed as part of this EA except as they contribute to cumulative impacts. Various vegetation maintenance activities may be implemented by utility companies on private rights-of-way in the park, such as power lines. Management of these activities is not part of this EA.

Resource Management Herbicide Use

The NPS currently uses limited herbicide application using targeted spot spraying by hand and backpack sprayer. Limited herbicide application is allowed to control invasive and non-native plants. Herbicide work is done primarily by CONG natural resource management staff. Park personnel apply only U.S. Environmental Protection Agency (US EPA) approved herbicides, following the conditions specified on the labels. Herbicide use may occur before or after prescribed burns, in areas unrelated to burning, and after wildfires. Prescribed fire may be utilized to support or reinforce herbicide treatments used to control invasives. Herbicide treatment activities are authorized under the NPS Categorical Exclusion 3.3 E.2 for treatment of exotic, non-native plants.

For park herbicide use, a pesticide use proposal is submitted into the NPS Pesticide Use Proposal System. Approval comes only after regional and/or national staff consider numerous factors such as the target use,

location where the application would occur, potential threatened/endangered species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, and type of application (e.g., spot spraying). The CONG staff utilizes the NPS-designated recordkeeping system for purchasing, storing, tracking, and maintaining each approved product.

Alternative A––Continue Current Fire Management at CONG (No-action Alternative)

Alternative A would continue using the strategies in the current FMP and other approved environmental documents to do work related to fire management. Wildfire management focused on suppression, prescribed burning in the uplands, limited defensible space work (50 feet), and herbicide use for non-native plants would continue at the park as discussed in detail in the *Elements Common to All Alternatives* section.

The CONG fire staff would utilize their existing FMP strategies, Federal Wildland Fire Management Policy and terminology updates, and continue to use the fire and vegetation management tools approved under the CONG 2004 FMP EA and FONSI—fire suppression, prescribed fire in the uplands, and 50 foot defensible space work for protection of park structures. The NPS would also continue to engage in park management administrative and operational activities available under other environmental documents or through CE(s).

Wildfires would continue to be managed mostly through suppression strategies, which could include a confine/contain approach to be used as a suppression strategy in limited circumstances.

Generally, the park would conduct prescribed burning on approximately 100–1,000 upland acres annually. That goal would be highly variable, depending on a host of factors each year. Prescribed burning would reduce hazardous fuels, and maintain some forest openings and fire-dependent vegetation, but may have limited success in restoring parts of the upland pine communities dominated by dense or mature loblolly pines and other hardwoods. Timing of prescribed burns would occur to best mimic restoration and maintenance of fire adapted ecosystems, balanced with hazard fuel reduction activities. Prescribed burning may utilize ground or aerial ignition techniques—aerial ignition occurs from helicopter mounted ignition devices.

Alternative A represents what would occur if the CONG fire management program continued with the current vegetation/fuels management techniques and wildfire management options. It provides a baseline for comparing and evaluating the impacts to the environment by the action alternatives.

Alternative B––Comprehensive Ecological Restoration and Management Strategies (Proposed Action/Preferred Alternative)

Alternative B would utilize the fire management activities allowed under Alternative A plus provide additional vegetation management activities that would mainly focus on restoring the park uplands. Managing wildfires for multiple objectives, including resource objectives, could also be considered on all wildfires.

Alternative B would allow mastication, mowing and/or manual thinning of brush and trees for ecological restoration in the park uplands, defensible space point protection beyond the 50-foot zone where needed, and development and maintenance of fuel breaks such as along park boundaries. Mastication, which involves mechanical cutting or chopping of small undesirable trees, (i.e. sweetgum in longleaf restoration areas), and brush into chunks, chips, or strips is done via low ground pressure wheeled or tracked equipment operated off road. Mastication would be used on brush or trees up to 6 inches in diameter in select areas to restore the structure of forest stands, which would allow space and time for planting/growth of longleaf pine seedlings and natural restoration of understory grasses and forbs. Overall, the objective would be to gradually thin out dense planted pine plantations, create openings, restore historical forest structure, and increase native plant and wildlife diversity. This would also decrease the likelihood of pine beetle and other forest infestations. Manual thinning could also be completed using hand-operated power equipment (e.g. chainsaws or weed cutters) cutting trees, brush, or grass. Clearcutting, even in the densely planted loblolly pine plantation areas, would not occur under this alternative.

The annual acreage treated mechanically in the park would be approximately 25–200 upland acres. The actual amount of acres treated would depend on many factors including the vegetation condition of the restoration treatment unit, area environmental conditions, funding, available staff, and past treatment history. It is expected that the need for mechanical treatments would decline over time as successful restoration occurs. Following mechanical treatments the ecosystem maintenance would occur mainly by prescribed burning. Overall, there would be an increase of longleaf pine forest and vegetation diversity in the upland areas, but the species composition of the forest stands would vary depending on local soil and vegetation conditions.

The CONG fire staff would coordinate with the resource management staff to develop treatment plans to target undesirable plant species that hinder successful forest restoration. Treatments may include hand-applied herbicide treatments that would accompany mechanical or fire treatments to slow or stop selected vegetation growth (i.e. upland sweetgum) and speed up ecological forest restoration of longleaf pine, other tree species, or help with establishment of grass and herbaceous understory growth. Targeted herbicide techniques include hand or backpack application to specific basal, foliar plant areas, and/or cut stumps.

Basal application would paint or spray all of the lower 12 to 18-inches of the trunk. Cut stump treatments include first cutting the undesirable vegetation near the ground, then applying herbicide to the stump to prevent re-sprouting. Foliar treatments consist of hand and/or backpack spraying herbicide directly onto leaves of small trees and/or vegetation. Particular care would be taken to avoid application to non-target species. The herbicide applied would only wet the foliage but not to the point of runoff and would avoid drift to non-target species. Herbicide application could be modified by the NPS as more effective application techniques are developed.

The annual acreage treated by herbicide as a fuel/vegetation treatment would be approximately 25 acres annually. The need for herbicide treatments could decrease over time in particular treatment units as desired trees grow taller than the competing vegetation, and the units become maintained mostly by prescribed burning. If periodic prescribed burning did not occur and stand maintenance fell behind, then herbicide may have to be utilized in later stages to maintain desired forest conditions.

Selective planting of native trees and plants, such as longleaf and shortleaf pine (*Pinus echinata*) or specific native hardwoods or grasses could also occur under Alternative B to speed up restoration of historical forest vegetation associations. The NPS anticipates planting up to 25 acres annually when a native seedling nursery program is established. Tree shaking machines may be used to help gather seed from remnant native longleaf pine trees found in the park to ensure seedlings come from local genetic stock. This machine would need to be operated off road in the park to access the best seed producing longleaf pines.

This alternative also allows selective prescribed burning in the CONG floodplain. Several locations within the floodplain were developed as agricultural plots (about 125 acres) in the pre-park period and were extensively modified from the native deciduous floodplain forest. Restoration of these altered lands is presently a low park priority, but if/when a plan is developed for restoration, the NPS would consider prescribed burning if it was determined to be an appropriate and feasible restoration tool.

When the wilderness boundary was created in the park, approximately 700 acres of park uplands that have been significantly altered by past logging, agricultural and settlement activities were included in the wilderness. These wilderness lands are immediately adjacent and ecologically identical to the non-wilderness uplands. The NPS realizes that some mechanical work including mastication and handheld motorized equipment combined with prescribed burning and targeted herbicide use may be necessary to assist with forest and ecosystem restoration, both on the wilderness and non-wilderness uplands. Such work in wilderness would only be authorized if performed in accordance with a programmatic or project-specific MRA document.

The NPS has a goal of restoring the historic forest associations and diverse species that occupied the park upland pine flats before human alteration. The use of wheeled/tracked equipment could be considered for all uplands including wilderness (where it is the minimum requirement/minimum tool) during the initial phases of forest restoration activities. Although wheeled/tracked equipment use may be considered and utilized where necessary, the park intends to minimize its use to lessen impacts on wilderness and park natural and cultural resources.

Wildfires caused by lightning ignitions would be managed for multiple objectives, including resource objectives throughout the park, including floodplain areas in the park. The FMP would define the limited circumstances where this would be allowed to prevent threats to adjacent private property and park values. In the floodplains, plentiful surface water, abundant vegetation resistant to burning, and dampness make the area unlikely to sustain large fires during most conditions. The CONG fire staff has utilized confine/contain tactics to suppress fires in the park due to difficult access, firefighter safety, or cost considerations allowed under Federal Wildland Fire Management Policy. These fires were self-limiting and burned out on their own due to environmental factors such as moist conditions, fire resistant vegetation, and natural barriers. Under this alternative, the CONG fire management staff would evaluate specific conditions associated with a particular wildfire (unplanned) ignition to determine the level of management actions needed, and the capability to manage or partially manage the wildfire for multiple objectives without detriment to park values.

What is "wildfire managed for multiple objectives"?

Wildfires are managed for multiple objectives, but some wildfires are also managed for resource objectives that allow all or part of a fire to burn, in certain areas under certain conditions. These fires are unplanned ignitions, managed by qualified personnel, and must have appropriate pre-planning in place. This technique is useful as a management tool for lightning ignitions in natural areas where local values are not threatened. It does not preclude utilizing a full suppression strategy.

The decision process for all wildfires initially involves the on-duty fire manager utilizing fire personnel to immediately gather information on the unplanned ignition. This includes location, expected weather and fire behavior, firefighter and public safety, vegetative fuels, threats and distance to values (agency infrastructure, neighbor properties, natural and cultural resources), previous fire history, fire season severity, available firefighting resources, and other factors.

After this initial assessment, the fire manager consults with resource specialists and management staff and a decision is made whether to manage or suppress the fire. While sounding cumbersome, this process occurs very quickly so there is no delay in initiating firefighter operations. The Superintendent must sign and approve the decision.

Different areas of the same fire can be managed differently in certain cases; for example, one flank of a fire nearing private structures may be suppressed, while another flank burning into the wilderness may be allowed to continue for habitat maintenance and hazard fuel reduction objectives. If conditions are too rigorous or inappropriate, the park could select full suppression as the appropriate response strategy.

Since wildfires including management for resource objectives have not yet been utilized at CONG, the decision process would be developed and formalized in the updated FMPs and other fire operational guidance documents.

The goal of managing wildfires for multiple objectives including resource objectives would be to utilize fire as a natural disturbance process to help restore and maintain fire-dependent plant and wildlife communities; to reduce hazard fuels and to decrease the chance for widespread, uncharacteristically severe wildfires that may impact human and natural values.

To be able to use this management strategy, agencies must include this strategy in their FMPs, provide for firefighter and public safety, address values to be protected and public health issues, be consistent with CONG resource management objectives, and follow environmental laws and regulations.

Estimating the acres to be burned annually by wildfires for resource objectives is not possible due to the uncertainties of ignitions, area of start, constraints on use, weather, staffing, timing, fire behavior, and a host of other issues. The number of acres burned may vary widely by year, but impacts are expected to be minimal in the floodplain and possible in some years in the uplands.

All techniques described above would be utilized under carefully prescribed conditions, plans, and objectives to restore, protect, and enhance the park resource values including wilderness character. These strategies would be incorporated into a new FMP, along with changes in national fire terminology. The strategies would also be incorporated into any future park wilderness planning, including development of a park-wide Wilderness Stewardship Plan. They would be implemented incrementally over the long term. They would also include strategies and mitigations important for sensitive species, historic and cultural sites, adjacent private property, and other park values. Implementation of all activities may be limited by available funding.

Alternative B would provide the greatest flexibility among the alternatives for the park to meet agency requirements and resource management goals and objectives. Specifically, these additional techniques would improve progress towards meeting the management objectives to reduce fuel loads by 50%, overstory tree density by 15–50%, pole-sized tree density by 70%, and increasing longleaf pine seedlings by 200 per acre (NPS 2015a).

Fire Management in the Wilderness

Under this alternative, the park would consider utilizing the ecological restoration techniques described above to restore specific altered areas of upland and floodplain located in the wilderness. All fire management activities affecting wilderness at the park must utilize the MRA concept defined in NPS Reference Manual 41. This planning tool and documentation process is used to determine if administrative activities affecting wilderness resources or the visitor experience are necessary, and if so, identify tools and techniques to minimize impacts. The MRA is applied as a two-step process: (1) it determines whether the proposed fire management action is appropriate or necessary for administration of the area as wilderness and does not pose a significant impact to wilderness resources and character; and (2) it analyzes the techniques and type of equipment needed to ensure that the impacts to wilderness resources and character are minimized (

Figure 2).

Typical fire management procedures and tools related to wilderness would be described in the Congaree FMP and analyzed in a programmatic MRA attached to the FMP (see draft programmatic MRA in Appendix A). The MRA would be done to determine whether or not a proposed management action is appropriate or necessary for administration of the area as wilderness, and whether or not it could pose a significant impact to wilderness resources and character. The programmatic MRA would also provide direction on the techniques and/or types of tools and equipment (minimum tool) that could be used to accomplish project objectives while minimizing impacts to wilderness resources and character. As part of its analysis, the programmatic MRA would specify the circumstances under which those techniques/tools could be used. Projects falling outside the scope of the programmatic MRA would need to be covered by a project-specific document. The Minimum Requirement Concept is not intended to limit choices. It challenges managers to examine every planned management action to determine if it is appropriate and necessary in wilderness and to make the best choice that would least impact wilderness resources and character. The purpose and philosophy of wilderness must be considered when evaluating proposed actions. As noted above, if a proposed treatment was confirmed to be within the framework of the programmatic MRA, the project plan would not have to revisit the decision. However, each project plan would be required to contain an analysis of the minimum methods and techniques necessary to accomplish the specific action with the least negative impact to wilderness character.

In wilderness areas of Congaree National Park, where wildfire has played a role in shaping and maintaining ecological systems, natural fire is considered a fundamental component of the wilderness environment. Given that these ecological systems have been impacted by past human activities, such as logging, agriculture, and fire suppression, active management is necessary to restore the vegetation and fire regime in the Congaree wilderness to a state that more closely approximates what would have naturally occurred. To restore native vegetation structure and species composition and achieve a more natural fire regime, active manipulation is necessary in the short run to enhance the natural quality of wilderness in the long run. The primary resource objective of these fires is to restore and maintain natural fire regimes and ecosystem stability by altering vegetative fuel conditions to within the range of natural variability. Research science and published literature suggest that natural systems in the park can be restored over time with careful reintroduction of wildland fire using both prescribed fire (planned ignitions) and wildfire (unplanned ignitions) managed to achieve resource objectives, supplemented with the limited use of non-fire vegetation treatments. In that regard, Section 6.3.7 of *NPS Management Policies* provides that active intervention in wilderness may be undertaken where necessary to correct past mistakes and the impacts of human use. Furthermore, Section 6.3.9 of *Management Policies* and Director's Order 41, Section 6.7 authorize the use of wildland fire (including prescribed fire) or other fuel treatments in wilderness to reach desired future resource conditions, as established in park planning documents. Additional direction is provided by Section 4.4.1 of *Management Policies*, which directs park units to preserve and restore the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations, and the communities and ecosystems in which they occur.

Fire management strategies that are being proposed in this alternative include hazardous fuel reduction, ecological restoration, and maintenance of natural ecosystem processes. To effectively maintain restore and ecosystems in the wilderness necessary tools include but are not limited to hand tools such as ax, pulaski, cross-cut saw, pruners, and shovels; handheld motorized equipment such as weed eaters, chainsaws, leaf blowers, or similar; and wheeled or tracked equipment such as masticators or brush cutters.

Wildfire suppression equipment that may be used in wilderness includes pumps, chainsaws, motorized handheld equipment and hand tools as listed above, helicopter and fixed wing aircraft, masticators and fire plows. (Note: some of this equipment, including fire plows and aircraft, could only be used if authorized by a project- or incident-specific MRA.) The NPS would minimize the use of heavy equipment, such as fire plows, masticators, and retardant to rare or unusual occasions necessary for specific objectives or when important values-at-risk are threatened. Many of these heavy impact techniques are incompatible with wilderness and park purposes, and are avoided because of their ability to have major impacts on wilderness character. The consideration and utilization of MIST techniques is required. The park would continue to discourage the construction of firelines in wilderness but would rely instead on existing roads, trails, and other natural features inside and outside of wilderness to the extent possible. Flexible management would be practiced by the park staff to update management techniques and the FMP by adopting improved methods as they are developed and evolve over the years, so long as they are within the scope of the EA and the programmatic MRA analysis in the FMP. The programmatic MRA analysis may be updated as long as it is within the scope of the EA.

Under certain circumstances, especially those involving long-duration wildfires, an incident-specific minimum requirements analysis would be required. For large fires or long-duration incidents, fire suppression tactics in wilderness conceivably could include application of foam, water, and/or retardant by ground equipment or aircraft; limited off-road use of engines, hoses and suppression tools; cutting of vegetation in advance of the fire front by tracked or wheeled equipment; and potential use of heavy equipment, such as fireplows or bulldozers. However, in each instance only the minimum tool/technique would be authorized, as directed by the totality of circumstances and consistent with protecting human health and safety. Prior approval by the CONG Superintendent would be required before taking these actions.

While the programmatic MRA process considers planned and likely fire management activities, including likely responses to wildfires, some unanticipated wildfire situations may require the Superintendent to make action decisions without the benefit of an incident specific MRA analysis. However the existing MRA analysis may structure questions and issues that assist the Superintendent in making the best decision at the time within the framework of Federal Wildland Fire Management Policy.

After major wildfires, Burned Area Emergency Actions (BAER) would be considered in consultation with regional office and resource specialists. Any BAER plan that requires actions in the wilderness would be accompanied by an MRA analysis specific to the proposed actions.

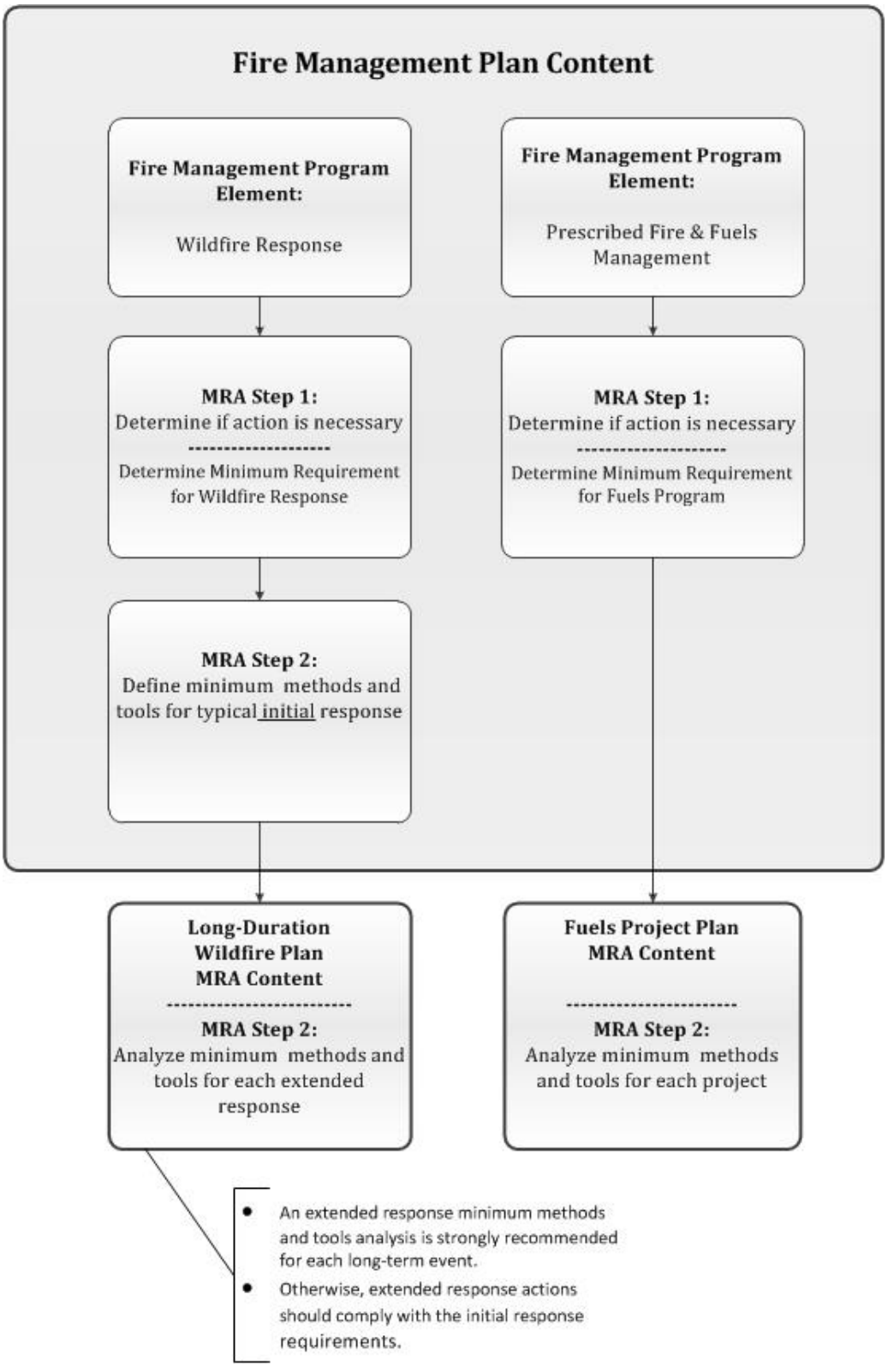

FIGURE 2. MINIMUM REQUIREMENTS ANALYSIS PROCESS

Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Alternative C is similar to Alternative B, except that wheeled/tracked equipment used to create fuel breaks and/or defensible space and forest restoration treatments (mastication of brush and small trees), and tree shaking machines for gathering longleaf pine seeds would not be used in wilderness. See the descriptions above in the Elements Common to All Alternative, Alternative A, and Alternative B sections for more detail on these techniques and activities.

The following fire management strategies that could be used under this alternative would include:

- suppression related activities permitted under Federal Wildland Fire Management Policy;
- management of wildfires for multiple objectives including resource objectives;
- defensible space and fuel break work in non-wilderness areas;
- wheeled/tracked equipment use in non-wilderness uplands for forest/ecological restoration;
- use of handheld motorized equipment use (e.g. weed eaters, chainsaws, hand-held brush cutters, leaf blowers) in support of fire management activities;
- prescribed burning in all areas if ecologically indicated or needed for vegetation community restoration (such as former agricultural plots in the Congaree floodplain in wilderness);
- limited herbicide application using targeted spot spraying by hand application to control invasive, non-native (exotic) plants and/or natives that hinder ecological restoration efforts; and
- the collection of and planting of native tree seedlings, and tree and grass seeds.

The estimated acreages would be similar to Alternative B, except for a slight reduction of wilderness acres restored because of excluding wheeled/tracked equipment for mechanical work. While prescribed burning, planting, and herbicide would be allowed in wilderness under this alternative, use would be reduced since park staff intends to use them in conjunction with mastication by wheeled/tracked equipment; eliminating that use in wilderness would likely lead to reduction of the other activities.

When the wilderness boundary was established in the park, approximately 700 acres of park upland was included in the wilderness that had been significantly altered by past logging, agricultural and settlement activities. These acres include planted areas of dense loblolly, where the closed canopy shades the forest floor preventing native plant and grass growth, and native tree re-establishment. The relatively ecologically sterile environment does not resemble the historic native pine and deciduous forests of South Carolina, and has minimal use by wildlife due to the scarcity of native vegetation food sources and lack of diverse forest vegetation structure. The NPS has a goal of restoring the historic forest associations and diverse array of species that occupied the park uplands before human alteration.

Alternative C would exclude the use of wheeled and tracked equipment and tree shakers in park wilderness. This would cause a temporary degradation of the natural quality of wilderness by forestalling restoration and perpetuating past human disruptions to the system. While this is compatible with the goal of the Wilderness Act to preserve wilderness in an unmanipulated state, the result is that it would likely preserve some human altered, non-native forest conditions and landscapes.

The MRA process would be completed prior to implementing any planned fire/vegetation management actions in park wilderness. The MRA requires NPS managers to determine the necessity for specific administrative actions in wilderness; if the actions are found necessary, then the park staff develops mitigations to protect wilderness character (See NPS RM-41). If the fire/vegetation management actions are found to be appropriate to conserve and protect wilderness resources and values, then the actions will be further analyzed to determine the minimum tools necessary to accomplish the wilderness/forest restoration goals of the action.

All techniques allowed under Alternative C would be utilized under carefully prescribed conditions, plans, and objectives to restore, protect, and enhance the park resource values including wilderness character to the maximum extent possible. These strategies would be incorporated into the new FMP, along with changes in

national fire terminology. The strategies would also be incorporated into future park wilderness planning, including development of a park-wide Wilderness Stewardship Plan. The allowed activities would be implemented incrementally over the long term, allowing species time to adapt and adjust to these human initiated activities. The FMP would also include strategies and mitigations important for sensitive species, historic and cultural sites, adjacent private property, and other park values. Implementation of all activities may be limited by available funding.

Fire Management Actions and Components

Table 1 summarizes alternative actions and CONG fire management program components. While not all listed activities are performed by fire management staff, they are related to vegetation management, which is an activity that has bearing on the fire management program. Additionally, Table 1 highlights the primary differences between the alternatives.

TABLE 1. COMPARISON OF FIRE MANAGEMENT RELATED ACTIVITIES FOR EACH ALTERNATIVE

Fire Management Activities and Program Components	Alternative A (No-Action Alternative)	Alternative B (Proposed Action)	Alternative C (Ecological Strategies minus Wheeled/Tracked Equipment in Wilderness)
Wildfires would continue to be suppressed	X	X	X
Direct and indirect attack and confine/contain strategies could be utilized in suppression.	X	X	X
Wildfires could be fully or partially managed for resource objectives in defined areas under appropriate conditions.		X	X
Wildfire control tactics may include application of foam, water, and/or retardant; off-road use of vehicles with suppression equipment; use of wildland fire engines; vegetation cutting by chainsaws and tracked or wheeled equipment; and potential use of heavy equipment such as fireplows or bulldozers, when approved by the CONG Superintendent.	X	X	
Protection of adjacent private property would be a priority and considered in all phases of fire management.	X	X	X
Minimum Impact Suppression Techniques (MIST) would be utilized whenever possible to protect CONG values.	X	X	X
Park management would use specific MRA process to determine appropriate fire management activities in park wilderness.	X	X	X
Wheeled/tracked equipment would not be considered for use in park wilderness for fuels management work.	X	X	
Mechanical treatments using wheeled/tracked equipment could be considered and used, if approved, for forest restoration and hazard fuel reduction in park wilderness using the MRA process.		X	
Mechanical treatments using wheeled/tracked equipment could be used off road on non-wilderness lands for forest restoration, hazard fuel reduction, and defensible space goals.		X	X
BAER could occur after wildfires.	X	X	X

Fire Management Activities and Program Components	Alternative A (No-Action Alternative)	Alternative B (Proposed Action)	Alternative C (Ecological Strategies minus Wheeled/Tracked Equipment in Wilderness)
Community cooperation and coordination with neighbor and partner agencies would continue.	X	X	X
Prescribed burns could be utilized to achieve identified objectives with approved burn plans.	X	X	X
Prescribed burning could occur in limited circumstances in the Congaree floodplain.		X	X
Planting of native plants, such as longleaf pine, could occur in restoring historical forests.		X	X
Approved herbicides could be used to aid in ecological restoration.		X	X

Mitigation Measures

The following mitigation measures were developed to minimize the degree and/or severity of adverse effects to the park resources and would be implemented with the action alternatives, as needed. The park managers would include these mitigation measures in the new FMP. Many of them would be utilized under any alternative, although their influence may differ depending on which alternative is selected.

Fire Managers would work with the CONG staff and other agencies to ensure that the park operations, natural, cultural, and wilderness concerns are considered in planned projects and wildfires. These mitigation measures are based on best practices balanced with law and agency regulations. They may be updated over time as park management goals change, new science becomes available, new species recovery actions are developed, new cultural sites are identified, and/or better approaches and efficiencies are learned.

The following mitigation measures would help minimize potential effects of the park fire management activities on resources, other values, staff, and the public. They would be incorporated into the new FMP, Wildland Fire Decision Support System (WFDSS), Delegations of Authority, and fire management work as applicable.

General

- For all wildfires and fire management activities CONG fire staff would consider tools, procedures, and equipment that least impact natural and cultural resources, general undeveloped character, and wilderness. Threats to these values would be balanced with safety, fire, and land/resource management objectives. Managers and firefighters would consider Minimum Impact Suppression Techniques (MIST) on all incidents to minimize impacts of fire response operations. These tactics would also be utilized for prescribed fire and vegetation management projects, whenever possible. See page 91, *Incident Response Pocket Guide, January 2014*.
- The CONG fire staff would utilize indirect/confine type strategies as preferred tactics in suppressing and managing most wildfires beyond initial attack. Burnouts can help solidify natural and manmade features as barriers to fire spread. Fire staff would consider slow, less intense burnouts as it is often safer and more efficient, and creates lower intensity fires more characteristic of past historic fires.
- Point protection to protect identified park values would be utilized in all areas.
- Appropriate weather, fuel, fire behavior, fire management, staffing, and social considerations would be developed for managing wildfires where resource objectives could be a primary objective. These considerations would be outlined in the FMP.
- The CONG fire management staff would use fire effects plots, fire behavior monitoring, resource databases and GIS mapping protocols to determine locations of sensitive species, resource values, and important human/infrastructure values. These would help in predicting and evaluating wildfire and project-specific effects, and help develop specific incident/project objectives and mitigations.

- All prescribed burns would have a written and approved prescribed fire burn plan, as required by the *Interagency Prescribed Fire Planning and Implementation Procedures Guide (April 2014)*. The Guide includes resource, safety, and public mitigation considerations that are to be implemented on each project.
- After major wildfires, BAER would be considered in consultation with regional office and resource specialists.
- The NPS Appalachian/Piedmont fire effects monitoring team and the Southeast Coast Inventory and Monitoring network would collaboratively monitor all fire program vegetation management activities (e.g., prescribed fire, mechanical and herbicide treatments, and control areas). Systematic monitoring may occur before and after fuels/vegetation treatments to determine vegetation mortality and progress towards achieving treatment objectives. Such information would ensure that park managers have the information needed for best practices and adaptive management.

Air Quality

- The CONG fire management programs would follow South Carolina smoke and burning regulations. Burn parameters in permits from South Carolina Forestry Commission would be followed.
- The air quality monitoring station at the park would be protected from wildfire damage; NPS coordination with the state would occur if park projects are occurring that might impact readings.
- Fire staff would utilize the park's public and neighbor notification procedures for all prescribed burns and wildfires, focusing on residents and activities that might be impacted. Known sensitive receptors would be specifically notified in advance by NPS staff.
- Smoke management tools, such as modeling programs, would be utilized before prescribed fires and wildfires managed for resource objectives to determine predicted smoke paths and effects. Smoke transport winds would be regularly assessed by prescribed fire and wildfire managers to determine impacts to sensitive receptors, travel and transportation corridors, (including aircraft and boats), and populated areas. Coordination would be accelerated with appropriate federal, state and local agencies.
- Signage, closure, and escorted travel would be considered/coordinated with appropriate state and local agencies if smoke were expected to impact roadways.
- When possible, prescribed burns would be conducted when fuel moistures are relatively low to provide better combustion and less residual burning, and better transport and lofting of smoke. Timing and methods of ignition on prescribed burns would be regularly assessed and reviewed to help minimize smoke impacts. Accelerated mop-up would be used where possible to minimize smoldering.

Soils

- Natural and manmade features (such as roads, trails, rivers, ponds, pre-existing firelines), or vegetation change barriers would be utilized whenever possible for wildland fire control lines to minimize the need for line construction and vegetation cutting. This would minimize disturbance (e.g., soils, habitat, cultural sites, vegetation) by mechanical or hand line construction.
- Where constructed firelines are necessary, they would be built to the minimum depth and width needed for safe control operations for both prescribed fire and wildfires. Light scraping would minimize ground disturbance. Hand lines should blend with natural features to the extent possible.
- If constructed, firelines would be rehabilitated as soon as possible after fires are out to prevent erosion, other impacts, and negative visual effects. Hand line disturbances should be pulled back over themselves or covered with brush cut as part of the operation.
- Firelines on the park boundary or park boundary fuel breaks are considered park infrastructure; they are used to prevent fires from leaving/entering the park and as prescribed fire control lines. They may be maintained in place with full considerations to minimizing soil, environmental, and visual impacts.
- Fire staff would utilize water, pumps, and hose lines when possible for wetlines or to back-up smaller firelines, to minimize the amount of fireline construction and habitat disturbance.
- If equipment is authorized by the Superintendent to be taken off road, resource advisors (READs) will advise equipment operators on techniques to minimize soil and vegetation disturbance, compaction, and displacement. Turning of equipment causes the most damage, so

work would be planned to minimize turning. Untrained or new operators may be accompanied by more experienced operators or READs to recommend low-impact techniques.
- Prescribed fire and wildfire suppression burnouts would avoid widespread, intense, and long-duration surface burning if possible to prevent soil damage and erosion.

Water Resources/Floodplains

- If aviation resources are utilized, water would be the agent used for aviation drops on CONG wildland fires to minimize contamination of surface waters. Use of foam or fire retardant drops must have Superintendent approval before use, and is usually not considered unless life or major property loss appears inevitable.
- Helicopters and air tankers would be required to pre-wash their helicopter buckets/tanks in a disinfectant solution before use to prevent potential transfer of exotic organisms.
- Helicopter dip sites must be approved by the park before use.
- If pumps are utilized on wildland fire operations, appropriate containment systems would be employed to prevent leaks of gas, oil or other fluids.
- When considering use of mobile motorized equipment (tracked or wheeled vehicles), equipment with fluid leaks would not be utilized. Refueling, filling, or mixing of gas and other fluids would be avoided in sensitive areas and near surface waters.
- No dozers or tractor plows would be used in the park without Superintendent Approval. If equipment is authorized, stream or water crossings would be minimized. If necessary, crossings or damages will be promptly restored and rehabilitated in consultation with resource specialists.
- Staff utilizing herbicide would be trained in accordance with park integrated pest management policies and procedures related to approved handling, storage, transportation, mixing, spill prevention, and application procedures.
- Widespread high-severity fire will be avoided when possible in prescribed fires and wildfire suppression activities.
- READs would advise fire operation responses and tactics considering the impacts on lakes, creeks, guts, and sloughs from ash, sediment and nutrient loading resulting from fire, and from consumption of plants by fire in wetland communities.

Biological including fish, wildlife, plants, exotic species and special status species

- All appropriate endangered species consultations would be completed prior to any planned fire management activity. Appropriate consultations would be initiated during emergency fire operations.
- Upon notification of a wildfire, CONG resource staff/READs would examine maps and information resources to assess and discuss potential wildlife/habitat/cultural effects; they would then advise fire managers on protection of wildlife/habitat/cultural values.
- When planning, and before initiating treatments or prescribed burns, CONG resource/wildlife specialists would be consulted to determine presence of and effects on sensitive species. Specific mitigation actions would be developed to minimize impacts on species of concern.
- The park WFDSS objectives and management requirements would be developed to guide firefighters in protecting sensitive species or habitats from wildfire management impacts.
- Project work, such as mastication, mowing, and brush cutting equipment use may be curtailed in some areas during sensitive wildlife breeding seasons.
- Firing patterns on prescribed burns would be considered that allow escape routes for wildlife.
- Low-level hovering and flights by helicopters would be minimized to lower the risk of bird collisions and protection of wilderness character.
- If new T&E or sensitive species are identified at the park, park management would consult with local specialists and fire managers with the latest science or understanding of those species. Fire/Resource Management staff would develop best fire management practices related to that species or habitat, and then add new information to the FMP with the goal of keeping fire management activities operational for the good of fire-dependent species and habitat. Fire/Resource Management staff would consult

with appropriate wildlife management agencies to get recommendations/keep them abreast of the park's efforts.

- Chainsaw work involving bucking and felling of live and dead large, mature trees would be minimized to what is needed for firefighter safety, public safety, or necessary fire control operations.
- Identified Champion Trees would be protected from fire or fire suppression impacts when possible.
- In stands of older, larger upland pines, management would consider vegetation/fuels work that reduces risk of high-intensity, stand-replacing fire. The goal would be to develop historical forest structure and openings resembling historical forests/Red-cockaded Woodpecker (RCW) habitat.
- Prescribed burn prescriptions would consider pre-burn habitat evaluations for increasing/improving potential RCW habitat.
- Management would ensure that fire suppression personnel consider low-intensity burnouts for wildfires in mature pine areas to increase/protect possible RCW habitat.
- Carolina bogmint (*Macbridea caroliniana*), which grows in the wilderness floodplain area, will be protected from wildfires until it is determined if it is a fire adapted species or additional populations are discovered.
- Additional species-specific fire management measures and considerations would be developed and added to the FMP as resource specialists coordinate with fire managers.

- **Non-Native Species (exotic plant or animal)**
    - Prescribed fire, wildfire management, and non-fire treatments would be utilized to support exotic plant and animal control efforts, restore and maintain native plant communities, and reduce hazard fuel accumulations.
    - Vegetation would be removed, cut or manipulated along firelines to the minimum width necessary to minimize disturbances that often promote invasive species.
    - Managing wildfires for resource objectives may be rejected during intense drought/extreme fire risk periods to avoid high-severity, stand-replacing fire behavior beyond the natural range of variation that may create habitat opportunities for invasive species.
    - Mowing or mastication may be utilized for firelines to avoid scraping or exposing soils, providing fewer soil disturbance opportunities for establishment of invasive plants.
    - The park would develop equipment washing (weed washing) procedures in their FMP to minimize the spread of exotic vegetation/seeds when equipment from outside the park, or returning to the park, is utilized.
    - Fire staff would rehabilitate firelines immediately after fires are out to prevent erosion, visual effects, and prevent establishment of invasive plants.
    - Fire and resource specialists would do post-wildfire, post-treatment monitoring to check for establishment of new invasive species populations. If found, they would develop specific invasive control/treatment plans as necessary.
    - Prescribed fire would usually utilize prescriptions that minimize widespread, intense, and long-duration surface burning of soils to prevent opportunities for invasive plant species establishment.
    - Staff would monitor recently burned areas for feral hog use; if such areas are found, the park may have to alter its trapping program to protect native seedling growth and prevent soil disturbance in these areas.
    - Off-road equipment operators would be trained or supervised to minimize soil and vegetation disturbance, compaction, and displacement.

Wilderness

- For all park fire management activities in wilderness, the MRA process would be used to help determine the appropriate action in wilderness, its impacts, and any site-specific mitigation measures. See NPS Reference Manual 41, "Wilderness Minimum Requirements for Wildland Fire."
- General MRA procedures and guidance in the CONG FMP would list typical tools, procedures, and methods to be utilized during initial responses to wildfires, as identified in the Minimum Requirements Decision Guide.

- Consideration for sound impacts in wilderness produced by park fire/vegetation management activities will occur in the FMP MRA analysis.
- When wilderness is impacted by a long-duration wildfire (one that would last for more than a couple of operational periods), the CONG FMP would outline how incident planning would consider tools and techniques that may be less intrusive than those used during the initial response period.
- Prior to a proposed park fire management project or to restoration activities in wilderness, the MRA process would be utilized. Specific wilderness considerations would be developed for wilderness projects.
- Firefighters would emphasize and rigorously utilize MIST in wilderness.
- Firefighter tactics and actions in wilderness would be selected that minimize wilderness-related rehabilitation requirements.
- Natural or manmade features or vegetation change barriers would be utilized whenever possible for wilderness fire control lines to minimize the need for fireline construction and to minimize vegetation cutting in wilderness. Indirect/confine type strategies would be the preferred strategy for most wilderness wildfires.
- For wildfires in wilderness, wilderness character would be given more weight than efficiency and convenience.
- Prescribed fire may be considered in wilderness to mimic natural fire ecosystem needs and address the buildup of hazardous fuels. First-entry wildfire for resource objectives under high-energy conditions would be avoided if it could lead to widespread stand replacing, high-severity fire beyond the natural range of variation.
- Off-road vehicle (ORV) use on trails or abandoned roads in wilderness must be pre-approved by the Superintendent via an MRA; this will be considered only for critical needs, not just "fire patrol" use.

Cultural/Historic Resources

- Staff would utilize databases to identify known cultural sites in advance of wildfires, prescribed fire, or fuels treatment activities whenever possible in order to consider avoidance and mitigation strategies. Since wildfire has occurred regularly in the park ecosystem for centuries, many cultural sites have had fires burn through them many times. The greater risk may be from firefighter actions than from wildfire.
- The Cultural Site list in the 2004 FMP would be updated to include newly documented sites with their planned protective mitigation actions.
- The park would educate fire personnel about the significance of cultural sites, how to identify obvious sites, and appropriate actions and notifications to be made if new sites are encountered.
- Firelines and ground disturbance would be avoided in identified cultural site areas.
- If cultural resources are identified while digging firelines, the READ and Chief of Resource Management would be notified immediately and appropriate protective measures would be taken. The fireline would be relocated to an area with no cultural resources.
- If previously unknown archeological resources were discovered, ground disturbance would be stopped in the area of any discovery, protective measures would be implemented, and procedures outlined in 36 *Code of Federal Regulations* Part 800 would be followed, as applicable. Associated tribes and the South Carolina State Historic Preservation Officer would be notified of the discovery. Resources would be evaluated for their National Register of Historic Places significance, and adequate mitigation of project impacts (in consultation with appropriate agencies) and adjustment of the project design would take place to avoid or limit the adverse effects on resources.
- In collaboration with cultural resource specialists, fire staff would utilize defensive and protection tactics to prevent damage to historic, cultural, archeological, and ethnographic sites.
- When prescribed burns occur within or near archeologic/historic site areas, the mitigations will be documented and updated in park records to help evaluate protection effectiveness over time. The recorded mitigations would also be immediately available for reference if wildfires occurred in that area.

Human Health/Safety and Visitor Use and Experience

- The park would continually emphasize the safety to fire and park staff, and the public as the highest priority in all fire management activities. Safety sometimes drives fire-related decisions.
- The park would develop/utilize a public evacuation plan that would include processes to evacuate recreational users from backcountry areas and campgrounds. Visitors that may be in the path of a wildfire would be located and escorted out of the risk area.
- Initial attack staff would determine the proximity of wildfires to visitors, adjacent landowners, and communities. They would coordinate with rangers/law enforcement staff and local agencies to inform them of the potential hazard and evacuate as necessary.
- The park would monitor fuel, weather, and fire condition parameters and may limit public access and activities when extreme conditions develop, as designated in Preparedness Level planning (included in the FMP). The Superintendent may authorize temporary closure of risk areas to public and visitors as necessary.
- To prevent exposure to hazards where fire/vegetation management activities are underway, visitors would be kept out of the immediate vicinity of mastication, tree falling, low-level aviation operations, prescribed fires, and other special equipment use.
- The park neighbors, visitors, local residents, and adjacent communities would be notified of all fire management activities that have the potential to impact them.
- Fire staff would ensure public notification procedures occur for all park prescribed burns. For long duration wildfires, regular media releases would inform locals and visitors about the expected impacts of the fire, especially related to smoke and closures or restrictions. Signs or notices may be posted at appropriate places to inform incoming visitors and recreational users of the fire situation.
- The CONG fire program outreach, interpretive and media releases would continue to emphasize the importance of fire processes to the local ecosystem and would promote the long-term benefits of fire to fire-dependent species, wildlife, recreation activities, and related local economies.
- As burned areas are opened to visitors after a fire, signs would be posted informing the public of potential hazards in the burned areas, (snags, stump holes, etc.).
- Chainsaw use would be minimized along trails and adjacent to developed areas. Stumps would be flush cut; butt ends of logs would be turned away from trails and public areas.

Alternatives Considered and Dismissed

The NPS considered multiple alternatives for project implementation; the following were dismissed from further analysis. These alternatives were determined not to meet park fire management goals or the program purpose and need, and were thus not analyzed in this EA. Descriptions of the dismissed alternatives and reasons for their dismissal are provided below.

Alternative 1 was similar to Alternative B, except that no wheeled/tracked equipment would be used off road in forest restoration efforts or to create fuel breaks and/or defensible space. This means that large mechanized equipment such as masticators, off-road vehicles, wheeled, or tracked vehicles would not be used off-road, trails, or existing fuel breaks for fuel or ecological restoration activities anywhere in the park.

This alternative proposed using wheeled/tracked equipment to create fuel breaks, defensible space, and ecological restoration efforts only on existing roads and trails in all areas of the park. Since many of these activities must occur off roadways, it means that they would not be accomplished. This meant that mechanized equipment such as masticators, mowers, off-road vehicles (ATVs, UTVs), wheeled, or tracked vehicles would not be used by the NPS off-roads or trails anywhere in the park, even outside designated wilderness. This alternative was presented as a possible alternative in the scoping brochure and at the public scoping meetings. There was almost no interest in this alternative or discussion of it at the meetings or in public comments.

The NPS determined that this alternative would likely hinder accomplishment of existing park goals and maintenance functions outside wilderness. This alternative would prohibit mowing in various developed areas (e.g. campgrounds), restoration work on recently purchased park lands, preparation of fire defensible space around park infrastructure, trail maintenance, search and rescue, prescribed burning allowed under the 2004

FMP, use of a tree shaker machine to gather native longleaf pine seeds for forest restoration, and reduce effectiveness of wildfire suppression responses outside wilderness. The park already limits NPS administrative off-road equipment use in the park and would continue to limit equipment off-road use to essential management operations. This alternative was dismissed because it would prevent accomplishment of existing park management objectives, reduce visitor use and enjoyment, and hinder park protection efforts.

Alternative 2 proposed to utilize wildfire suppression as the only vegetation management and protection strategy in the park. Wildfires would not be managed for resource objectives. Prescribed burning and vegetation management for hazard fuel reduction and ecological restoration would not occur.

This alternative was dismissed due to safety and risk issues, and failure to meet the park fire management goals. Initial attack success would not increase, as there would not be an increase in fire staff and firefighting resources to take only suppression actions. A larger firefighter staff, more equipment, more facilities, and more aerial support would be required to depend solely on wildfire suppression responses. Funding for these increases would be extremely unlikely given the park's modest fire occurrence history.

A 100% suppression response might lead to fewer acres burned initially by wildfire; however, this would result in more unburned acres annually, which would over time contribute to the buildup of hazardous fuels and create an overall increase in wildfire risk. There would be no fuels management, prescribed burning or mechanical treatments to treat acres, which would also contribute to a net increase in hazardous fuels. This would reduce the health and vigor of fire dependent ecosystems that need periodic burning.

Over time, this would lead to more severe, high-intensity wildfires that would be difficult to control and would likely result in loss of critical ecosystem components, infrastructure, and private property. Aggressive suppression response is already allowed at the park under Federal Wildland Fire Management Policy and the 2004 FMP, so restricting agency response to this as the primary response and fuels management tool would not contribute to meeting the park management goals and objectives. Consequently, this alternative was dismissed.

Alternative 3 would use all the tools and strategies in Alternative B, but would not allow mechanical equipment of any kind to be used in park wilderness, even in emergencies. This would include no chainsaws, leaf blowers, fire suppression water pumps, weed eaters, ATVs/UTVs, masticators, or similar mechanical equipment. This alternative would not protect wilderness values as it would allow an increase of hazardous fuel loads in the wilderness. Over time this could lead to severe and intense fires, which would be difficult to control, likely resulting in loss of critical ecosystem components, infrastructure, and private property. Additionally, this alternative would prevent reasonable maintenance of the park boardwalks and trails, some search and rescue considered necessary to save human lives, and effective suppression of wildfires that could damage fundamental park values. The park already uses the wilderness MRA process to carefully consider and minimize all incompatible wilderness use. This alternative was dismissed because it would not contribute to meeting resource management goals and objectives or protect wilderness values.

Alternative 4 would use all the tools and strategies in Alternative B, but prescribed burning could only occur during the vegetation dormant season (winter) to protect nesting birds during breeding seasons. While burning during the non-nesting season would likely protect some nesting birds, it would over time alter fire evolved upland ecosystems. This might benefit some bird species, but would be detrimental to many native birds and other fire-dependent species that have evolved with regular, natural fire frequency. The NPS will continue to develop and implement mitigations for this issue, but felt restricting prescribed burning to dormant (winter) burning had too many negative effects. The NPS plans to rotate prescribed burning and limit the annual acreage burned in the park, which creates a mosaic of suitable habitat for all species across the park. Limiting the NPS to winter burning would not meet NPS ecosystem management objectives and would degrade habitat quality and amount of available habitat for fire-dependent bird species. Thus, it was dismissed as an alternative.

Alternative 5 would use all the tools and strategies in Alternative B, and would add the utilization of mechanical logging equipment for thinning and forest stand restoration where needed, utilizing the profit from timber sales to help further the restoration program. The staff felt that the ground disturbance from logging activities would be too intense to be appropriately mitigated in this NPS area. While some limited thinning

might be allowed under Alternative B, logging and clearcutting for commercial profit was considered an unacceptable practice at the park and thus was dismissed.

Alternative 6 proposed to utilize goat grazing to achieve thinning, vegetation restoration, and hazard fuel reduction. While grazing may reduce palatable grazing vegetation species in accessible areas, grazing would not reduce many woody vegetation species that are contributors to hazardous fuels, thus the fire hazard reduction would be site-specific and not widespread. Grazing would not reduce larger saplings and crowded plantation trees, which are an issue in the park's forest restoration objectives. Grazing at any level would require additional resources such as staff for issuing permits, management of grazing, and fence and infrastructure installation; such funding and staff increases are unlikely. Grazing would be likely to introduce additional exotic invasive plants into the park habitats, already a park problem from historic grazing and agricultural practices. Grazing would have profound negative impacts on park wildlife and plant species management. Widespread goat grazing would create negative habitat and watershed effects, which is not compatible with the park management objectives and various management plans, thus this alternative was dismissed.

Alternative 7 proposed to utilize wildfire managed for resource objectives as the primary tool to achieve CONG landscape and resource objectives. This alternative was dismissed because treating fuels by wildfire primarily depends on random natural ignitions, many of which do not occur in a small park such as the park at the appropriate times and places. Existing hazardous fuels, some adjacent to private and government infrastructure, could continue to accumulate increasing the risk to park facilities and adjacent private property by high-severity wildfires over time. The lack of planned vegetation management could cause fuels to build up in critical areas and eventually result in uncontrollable, intense fires that would be difficult to suppress. This alternative compromises human safety of firefighters, residents, landowners, and visitors by using wildfires to manage all hazardous fuels, without the options of utilizing other treatment methods. This alternative would not serve the resource management needs of the park to protect wilderness and other park values and could result in loss of critical ecosystem components, infrastructure, and private property. It would not meet the park fire management goals, thus this alternative was dismissed.

Alternative 8 proposed to not utilize prescribed fire as a management tool; this was rejected as it does not allow any ecosystem restoration/maintenance burning or protect infrastructure or road corridors, and did not meet other fire management goals. It conflicts with NPS management objectives. It would allow the continued build-up of hazardous vegetation/fuels, which over time could lead to severe and intense wildfires that would be difficult to control. Severe and intense wildfires would likely result in loss of critical ecosystem components, infrastructure, and private property. Thus, this alternative was dismissed.

Affected Environment and Environmental Consequences

This section describes the affected environment and environmental consequences within the project area as they relate to the implementation of the proposed alternatives as described in the Alternatives Chapter. This EA analyzes both beneficial and adverse impacts that could result from implementing the alternatives considered. This chapter is organized by the impact topics presented in the Purpose and Need for Action Chapter.

Methodology for Analyzing Impacts

In accordance with Council on Environmental Quality regulations, direct, indirect, and cumulative impacts are described (40 CFR 1502.16). General definitions for potential impacts are described as follows:

Direct: An effect that is caused by a proposed action and occurs in the same time and place of implementation (40 CFR 1508.8).

Indirect: An effect that is caused by a proposed action but is later in time or farther removed in distance from the action (40 CFR 1508.8).

Cumulative Impacts Analysis

As defined by NEPA regulations (40 CFR 1508.7), "Cumulative impacts result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Cumulative impacts are considered for both alternatives.

Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Past, present, and reasonably foreseeable actions that could contribute to cumulative impacts include:

- Continued rural development of the Richland County area near CONG that results in conversion of rural and undeveloped lands to more intense human uses.
- Continued harvest of timber in the Richland County area near CONG with attendant forestry practices such as prescribed burning and planting.
- Feral hog management
- Fire management activities in adjacent private lands.

Climate Change

Climate change is affecting forest structure, composition, function, and ecosystem processes in the eastern United States. Increased temperatures, pollution, non-native insect pests, disease, and invasive plants are all contributing to altering ecosystem processes and forest structure and composition (Grimm et al. 2013, Fisichelli et al. 2014). A recent analysis at the park shows climatic conditions are already shifting faster than projected rates, especially under low greenhouse gas emission scenarios (Fisichelli et al. 2014). Climate change is affecting all aspects of park management from natural and cultural resources to park visitation (Fisichelli et al. 2014, NPS 2015b).

Based on the current information available for climate change and associated vegetation changes, and the complex and uncertain interactions between climate change, non-native biotic stressors, and vegetation, climate change models have been developed that predict how park resources may change based on the predicted change of temperature and precipitation in the future compared to the baseline conditions. For example, changes in forest structure, composition, and function could affect habitat suitability, degrading or eliminating habitat for some species in the park. Increased temperature could correlate to a drier landscape in the park, resulting in decreased water availability of both surface and groundwater, with resultant impacts on aquatic and wetland environments.

There are potential future changes in plant communities from predicted climate change, as individual plant species respond to large and small-scale changes in temperature and precipitation, fertilizing effect of increased carbon dioxide, and changing patterns of inter-specific competition (Shafer et al. 2001). The spread of non-native plant species could be accelerated in response to future climate changes, particularly in those areas where native plant species are unable to adapt to the climate changes (DeVivo et al. 2008). In the park, potential forest change in tree species was projected to be 45–55% by 2100 with a 45–58% uncertainty in forest change projections (Fisichelli et al. 2014). Habitat suitability for some individual tree species in the park had mixed results from no change to large decrease or increase depending on the greenhouse gas emissions scenario (Fisichelli et al. 2014).

It is important to note that climate change and sea level rise is not an exact science with various future scenarios having been developed and modeled in an attempt to quantify future climate change (Solomon et al. 2007, Fisichelli et al. 2014). Annual temperatures predicted for the park are predicted to increase from 1.8 to 6.1 degrees Celsius in 2070–2099 compared to the baseline (1961–1990; Fisichelli et al. 2014). Precipitation is predicted to increase from 4.2% to 19.3% by 2070–2099 compared to 47.2 inches of annual precipitation in baseline (Fisichelli et al. 2014).

However, alternatives that improve natural resources resiliency (i.e., hazardous fuel reduction and vegetation management) (Alternatives B and C) would be expected to provide more beneficial impacts than alternatives that improve natural resources to a lesser degree. Currently, the models are not sufficiently precise to address potential impacts of climate change over the short duration of the planning period and the small scale of the project area. Many national studies indicate sea level rise and temperature rise are inevitable; it is just the quantitative numbers that model differently. Therefore, these effects are not analyzed in detail in this EA.

Air Quality

Affected Environment

The park was classified as a Class II area under the 1977 amendments to the Clean Air Act (42 U.S.C. 7401 et seq.). Class II areas are allowed to increase emissions of particulate matter. Sulfur dioxide, nitrogen, and nitrogen dioxide are allowed beyond the baseline concentrations as long as the National Ambient Air Quality Standards established by the Environmental Protection Agency are not exceeded. Data collected and analyzed by the Southeast Coast Inventory and Monitoring Network from 2005 to 2009 show visibility, total-Nitrogen wet deposition and total-Sulphur deposition as significant concerns and ozone levels as a moderate concern (NPS 2013b). The park is currently within a designated attainment area, meaning that the park is in compliance with National Ambient Air Quality Standards for criteria pollutants.

Prescribed fires for forestry, wildlife management, or agricultural practices are required by state law to notify the South Carolina Forestry Commission prior to burning. The notification would identify the location, size, and purpose of the prescribed burn, as well as distance to smoke sensitive areas. South Carolina limits the amount of smoke injected into South Carolina air basins to prevent major air quality deterioration; because of the proximity to urban Columbia, the South Carolina Forestry Commission pays particular attention to burns occurring in the Columbia area. All prescribed burns in the park would comply with the State Smoke Management Guidelines and CONG Action Plan for Smoke on the Highway (when applicable). In addition, prescribed burn plans would include mitigation measures to minimize impacts on public safety when winds have the potential to carry significant smoke that could impact traffic corridors, communities, and visitor safety.

Analysis of Alternatives and Impacts on Air Quality

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

The CONG fire program would continue to coordinate prescribed fire activities under their 2004 FMP and federal wildland fire policies. Each prescribed burn plan would include expected smoke trajectory maps and identify smoke-sensitive areas. Fire weather forecasts would be used to coordinate ignitions with periods of

optimal combustion and smoke dispersal. Mitigation measures would be defined in the burn plan. Arrangements would be made prior to ignition to ensure that designated fire resources are available if needed to implement the mitigation measures. Prescribed fires would not be allowed when atmospheric conditions exist that could permit air quality degradation to the degree that negatively affects public health for an extended period of time (federal and state air quality standards would be the basis for this decision). Prescribed fire smoke situations that threaten smoke-sensitive areas in a significant way may trigger suppression and/or mitigation measures that terminate the prescribed fire.

Wildfires are not planned around favorable weather conditions that would allow for dispersion and transport of smoke away from sensitive receptors (i.e., private residents, waterways). Wildfires could affect air quality and visibility within the park and the surrounding area, depending on the fire location, size, fuel type (trees, shrubs), and wind direction. If needed aggressive suppression strategies would be implemented to reduce air quality impacts.

Impacts to air quality from particulate matter (ash) and smoke emissions from wildland fires may temporarily exceed air quality standards within and adjacent to the burn area. Fugitive dust generated from fire suppression activities and increased vehicle traffic associated with fire crews would temporarily affect air quality, but would be limited in scale to where the suppression activities were occurring. During and immediately following a wildland fire, smoke, particulate matter, and dust emission would impact visibility within the park and the surrounding area. However, fire management activities would reduce the potential for future intense wildfires, which produce large particulate matter loads into the air that could degrade the air quality and visibility.

The number of acres successfully restored in native vegetation communities, including fire-dependent longleaf pine would be reduced. Portions of forest stands would maintain dense mature stands with thick mid-story shrubs and brush, which could result in increased risk for localized, intense wildfires. The increased risk for intense wildfires due to the likely increased hazardous fuel loadings could increase smoke and visibility impacts.

Cumulative Impacts

Wildland fires on adjacent lands (private properties, including agricultural burning), traffic within and outside the park (vehicles, boats), commercial logging operations, and the potential for private development near the park contribute to cumulative impacts on air quality. Wildfires in the park have been infrequent and short in duration, negligibly contributing to adverse cumulative impacts. Alternative A would contribute negligibly to adverse cumulative impacts on air quality as most air quality impacts are from other sources.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts would be similar as described for Alternative A for wildland fires and fire management responses, including emission of air pollutants from the operation of mechanical equipment and the operation of vehicles for fire management activities. Under Alternative B, the increased use of mechanical work would temporarily impact air quality until the treatment was completed due to air pollutants from internal combustion powered equipment and gasoline emissions from equipment and vehicles.

Wildfires managed for multiple objectives including resource objectives over time would treat more acres and help to reduce hazardous fuel loads. The ability to include resource objectives in wildfire management and mechanical work in combination with targeted herbicide and longleaf planting could lead to a greater reduction of hazardous fuels compared to Alternative A. Over time this would increase the likelihood of localized, low intensity surface fires thus reducing emissions and fire effects to air quality. Alternative B is not likely to lead to burning of more areas by wildfires as most wildfires in the park have been small in size and burned out on their own due to the moist conditions, fire resistant vegetation, and natural barriers (water bodies), thus not producing large amount of smoke. The use of wildfire to benefit resources would accomplish specific resource management objectives through processes outlined in the FMP.

Targeted herbicide use could result in herbicide in the air temporarily within the treatment area due to spray drift and volatilization (evaporation of liquid to gas). Implementing mitigation measures and the minimal use of herbicide treatments would reduce the potential for drift into non-target areas and the amount released into the air through volatilization. Airborne herbicide risks have been documented as insignificant in smoke, even when prescribed fires are applied immediately after herbicide application (McMahon and Bush 1991, Bush et al. 1998).

Cumulative Impacts

Adverse cumulative impacts would be similar as described for Alternative A. Alternative B would contribute negligibly to cumulative impacts on air quality as most air quality impacts are from other sources and more hazardous fuels would be reduced, likely leading to lower intensity and less wildfire emissions.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Impacts to air quality would be similar as described under Alternative B. However, the wilderness upland pine forests (about 700 acres) would remain as dense, mature stands with increased risk for pine beetle infestations and attendant increase of hazardous fuels as woody debris and dead trees. The increase of hazardous fuel conditions could lead to high intensity wildfires that could produce a large amount of particulate matter, reducing the air quality and visibility within the burn area and surrounding lands. The degree of impacts would vary depending on size of the fire, fire behavior, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Cumulative impacts to air quality would be the same as Alternative B with negligible contributions to cumulative impacts as most air quality impacts are from other sources.

Soils

Affected Environment

The soils in the park are comprised of rich, fine textured alluviums as deep as 10 feet or more in places. The soils along the streams and floodplains are primarily loams. Soils along the low northern bluffs are silty clay, silt loams, and loams. Throughout the floodplain there are silt loam, loam, and muck, a peat. All of these soils are poorly drained with slow runoff and permeability and are moist most of the time due to the frequent flood events. The upland areas contain primarily fine sandy loams that are moderately well drained with medium runoff and slow permeability. The upland areas also include silt loam soils that are poorly drained with slow to very slow runoff and permeability.

Analysis of Alternatives and Impacts on Soils

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

Continuing to use prescribed fires to reduce hazardous fuel loads, increases the likelihood of localized, lower intensity ground wildfires. Lower-intensity wildland fires would release nutrients and minerals into the soil, which stimulates seed production and helps to perpetuate fire-dependent vegetation communities including the longleaf pine community (Neary et al. 2005, Rau et al. 2007). In addition to recycling nutrients back into the soils, raising pH, and increasing minerals and salt concentrations in the soil, the ash, charcoal, and vegetation residue resulting from incomplete combustion aids in soil buildup and soil enrichment by adding organic matter to the soil profile. The added material works in combination with living and dead and dying root systems to make the soil more porous, better able to retain water, and less compact while increasing needed sites and surface areas for essential microorganisms, mycorrhizae, and roots (Vogl 1979, Wright and Bailey 1982). Following a wildland fire, wind and water erosion may increase temporarily until revegetation occurs.

A prescribed fire that exceeds burn prescription and burns "hot" or an intense wildfire could result in the loss of regenerative plant tissues in the soils (Brown and Smith 2000). However, fire management personnel would contain and/or suppress out-of-prescription prescribed fires, reducing the potential for, and effects of, any large areas of high-burn severity prescribed fires. Impacts to soils in the floodplain are expected to be minimal as soils have high moisture content most of the year due to the frequency of flooding. During dry conditions, an intense wildfire could damage organic soils in the floodplain or upland. However, wildfires would be suppressed when possible during drought conditions to minimize impacts to organic soils in the floodplains.

Using prescribed fire as the primary vegetation/fuels management tool on a frequent rotation has had beneficial impacts on portions of the upland pine forests, which includes the remaining longleaf pine communities. Beneficial impacts include reduction of hazardous fuels, increased cover of grass and herbaceous layers, decreased density of some forest stands, and increased forest openings. The decreased density of forest stands and the creation of some forest openings have reduced the competition for longleaf pine seedlings and could continue to improve the health and vigor of the longleaf pine forest. However, areas in the upland pine forest with mature, dense loblolly pine and hardwoods (i.e., sweetgums) would maintain the thick canopy cover as prescribed fire is not efficient in thinning these mature trees or preventing multiple resprouts of hardwoods. The perpetuation of these forest stands would increase the risk for pine beetle infestation, which could increase the hazardous fuel load from dead standing or fallen trees. These fuel conditions would increase the possibility for intense wildfires in these areas, which could lead to increased soil erosion from the loss of vegetation.

Wildland fire suppression actions such as constructed firelines and the use of vehicles could compact soils and cause erosion. Minimum impact suppression tactics (e.g., select procedures, tools, and equipment that least impacts the environment, such as use of water diversion devices on firelines to reduce erosion risk, re-contour area) would be used to reduce suppression action impacts.

Cumulative Impacts

Cumulative impacts to soil resources from other activities include continued maintenance and construction activities within the park, continued growth in Richland County, particularly construction development, which could contribute to the overall disturbance and loss of soils in the greater area, and wildland fires originating from adjacent lands (e.g., private agricultural burning, other landowner prescribed burns). The contribution of Alternative A to cumulative impacts on soils would be negligible as impacts to soils would be distributed throughout the park burn units, rather than being concentrated to one large area or conducted all at one time, thus minimizing adverse cumulative effects.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to soils would be the same as described under Alternative A for prescribed fires and wildland fire suppression actions. Wildfires managed for multiple objectives would include resource objectives. Wildfires managed for resource objectives could cover a larger area, but would have less impact on soils from ground disturbance compared to full suppression of wildfires. Wildfires managed for resource objectives would only be allowed under conditions that would limit threats to the park resources.

Mechanical equipment used during hazardous fuel reduction treatments (e.g., defensible space, fuel breaks, thinning) and to collect longleaf pine seeds could impact soils in small, localized areas due to increased erosion by removing larger vegetation, rutting, or compaction of soils. Masticators generally are tracked, which distributes the weight of the machine over a wider area, reducing the potential for rutting. Mechanical trees shakers typically have rubber tires or are tracked, which also reduces potential for soil rutting. Tracks from mechanical equipment would be expected to last until the following growing season. Implementing appropriate mitigation measures (See Mitigation Measures Section) such as using mechanical equipment when soils are dry and using existing trails or roads when possible would help to reduce potential impacts to soils. Mechanical treatments would be small in scale (up to 200 acres annually, which is less than 1% of the total land in the park), but would help to restore upland pine habitat which promotes the germination and growth of an abundant ground layer that is lacking in some areas, thus, increasing the soil stability and production. Additionally, trees removed would be cut or chopped into chunks, chips, or strips and could be scattered on the

sites, releasing the nutrients back into the soils. Creating forest patches as well as planting longleaf pine seedlings or seeds, native hardwoods, and grasses would increase the soil stability and production in treated areas by initially providing ground cover that would prevent erosion from water or wind events.

The use of wheeled/tracked equipment such as masticators in the dense, mature pine and hardwood forests would decrease the risk for pine beetle infestation and the attendant increase in hazardous fuels. Decreased hazardous fuels would increase the probability of low intensity surface fires, which would release nutrients and minerals into the soil as well as promote the germination and growth of ground cover in the created open patches.

Targeted herbicide application, such as hand application, could result in herbicide migration into the soil. However, the NPS plans to use herbicides that do not have short or long-term residual implications to soil, water, wildlife, or humans. The mitigation measures (Mitigation Measures Section), limited use as follow-up treatment to prescribed fire and mechanical treatments and low volume/low acreage application of herbicide to specific basal or foliar plant areas, would also help minimize chances for overspray and migration into the soil.

Cumulative Impacts

Adverse cumulative impacts to soils would be similar to those described under Alternative A. However, over time aggressive wildfire suppression actions may be less than in Alternative A as more acres of fire-dependent habitat may be treated and restored, thus less adverse impacts on soil resources.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Impacts to soil resources would be similar as described under Alternative B. However, upland forests in wilderness (about 700 acres) would not use wheeled/tracked equipment, which would reduce restoration of upland pine forest structure. The perpetuation of dense, mature forest stands would increase the risk of pine beetle infestations, which could increase hazardous fuel loads. These conditions would likely change the behavior of wildland fires that originate and/or spread into the wilderness uplands to be of high intensity. High intensity wildland fires could remove large tracts of vegetation, thus resulting in increased soil erosion within the burned areas. Intense wildland fires could also cause physical changes in the soil—loss of soil organic matter, lower the soil pH and nitrogen content, or kill rhizomes and mycorrhiza. The degree of impacts would vary depending on size of the fire, fire behavior, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Alternative C would have similar adverse cumulative impacts as described for Alternative B. However, soil resources in and adjacent to the wilderness upland forests could have increased adverse cumulative impacts due to the increased potential risk for intense fires that could increase erosion and physically change soil properties.

Vegetation (Including nonnative and exotic species)

Affected Environment

The park contains approximately 26,000 acres of diverse vegetation communities which includes twenty forest types, one woodland and one shrubland (TNC 2001). About 90 percent of the 26,000 acres is floodplain consisting of surface water features and bottomland hardwoods. Forested uplands and upland depressional wetlands are located on the north side of the park. The common forest types are described below. The vegetation report by the Nature Conservancy (2001) provides a more detailed description of the vegetation communities found in the park.

Southern bottomland hardwoods are located between the northern bluffs and Congaree River. The overstory consists of bald cypress (*Taxodium distichum*), cottonwood (*Populus deltoids*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), oaks (*Quercus* spp.), sweetgum (*Liquidambar styraciflua*), and swamp tupelo (*Nyssa biflora*) with dwarf palmetto (*Sabal minor*), paw paw (*Asimina triloba*), ironwood

(*Carpinus caroliniana*), possum haw (*Ilex decidua*), and associated saplings as the dominant understory. The fertility of the floodplain, long and warm growing conditions, and lack of human logging has allowed trees to grow to a very large size (NPS 2014b). The park is known as one of the tallest temperate, hardwood forests in the world with 25 champion trees (largest of its species) documented in the park (https://www.nps.gov/cong/planyourvisit/upload/Big%20Tree%20Brochure.pdf).

Loblolly pine forests are found mostly above the northern bluffs (hereafter uplands) with a few stands or single trees located in the floodplain. Loblolly pine stands located on the uplands consist mainly of even-aged loblolly pines that were planted after logging or became established after agricultural activities prior to NPS ownership.

The loblolly pines mixed with bottomland hardwoods in the floodplain are an uncommon forest association in the park. It is believed that fire, farming practices, logging, or hurricanes may have been the disturbance mechanisms that created openings allowing establishment of loblolly pines in the floodplain.

Upland hardwood forest stands are located along the bluffs where the soils are well-drained (Tawcaw silty clay and Persanti fine sandy loams). This forest type is typically dominated by oaks and hickories (*Carya* spp.) with sycamore (*Platanus occidentalis*), beech (*Fagus grandifolia*), and sugarberry (*Celtis laevigata*).

The longleaf pine forest is limited to upland areas of the park with sandy loam soils (TNC 2001). The longleaf pine forest is a globally rare ecosystem type due to logging, land conversion, and fire exclusion in the southeastern U.S. Within the park's upland, longleaf pine may occur as dominant, scattered individuals, or codominant with native loblolly pines. Today, the rare longleaf pine forest in the park is limited to a small tract in the upland area (NPS 2014b). The more open pine stands have a sparse shrub and tree mid-story with a more abundant herbaceous layer. Periodic prescribed fires have helped to maintain the open stand structure; however, young sweetgums tend to re-sprout and may become more abundant following prescribed fires. The longleaf pine community requires periodic fires to maintain the open savanna vegetation structure with low tree density and basal area, low shrub density, and a diverse and dense herbaceous layer of grasses and forbs. Frost (2001) estimated a 1–3 year fire frequency with mostly low-intensity surface fires ignited by lightning.

The current forest composition of the uplands once dominated by open savanna-like longleaf pine forests consists mostly of dense loblolly pine, shortleaf pine, and slash pine and hardwoods, mainly sweetgum, with a closed over story and dense mid-story. The understory consists of scattered shrubs and small trees. Little bluestem (*Schizachyrium scoparium*) is dominant in the herbaceous layer in some areas where openings in the over- and mid-story occur. The longleaf pine-little bluestem vegetation community is one of the pre-settlement natural communities that were found on most fire-exposed sites (Frost and Wilds 2001). However, the herbaceous layer is sparsely populated in most areas with a dense pine needle and organic debris layer that prevents growth of vegetation in the ground layer. In pre-settlement times there would have been frequent fires (1–3 years), creating a more abundant and diverse herbaceous layer and maintaining the open stand structure.

There have been 74 plant species identified in the park that are exotic (alien species not native to the U.S.) or invasive (alien species that do or are likely to cause economic or environmental harm; NPS 2016). Two species were identified of particular concern for spreading—kudzu (*Pueraria lobate*) and Japanese climbing fern (*Lygodium japonicum*).

Analysis of Alternatives and Impacts on Vegetation

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

The pine savannas and forests, pine and mixed hardwood woodlands, and savanna-wetland mosaics have evolved with fire and created fire-dependent communities (Frost and Wilds 2001). Prescribed fire emulates a natural fire regime that perpetuates the species diversity and composition and structure of the fire-dependent and fire-influenced (mosaic wetlands) communities. The CONG fire staff would continue to use prescribed burns to achieve resource management and/or hazardous fuel reduction objectives, which includes reducing fuel loads, creating forest openings to promote new growth of grasses, forbs, and longleaf pine seedlings, maintaining the natural ecological function, maintaining the remaining longleaf pine individuals and stands,

and controlling non-native species. Impacts of prescribed fires and wildfires are similar with the degree of impact depending on the fire behavior and intensity, which depends on a variety of factors, such as the time of year, fuel composition, soil moisture, and relative humidity.

The use of prescribed fire could result in the loss of individual plants and communities of plants. However, prescribed fires are typically low intensity, surface fires that help to maintain and enhance the survival of fire-dependent vegetation communities and seedbeds. Prescribed fires would benefit the native vegetation communities by rejuvenating soils with nutrients, which would help to perpetuate ground cover growth of grasses, forbs, and longleaf pine seedlings in existing open, mature loblolly and longleaf pine stands and in created forest openings; reducing competition from invasive plants; maintaining open vegetation structure in fire-influenced upland wetland communities; and enhancing the diversity, structure, composition, and integrity of fire-dependent vegetation communities. Prescribed fires may also contribute to the increased production and/or seed function in longleaf pine communities. Overtime, the use of prescribed fires would be expected to decrease the potential size and intensity of wildfires by reducing hazardous fuel loads. Maintaining traditional prescribed fire behavior would lead to the increased vigor and health of some of the existing fire-dependent vegetation communities in the park.

Portions of the upland forests would continue to have dense stands of loblolly and hardwoods as prescribed fire treatments are ineffective in reducing mature loblolly pine and larger sweetgums (Waldrop et al. 1987). Prescribed fires are also ineffective in reducing the root systems of hardwoods, which can produce multiple sprouts (Waldrop et al. 1991). The hardwood sprouts could grow faster than longleaf pine seedlings and herbaceous cover shading out the ground layer and competing for water and nutrients. However, overtime with periodic fires grasses and forbs would replace the sprouts (Waldrop et al. 1991).

The existing mature, dense loblolly pine stands would have an increased risk for pine beetle infestations, which could increase tree mortality or require trees to be cut and left on site to limit the spread of the infestation. The spatial extent of pines affected from a pine beetle attack would depend upon how quickly the stand was treated and the climatic conditions (drought conditions). Additionally, hazardous fuels could increase from the dead pine trees left standing or as woody debris from fallen trees and branches. These areas would have an increased potential for intense wildland fires that could result in the removal of large tracts of vegetation in the upland forests. High intensity wildfires could remove most of the vegetation and soil organic matter (duff/litter), altering soil resources (e.g., kill rhizomes and mycorrhizae), which could lead to changes in vegetation species composition, structure, and diversity. Removing most standing vegetation and organic matter could also create bare and burned soils susceptible to increased opportunities for invasive and non-native plant species to become established. Overall, the acres restored successfully and the health and vigor of fire-dependent vegetation communities, including longleaf pine forests, may be reduced in these areas using prescribed burning alone. Furthermore, overtime fire-dependent vegetation communities could continue to decline in species composition and diversity.

Wildfires would be managed for multiple objectives, excluding resource objectives, with an emphasis on suppression objectives per the 2004 FMP. Wildfires in the floodplain would continue to be managed with confine/contain strategies not aggressive suppression actions as wildfires would be self-limiting and typically burn out on their own due to the moist soils and wet conditions. Wildland fire management actions in the upland areas could remove, cut, or trample vegetation from line cutting operations along control lines. Tracked or wheeled equipment approved by the Superintendent or vehicles that carry fire personnel and equipment could also trample or remove vegetation. New fireline construction does not usually happen due to access, safety, and terrain limits, but could occur when utilizing MIST tactics to minimize effects on vegetation and other resources. However, wildland fires would be contained using existing natural barriers, roads, or trails when possible.

Potential spread of invasive, non-native plants and seeds could occur from equipment used by fire crews on wildland fire suppression efforts (e.g., fireline construction equipment, carried on equipment from outside the area) or naturally distributed by wind or animals. Soil disturbance and bare areas from fireline construction could lead to increased opportunities for establishment and/or spread of invasive, non-native plant species. Mitigation measures would be implemented such as, cleaning equipment before and after use, firelines re-

contoured and covered with cut vegetation debris, and utilizing targeted herbicide application and monitoring after fires to minimize potential impacts.

Mechanical treatments (typically hand tools or handheld motorized equipment) around park buildings would remove small areas of vegetation, not entire plant communities, which could create bare ground or denuded areas. Vehicles and crews associated with mechanical work could temporarily trample or remove vegetation adjacent to the 50-foot buffer for defensible space work. The trampled vegetation is expected to recover after the mechanical work is completed and the vegetation outside the 50-foot buffer is expected to regrow. Vegetation within and adjacent to the 50-foot zone around buildings are or have been disturbed in the past by infrastructure development and daily staff activities.

Cumulative Impacts

Activities that could impact vegetation resources include feral hogs, fire management activities within the park and on adjacent private lands, resource management plans that provide guidance for protection and management of vegetation resources, timber harvesting on adjacent private lands, and growth and development in Richland County. Under Alternative A, the incremental impacts to vegetation resources within the park would continue with prescribed fire being used to reduce hazardous fuels and to aid in the maintenance and restoration of fire-dependent vegetation communities. Alternative A would contribute negligibly to adverse cumulative impacts on vegetation resources because of the potential loss of individual plants and small areas of vegetation associated with the fuels/vegetation management activities and most vegetation impacts are from other sources.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to vegetation communities would be similar to those described under Alternative A for prescribed fires and wildfire management/suppression actions. Wildfires managed for multiple objectives, including resource objectives, could increase the number of acres treated by fire and the ability to reduce hazardous fuel loads, thus over time reducing the number of wildfires requiring active suppression actions. Including resource objectives in wildfire management and using prescribed fires could help to move more vegetation communities toward having impacts from fires within the range of naturally occurring fires across the landscape. This would increase species diversity, resilience, and sustainability of fire-dependent vegetation communities. Furthermore, wildfires managed or partly managed for resource objectives could use natural or manmade features as containment boundaries that are more distant from the fire, depending on the resource objectives and values to be protected, rather than immediate direct suppression.

These vegetation communities are typically difficult for fires to spread, thus less fire suppression actions and effects on vegetation. During drought conditions, the CONG fire staff may have to take more aggressive fire management actions to prevent spread into non-fire adapted vegetation communities.

The increased ability to use mechanical treatments would reduce hazardous fuels, help to restore the health, vigor, and species diversity of native upland forests, and create defensible space and fuel breaks where necessary. The use of wheeled/tracked equipment such as masticators to improve the structure, species composition and diversity, and resilience of the upland forests (up to 200 acres annually) could result in the damage to non-targeted trees or spread invasive plant species if not managed carefully. The park would implement mitigation measures to reduce potential impacts to non-target trees. However, a more open stand would increase sunlight and moisture availability for growth and germination of ground cover from the remaining longleaf pine seedlings, grasses, forbs, and shrubs. Mechanical thinning would be used in the upland forests in combination with the other fuel/vegetation management tools to help accomplish ecological restoration.

Planting of longleaf pine seedlings, native hardwoods, and grasses could occur to promote longleaf pine and upland forest restoration efforts; seeds would be used in areas that do not have longleaf pine seed sources. Planting of longleaf pine seedlings may reduce the grass stage to one or two years (Van Lear et al. 2005), which could reduce the potential to contract blight, a common disease, and speed up restoration efforts. Collection of viable, local longleaf pine seeds could be done using a mechanical tree shaker that would travel

off-road to collect the best seeds. Individual trees would be shaken to collect the pine seeds. Mitigation measures would be taken to avoid damaging crowns, limbs, and trunks of longleaf pine trees and to minimize vegetation damage by the shaker traveling off-road.

Targeted herbicide application of selected hardwoods (e.g., dense sweetgum sprouts and saplings) would be used as a follow-up treatment to mechanical or fire treatments to reduce resource competition for longleaf pine seedlings. Prescribed fire alone is not effective in reducing resprouting of hardwoods or mature hardwoods like sweetgums (Waldrop et al. 1987, 1991). Targeted herbicide application would increase the amount of acres ecologically restored by helping to maintain patches of forest openings, which could enhance growth and germination of native grasses and forbs, and longleaf pine seedlings and reduce resource competition for longleaf pine seedlings to thrive. Mitigation measures, limited use, and targeted herbicide application to specific basal or foliar plant areas would minimize chances of over spraying and impacting non-target plants.

Cumulative Impacts

Cumulative impacts to vegetation resources for past, present, and reasonably foreseeable actions are similar to Alternative A. Alternative B would contribute to beneficial cumulative impacts to vegetation resources due to the increased ability to restore native plant communities improving the health and vigor of native vegetation communities and maintenance of fire-adapted vegetation communities. Alternative B would contribute negligibly to adverse cumulative impacts on vegetation resources as most vegetation impacts are from other sources.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Impacts would be the same as described for Alternative B; however, slightly fewer acres would be treated and restored in the upland pine forests than Alternative B (700 acres). The risk for pine beetle infestations could increase in the dense pine and hardwood forest stands followed by increases in hazardous fuel loads (dead standing trees, fallen woody debris, or leaf and needle cast) in the wilderness upland areas with no use of wheeled/tracked equipment. These areas would have an increased potential for intense wildland fires that could result in the removal of large tracts of vegetation in the upland forests, altering the structure, composition, and species diversity of vegetation communities. The degree of impacts would vary depending on size of the fire, the location, extent, timing, and other factors related to the fire. No use of wheeled/tracked equipment (masticator, mechanical tree shaker) in the wilderness uplands would prevent most ecological restoration efforts on the 700 acres.

Cumulative Impacts

Alternative C would have similar cumulative impacts to Alternative B, except that vegetation resources in and adjacent to the wilderness upland forests could have increased adverse cumulative impacts due to the increased potential risk for intense fires and pine beetle infestation.

Water Resources (water quality, floodplains, wetlands)

Affected Environment

The principal water feature within the park is Cedar Creek, which a portion has been designated as an Outstanding National Resource Water by the state of South Carolina from Wise Lake to the Congaree River. The southern boundary of the park runs along the Congaree River, while the Bates Fork Tract (newly acquired NPS lands) runs along the Wateree River on the east and the Congaree River on the south. Other water features in the park include oxbow lakes, ponds, guts, and sloughs. Approximately 90% of the park is within the floodplain and is flooded by the rivers several times a year.

Water quality within the park is generally good (Malin and McIver 2010), but there are current and potential stressors. Potential stressors that fire management activities could contribute include erosion, turbidity, and sedimentation. Malin and McIver reported increased turbidity after rain events in Cedar Creek and Congaree and Wateree Rivers. Stressors outside the park include fecal coliform and mercury. Congaree River is impaired

by *E. coli* where the river enters the park and by mercury at U.S. Highway 601 (NPS 2014b). A Total Maximum Daily Load (a plan that calculates the maximum amount of a pollutant that could occur in a water body and maintain water quality standards) is planned for the E. coli impairment this year; the mercury impairment in 2027 (NPS 2014b).

Analysis of Alternatives and Impacts on Water Resources

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

Under Alternative A prescribed fires would not be used in the park floodplain. Wildfires could impact water bodies in the floodplain by causing adjacent vegetation impacts during extreme fire conditions. However, wildfires are expected to continue to be rare events in the park floodplain and small in size as they are typically self-limiting due to the moist conditions (e.g., moist soils, surface water that acts as a natural barrier), thus would continue to be managed using confine/contain strategies.

In the upland wetland forests and water bodies, wildland fires (prescribed fires and wildfires) may burn or reduce vegetation along the banks. Vegetation removal or reduction could cause a temporary increase in water temperatures, negligible soil erosion, and sediment and nutrient yield. This could lead to a temporary increase in turbidity and sedimentation of surface waters along the banks impacted until regrowth of the herbaceous cover. Vegetation would be expected to recover quickly with hydrological conditions returning to pre-fire conditions.

Wildland fires could provide a temporary influx of nutrients to the banks of upland water resources from the plant biomass burned. The influx of nutrients stimulates seed production and new vegetation growth, helping to perpetuate the vegetation and wildlife species associated with water resources in the park, such as wetlands (Craft and Casey 2000, Battle and Golladay 2001). The influx of nutrients, especially nitrate, into surface waters may be a concern following a wildland fire. However, studies have found no change in nitrate concentrations following a prescribed fire from pre-fire conditions in pine-mixed hardwood and longleaf pine forests in the southeast (Elliott and Vose 2006, Vose et al. 2005). A wildfire simulation with 100% overstory mortality showed the only increase of nitrate into surface waters, which was attributed to the reduced nitrogen uptake from no vegetation present (Voss et al. 2005). Therefore, the intensity and duration of impacts to water quality from the temporary influx of nutrients would depend on the fire intensity, amount and frequency of precipitation events following a fire, and the ability of the remaining or new vegetation to act as a filter.

In the uplands, wildfires would be more aggressively managed due to their potential to spread in drier fuels. In most cases the NPS would utilize indirect tactics to contain the fire at nearby roads, trails, or natural barriers, depending on conditions. Wildfire suppression tactics could impact water quality by use of adjacent fire engines and vehicles on the roads, ATVs or UTVs, and other equipment that may release localized quantities of oil or other petroleum products or increase turbidity if standing water is present. The use of fire retardants, gels, or foams, by fire engines or retardants, helicopter, or fixed winged aircraft, could also temporarily alter the water quality of surface waters if misapplied or mishandled. These fire suppression chemical agents contain detergents or fertilizer type chemicals that temporarily change the water quality, interfering with the ability of fish gills to absorb oxygen and other aquatic organisms. These impacts are temporary as dilution occurs with the flow and mixing of the impacted water downstream. The degree of impact would depend on the amount of foam or retardant dropped into the water body, the size of the water body, and the volume of flow. However, mitigation measures would limit the use, type, and proximity to water bodies (no use within 300 feet of water bodies) making potential impacts to water quality minimal.

Use of equipment or ATVs and UTVs for off-road travel (with Superintendent Approval) could destabilize banks of water bodies. These impacts would be mitigated by minimizing off-road travel, utilizing READs, and prompt rehabilitation of any damaged stream banks.

Water drops used to suppress fires may be obtained from water resources within the park, which ensures that the water quality of dropped water is of the same as existing surface water resources. In addition, air tankers and helicopters used for water drops must rinse out tanks prior to responding to fires in the park. The use of

water resources in the park for water drops is expected to temporarily reduce flow for hours in the surface water used.

Cumulative Impacts

Actions that contribute to adverse cumulative impacts include existing practices at the park and adjacent private facilities (septic tanks), roads leading to water bodies, adjacent upstream forestry operations and agricultural practices. Additionally, the hydrology alteration in the floodplain from the regulation of water flows for Lake Murray and other upstream impoundments contribute to adverse cumulative impacts to water resources. The management activities under Alternative A would continue to reduce hazardous fuels, thus reducing the potential risk for intense, large wildfires in successfully treated areas using prescribed fire. The fire management actions would contribute negligibly to adverse cumulative impacts to upland water resources from the use of vehicles, equipment, and foams for wildfire suppression tactics.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts would be similar for management of wildland fires as those described under Alternative A with the temporary increase in temperature, erosion, and sediment and nutrient yields from the removal of vegetation in the upland. However, wildfires managed for multiple objectives including resource objectives could over time decrease the potential for intense, large wildfires. Wildfires would move towards having impacts within the range of naturally occurring wildfires, thus reducing impacts from fire suppression activities in upland water resources. Additionally, wildfires managed for resource objectives are managed under less rigorous fire conditions than suppression-oriented wildfires, thus containment boundaries could be more distant (natural barrier) and vegetation impacts should not be as intense.

The increased ability to use mechanical treatments is not expected to increase ground disturbance near water bodies from the current fire management strategies as the use of wheeled/tracked equipment (i.e., masticators, mechanical tree shaker) would be used in the upland forests to support ecological restoration efforts not in the floodplain. Furthermore, CONG fire managers plan mechanical treatments to minimize water quality impacts. Mechanical treatments would not occur near streams or surface waters, thus impacts would be mitigated by avoidance, where possible. If mechanical work is unavoidable near a stream or surface water body, immediate rehabilitation would occur using appropriate restoration measures. Given the annual acreage treated by mechanical works could be up to 200 acres spread across the upland landscape and along the park boundaries, the use of mechanical treatments for additional reasons would not be expected to have much effect on water resources.

The increased ability to reduce hazardous fuels and thinning dense forest stands could increase the probability for localized, lower-intensity ground fires. Lower-intensity surface fires could burn or remove some vegetation along the banks, but would be expected to leave vegetation along the banks to act as filters for water resources. Additionally, prescribed fires could produce increased localized erosion and sedimentation, but the amount and duration of impacts to water quality would depend on the timing and intensity of precipitation events before re-establishment of burned vegetation, and the ability of the remaining vegetation to act as a filter. Vegetation would be expected to recover quickly with hydrological conditions returning to pre-fire conditions.

Prescribed fires could be used in the abandoned floodplain agricultural plots (about 125 acres), which are adjacent to the Congaree River. Prescribed fire use in the old floodplain agricultural plots would only be used if modeling and analysis shows that it would be effective in helping restore these areas to typical Congaree bottomland vegetation types. Potential water quality impacts to the Congaree River from prescribed burns would be the same as described above for lower-intensity surface fires.

All herbicide treatment areas would have individual treatment plans, developed by the CONG fire staff, employing specific mitigation measures (see mitigation measures section), after approval of herbicide use by the NPS regional office. Approvals may be given after considering numerous factors including: the target use, location where the application will occur, potential threatened and endangered species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, and type

of application (e.g. spot spraying). Furthermore, all herbicides used in or near water bodies or wetlands would be applied according to the labels to ensure potential for herbicide drift is unlikely.

Cumulative Impacts

Adverse cumulative impacts to water resources would be similar to Alternative A. However, Alternative B would contribute to beneficial cumulative impacts to water resources due to the increased ability to reduce hazardous fuel loads and thinning of dense, mature forest stands, which increases the potential for localized, lower-intensity fires that would leave vegetation along the banks of water resources to serve as filters to protect water quality and could produce less sedimentation and erosion compared to Alternative A.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Under Alternative C, water resource impacts would be the same as described for Alternative B, however, not using wheeled/tracked equipment in the upland wilderness would prevent most active ecological restoration on these 700 acres. This could increase the risk of pine beetle infestations followed by increases in hazardous fuel loads from dead standing pines or fallen woody debris. These conditions could likely change the behavior of wildland fires that originate and/or spread into the wilderness uplands to be of high intensity that could spread into the edged of the floodplain or impact upland water resources. High intensity wildland fires could remove large tracts of vegetation that could temporarily increase the transport of sediment and nutrients, water temperature, and erosion of banks of water bodies. Additionally, the increased potential for localized, high intensity fires could decrease the overall health and vigor of vegetation communities that serve as filters for water resources. The degree of impacts to water resources would vary depending on size of the fire, fire behavior, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Alternative C would have similar cumulative impacts to Alternative B, except that water resources in and adjacent to the wilderness upland forests could have increased adverse cumulative impacts due to the increased potential risk for intense fires.

Wildlife

Affected Environment

The park provides exceptional terrestrial and aquatic habitat for a variety of native mammal, reptile, amphibian, bird, and fish species. A diverse array of tree and shrub species provides abundant mast production (e.g., acorns, fruit). The park is designated as a Globally Important Bird Area and provides valuable breeding and stop over habitat for birds with the diverse habitat communities present in the park.

Non-native invasive species that occur within the park include non-native wild pigs (*Sus scrofa*) and feral dogs (*Canis domesticus*) and cats (*Felis catus*). These non-native species pose threats to a variety of park resources, including native plant and wildlife species.

Analysis of Alternatives and Impacts on Wildlife

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

Wildlife species respond to wildfires and prescribed fires in the same manner with the degree of impact depending on the time of year, fire behavior, fire size, location, fuel composition, and soil moisture. Wildland fire suppression tactics would temporarily increase disturbance to individuals within and near the burn area due to noise from human presence and equipment, smoke, fire itself, and vegetation removal. Temporary loss of habitat and displacement may occur for individuals within the burn unit until revegetation occurs.

Disturbances to wildlife within a wildfire area could result from helicopters transporting firefighter personnel and low-level fixed winged aircraft and retardant drops that could be used in fire suppression actions. In

addition, reproduction and survival for individuals could be impacted from increased stress and loss of foraging opportunities from removal of vegetation after a high intensity wildfire. Mortality to small and less mobile wildlife species, such as turtles, snakes, and small mammals, may also occur from wildfires, while larger wildlife species may not always be able to move out of the fire path in time, becoming disoriented by the wildfire.

Prescribed fire would continue to benefit individual wildlife species and their habitat by emulating the natural fire regime, creating a more historic and natural vegetation pattern in the park. Prescribed fire could create some localized areas of early successional vegetation and enhance the diversity of vegetation communities and wildlife habitat present in the park (Keyser and Ford 2005). Following a prescribed burn an influx of nutrients would be present in the soils, which could increase vegetation growth, ground cover for security and escape cover, and the nutritional quality of forage for wildlife species. The burned areas generally green up earlier than non-burned areas, providing earlier foraging opportunities (Redmon and Bidwell 2003). The effects of treatments on forest understory composition and growth vary. A study in Piedmont pine-dominated forest in South Carolina found that post treatment sapling densities and graminoid forb cover differed among fire, thinning, and fire combined with thinning treatments (Phillips and Waldrop 2008). Overall, the use of fire and other tools to recreate historic forest conditions is recommended for wildlife because it helps restore a mosaic of ecosystem types that can benefit multiple species (Van Lear and Harlow 2000).

Prescribed fires could impact nesting resident and migratory birds if conducted during breeding/nesting season (generally March to August) through mortality of nestlings and fledglings at ground level or in the lower canopy that are unable to fly to avoid the smoke and fire. Effects on overall breeding success would vary by species and is difficult to predict, as bird abundance and species richness often do not show changes until several years post-fire (King et al. 1998, Greenberg et al. 2007). Some nesting birds could become more susceptible to predators, such as raccoons, due to the opening of the understory and increased open areas (Jones et al. 2004). However, fires have played a long-term integral role in the maintenance of vegetation communities in the park (Frost and Wilds 2001), with avian species in the park evolving with periodic fires; some avian species require periodic fires to maintain suitable habitat conditions and viable populations (e.g., red-cockaded woodpecker). In addition, past studies in the southeast have shown no change in breeding success from seasonality of fires (growing season fires versus dormant fires), which may be due to the ability of many bird species to re-nest (Brennan et al. 1998, Cox and Wiedner 2008, Knapp et al. 2009). Implementing prescribed fires when possible outside the breeding season and/or avoiding known concentrated nesting areas should help mitigate potential impacts. Prescribed fires could also have beneficial impacts on birds that inhabit fire-adapted vegetation communities, such as increased insect abundance and improved breeding and foraging habitat by maintaining the preferred vegetation structure.

In portions of the uplands, the dense mature loblolly pine and sweetgums would persist due to the inability of using prescribe fire as the sole fuel/vegetation management tool to restore the stands to a more open structure. Without sufficient ecological restoration, portions of the upland forests would continue to have a more homogenous habitat state, thus degrading wildlife habitat quality. Additionally, dense, mature loblolly pine stands would have an increased risk for pine beetle infestations, which could increase hazardous fuels from dead pine trees left standing or that have fallen. These areas would have an increased potential for intense wildland fires that could result in the removal of large tracts of vegetation, causing habitat loss and displacement of wildlife species in these upland forests.

Increased pine beetle infestation could also impact wildlife habitat and food availability. An infestation could change the forest structure, species composition and abundance, with cavity nesters increasing and security and escape cover for small mammals increasing. Food availability could increase for insectivorous birds as pine beetle populations increase and the increased production of grasses and forbs would increase browse for wildlife. Individual wildlife species responses would differ significantly based on their ecological requirements and their ability to use the modified habitat. The prevalent moist conditions in upland forested wetland areas would likely have prescribed fires of low-intensity that would lightly burn streamside vegetation and ground litter/debris. Low-intensity prescribed fires allows vegetation to regrow quickly with increased vigor. There could be temporary impacts to aquatic habitat from sedimentation from ash and increased water temperature as described in the Water Resources Section. However, abundant cover of native, herbaceous and soil-binding

plant species found along the upland forested wetlands should serve as a filter to reduce the potential for sedimentation from prescribed fires.

Impacts to fish bearing streams in the park from prescribe fires would not occur and impacts from wildfires is unlikely as most occur in the floodplain where wildfires are rare and self-limiting due to wet conditions. During drought conditions, fish-bearing water bodies could be impacted by wildfires that spread into the floodplain from removal of streamside vegetation that provides shade, increasing the water temperature until revegetation occurs. Impacts to fish populations would depend on the severity, size, location, and proximity to fish populations, as downstream reaches could cool rapidly if vegetation is present (Johnson 2004). Water bodies could also experience large pulses of water from precipitation events and an increase in sedimentation from woody debris and ash from wildfires. This could lead to a temporary increase in turbidity and degraded water quality, which could adversely affect riparian habitats and fish.

Cumulative Impacts

Actions that could contribute to cumulative impacts on wildlife species and their habitat under Alternative A include the ongoing development adjacent to The park and fire management actions in the park, traffic along roads and the rail line, and wildland fires on neighboring lands. All of these actions could temporarily or permanently disturb or displace local wildlife species. Additionally, the continued growth and development in the surrounding area could contribute to the conversion of wildlife habitat to developed lands outside the park. This would increase habitat fragmentation and loss of habitat in the area, which has caused habitat degradation and degradation to ecosystem function in the region. Alternative A would contribute negligibly to adverse cumulative impacts due to increased disturbance to individual wildlife species.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to wildlife and their habitat would be similar to those described under Alternative A, however the spatial extant of reducing hazardous fuels and restoring fire-dependent habitats in the park would increase as managing wildfires for resource objectives, prescribed fires in abandoned floodplain agricultural plots (about 125 acres), mechanical treatments, planting of longleaf pine and native trees and grasses, and targeted herbicide application are allowed. Upland prescribed fire would be used as described in Alternative A, except that it could be combined with the additional tools resulting in a more effective restoration of forests to historical upland forest conditions. Overall, under Alternative B more acres could be treated in fire-adapted vegetation communities, which would benefit associated wildlife species by improving habitat quality.

Managing wildfires for multiple objectives, which could include resource objectives, may help further reduce hazardous fuel loads by treating more acres with wildland fire. Wildfires managed for multiple objectives over time would further decrease the potential for intense, large wildfires, thus the attendant impacts to wildlife species from displacement and disturbance within and adjacent to the burn areas. Overtime wildfire behavior would move within the range of naturally occurring fires across the landscape, thus reducing impacts to wildlife species and their habitat from fire suppression activities. Furthermore, wildfire containment boundaries (existing natural or human made barriers) could be more distant, depending on the resource objectives and values to be protected.

Prescribed fires in the abandoned floodplain agricultural plots would likely be low-intensity, surface fires as the soils are moist almost year-round from the frequent flood events. Prescribed burns would help to move the agricultural plots towards restoration as a deciduous floodplain forest, thus benefitting the associated wildlife species. Prescribed fire use in the abandoned floodplain agricultural plots would only be used if modeling and analysis shows that it would be effective in helping to restore these plots to typical Congaree bottomland vegetation types.

The increased ability to use mechanical treatments to reduce hazardous fuels, thinning dense, mature pine and hardwood stands, and to create defensible space and fuel breaks would decrease the probability for localized, intense wildfires. Mechanical treatments would be small in scale (up to 200 acres annually, which is less than 1% of the total land in the park), but would help to restore longleaf pine habitat and associated wildlife species (e.g., eastern fox squirrel (*Sciurus niger*)) by reducing the potential for pine beetle infestation, and opening the

understory to allow sunlight and nutrients for grasses, forbs, and longleaf pine seedlings (Van Lear et al. 2005). Over time, the species abundance and diversity of the herbaceous layer would increase, which would improve the wildlife habitat and potentially species diversity. Additionally, collection of viable, local longleaf pine seeds could be done using a mechanical tree shaker that would travel off-road to collect the best seeds. Mechanical treatments and seed collection could displace or disturb wildlife species within the treatment area until the work is completed. However, restoring upland forest habitat, including longleaf pine communities, would benefit native wildlife species.

Planting of longleaf pine seeds and other native plants could occur to promote the restoration of longleaf pine forests. Planting of longleaf pine seeds may reduce the grass stage to one or two years (Van Lear et al. 2005), which could increase the resiliency and rate at which longleaf pine forest communities are restored. Speeding up restoration gets the longleaf pine trees sooner to a height that is more resistant to fire damage, and could shorten the period where mechanical and herbicide treatments are needed to reduce competition for successful establishment of longleaf pines.

Targeted herbicide application as a follow up treatment to mechanical and fire treatments, such as foliar application to specific basal or foliar plant areas, would minimize chances for overspray and impacting non-target plants. Additionally, mitigation measures, limited use, low-volume application of herbicide, and following all labels would minimize chances of impacts to non-target plants. Herbicides commonly used for vegetation management (e.g., triclopyr [Garlon 4/Element 4], glyphosate, imazapyr, sulfometuron, metsulfuron methyl, hexazinone) have been designed to target biochemical processes unique to plants and have low levels of direct toxicity or risk to wildlife and fish when used in accordance with label specifications (Tatum 2004). Herbicides commonly used for vegetation management also degrade quickly upon entering the environment and are neither persistent nor bioaccumulate (Tatum 2004). Over time, using targeted herbicide as a follow-up treatment to mechanical work or prescribed fire would reduce and/or cease the need for repetitive mechanical work, thus minimizing a reoccurring disturbance to wildlife species and their habitat.

Cumulative Impacts

Adverse cumulative impacts to wildlife for Alternative B would be the same as described for Alternative A. However, over time aggressive wildfire suppression actions may be less than Alternative A as less fireline construction and holding may be utilized. Alternative B would also treat and restore more acres of native upland forest habitat, including longleaf pine habitat, thus improving wildlife habitat quality.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Under Alternative C, impacts to wildlife and their habitat would be similar as described under Alternative B with 700 less acres treated. However, pine beetle infestations and hazardous fuel loads could increase over time in the wilderness upland areas (about 700 acres) with no use of wheeled/tracked equipment (e.g., masticator, mechanical shaker) to help in restoration efforts. Upland forest stands in the wilderness area would not be thinned or restored as longleaf pine forest communities. This would result in the perpetuation of dense forest stands with increased risk for pine beetle infestations, which could contribute to the hazardous fuel load as standing or fallen dead trees. These conditions would likely change the behavior of wildland fires that originate and/or spread into the wilderness uplands to be of high intensity. High intensity wildland fires could remove large tracts of vegetation that could reduce the resilience and integrity of native wildlife and their habitat. In addition, without successful ecological restoration (i.e., lower intensity, surface fire mimicking natural fire cycles), fire dependent vegetation may decrease in prevalence and vigor, with negative effects on native wildlife species. The degree of impacts to wildlife and their habitat would vary depending on size of the fire, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Adverse cumulative impacts for Alternative C would be the same as described for Alternative B. However, over time wildlife habitat in and adjacent to the wilderness upland forests could have increased potential risk for intense wildfires that would be more likely to spread into adjacent non-wilderness uplands and the floodplain. This could lead to slightly more aggressive wildfire suppression actions than under Alternative B as fireline construction and holding actions would be more likely to be needed within and adjacent to the dense upland forests in the wilderness.

Special Status Species

Affected Environment

Under the Endangered Species Act (ESA), the NPS has the responsibility to address impacts to federally listed threatened or endangered species. National Park Service policy dictates that an assessment of impacts for federal candidate species, proposed federal species, and state listed species occur during the NEPA process. For the purpose of this analysis, a list of federally and state listed species was obtained from the following sources: 1) federally listed species that may occur in or near the park from the U.S. Fish and Wildlife Service (USFWS) IPAC website (http://ecos.fws.gov/ipac/) on January 15, 2016 (Consultation number 04ES1000-2016-SLI-0246); 2) park official species list from NPSpecies; and 3) state listed and rare species that may occur in Richland County.

Twenty-five animal species and 14 plant species could occur in the park that are protected at the federal or state level or are recognized as rare (Tables 2 and 3). Of the 39 species, 3 are listed as either federally endangered or a species of concern that could occur in the park. There are 34 state listed rare species. These species are listed by the South Carolina Department of Natural Resources and warrant special attention because they have experienced long-term population declines and are vulnerable to degradation or environmental changes.

Species eliminated from detailed analysis in this EA include: 1) species that occur in rivers, bottomland hardwood forests, and floodplains as these areas would not be affected by fires (wildfires are expected to continue to be small and burn out on their own in the floodplain); and 2) species that are not a resident or breeding species, or migrant bird. There is no designated critical habitat, as defined by the USFWS, within the park.

TABLE 2. FEDERAL AND STATE-LISTED ENDANGERED, THREATENED, AND SPECIES OF CONCERN WITH POTENTIAL TO OCCUR IN THE PARK.

Species	Federal Status*	State Status
Mammals		
Rafinesque's big-eared bat (*Corynorhinus rafinesquii*)	—	E
Birds		
Swallow-tailed Kite (*Elanoides forficatus*)	SC	E
Bald eagle (*Haliaeetus leucocephalus*)	—	T
Wood Stork	T	T

Species	Federal Status*	State Status
(*Mycteria Americana*)		
Red-cockaded Woodpecker (*Picoides borealis*)	E	E

*E = endangered, T = threatened, SC = species of concern

TABLE 3. SCDNR RARE SPECIES WITH POTENTIAL TO OCCUR IN THE PARK*.

Species	State Rank**
Mammals	
Star-nosed mole (*Condylura cristata*)	S3?
Eastern fox squirrel (*Sciurus niger*)	S4
Southeastern myotis (*Myotis austroriparius*)	S1
Eastern woodrat (*Neotoma floridana*)	S3S4
Birds	
Cooper's Hawk (*Accipiter cooperii*)	S3?
Bachman's Sparrow (*Aimophila aestivalis*)	S3
Black-throated Green Warbler (*Dendroica virens*)	S4
Little Blue Heron (*Egretta caerulea*)	SNRB, SNRN
Mississippi Kite (*Ictinia mississippiensis*)	S4
Loggerhead Shrike (*Lanius ludovicianus*)	S3
Swainson's Warbler (*Limnothlypis swansonii*)	S4
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	SNR
Reptiles and Amphibians	
Timber rattlesnake (*Crotalus horridus*)	SNR
Pickerel Frog (*Rana palustris*)	SNR
Mussels	
Carolina slabshell	S3

Species	State Rank**
(*Elliptio congaraea*)	
Yellow lampmussel (*Lampsilis cariosa*)	S2
Rayed pink fatmucket (*Lampsilis splendida*)	S2
Eastern floater (*Lampsilis splendida*)	SNR
Paper pondshell (*Utterbackia imbecillis*)	SNR
Savannah Lilliput (*Toxolasma pullus*)	S1
Plants	
Eastern narrowleaf sedeg (*Carex amphibola*)	SNR
Cherokee sedge (*Carex cherokeensis*)	S2
Crowsfoot sedge (*Carex crus-corvi*)	S2
Low woodland sedge, social sedge (*Carex socialis*)	S1
Fivelobe cucumber, Cayoponia (*Cayaponia quinqueloba*)	S1?
Needleleaf rosette grass (*Dichanthelium aciculare*)	SNR
Eastern wahoo (*Euonymus atropurpureus*)	S1
Sarvis holly, serviceberry holly (*Ilex amelanchier*)	S3
Piedmont pinweed (*Lechea torreyi*)	SNR
Carolina birds-in-a-nest, Carolina bog mint (*Macbridea caroliniana*)	S3
Canadian moonseed, Canada moonseed (*Menispermum canadense*)	S2S3
Southern adder's-tongue (*Ophioglossum vulgatum*)	S2
Slim stinging nettle, Weak nettle (*Urtica chamaedryoides*)	S2

*Sources: SCDNR rare, threatened, and endangered species and communities known to occur in Richland County (http://www.dnr.sc.gov/species/pdf/Richland2014.pdf) and NPSpecies List.
**S1 = critically imperiled, S2 = Imperiled, S3 = Vulnerable, and S4 = Apparently Secure (Uncommon), ? = Inexact or uncertain numeric rank, SNR = Unranked

Analysis of Alternatives and Impacts on Special Status Species

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

Impacts Common to All Species

Under this alternative, the current fire management program would continue. Special status species would respond to wildfires and prescribed fires in the same manner with the degree of impacts depending on the time of year, fire behavior, fire size, location, fuel composition, and other variables. Wildland fire suppression tactics such as construction of firelines, use of portable pumps, fire engines on roadways, and noise from

human presence and fire equipment could temporarily displace or stress special status wildlife species within and near the burn area.

Continuing to utilize prescribed fires to reduce hazardous fuel loads would increase the probability of lower-intensity ground fires with wildfires, which are easier to manage/suppress and have less impact on special status species and their habitats. Many of the special status species and habitats are fire-dependent, which low intensity ground fires emulate the historic variety/range of fire behavior and fire effects. In addition, continued use of prescribed fires may reduce hazardous fuels, increase cover of grass and herbaceous layers, decrease density of forest stands, and increase forest openings in some treated areas. The decreased density of forest stands and the creation of some forest openings would reduce the competition for available resources for longleaf pine seedlings and could improve the health and vigor of the longleaf pine forest. Prescribed burn plans would include mitigation measures to minimize any potential impacts to known special status species and their habitats. Overall, Alternative A would benefit special status species by restoring fire-dependent vegetation communities and minimizing the potential for future severe wildfires.

However, relying on prescribed fires alone as the primary vegetation/fuels management tool would be ineffective in fully restoring fire-dependent ecosystems including the longleaf pine forest community. Prescribed fires are ineffective in reducing/thinning mature loblolly pine and larger sweetgums (Waldrop et al. 1987), which is needed to create patches of open canopy to promote the establishment of a diverse and abundant herbaceous layer as well as longleaf pine seedlings and to create a more diverse forest structure. Without restoration of the fire-dependent vegetation communities, the habitat integrity for special status species would likely continue to degrade. In portions of the upland forests, ladder fuels would continue to accumulate in the dense, mature pine and hardwood stands with closed overstory and mid-story. The increased hazardous fuel could lead to increased potential for localized, intense wildfires. Localized, intense wildfires could remove large tracts of vegetation, causing habitat loss and displacement of special status species. Furthermore, these uplands would have an increased potential for pine beetle infestations, which would degrade the vigor and health of forest stands, thus reducing pine-associated wildlife habitat. Pine beetle infested trees could also contribute to the hazardous fuel load as standing or fallen dead trees. Without sufficient ecological restoration in fire-adapted habitats, these mature, dense pine and hardwood stands would continue to have a more homogenous habitat state.

Mammals

Rafinesque's big-eared bat and Southeatern Myotis—Both bats inhabit bottomland hardwood forests and use large hollow trees with openings near the base to provide cavities for roosting; water tupelo (*Nyssa aquatica*) have been used in the park (Loeb 2006). Roosts in upland sites are non-tree structures, such as buildings and bridges; thus cavity trees in uplands are less important than cavity trees in bottomland hardwood forests (Lacki and Bayless 2013). Prescribed fire will not be used in the bottomland hardwood forests in Alternative A, thus roost sites would not be impacted. Bats roosting in structures within the uplands would not be impacted as structures are protected from prescribed fires, thus upland roost sites would not be impacted under Alternative A.

Fire may affect bats via heat and smoke or disrupting roosting and indirectly by modifying habitat (Perry 2012), but effects of fire are largely unknown for these bats (Lackie and Bayless 2013). Studies suggest fire generally has beneficial effects on bat habitat by creating snags, reducing understory and midstory vegetation, opening forests, and possibly by increasing insect prey abundance (Perry 2012). The upland forests are used by these bats for foraging and as corridors from roosting sites in the bottomland hardwood forest (Miller 2003, Medlin and Risch 2008). Under Alternative A, prescribed fire would help to maintain suitable habitat for their prey (e.g., moths) by sustaining existing forest structure and maintaining diverse herbaceous and woody plants (Summerville and Crist 2008, Dodd et al. 2012) in areas that have received an effective prescribed fire treatment. However, most of the upland forests are homogenous stands with closed overstories and mid-stories, which would be expected to have reduced prey abundance and overall foraging success (Summerville and Crist 2002, Lacki and Dodd 2011).

Eastern Fox Squirrel—Prescribed fire would continue to be used to restore and maintain some open forested stands of mature longleaf pine and loblolly pine where this squirrel occurs in the park. Prescribed burns in the

growing season have the ability to control the mid-story hardwood and shrub encroachment, although this is a difficult goal to always achieve in the CONG prescribed fire program. This squirrel benefits from maintenance of forested habitats in a natural condition of many types. Prescribed burns would continue to be implemented throughout the park uplands to manage fuel loads, maintain habitat, and to help control exotic species. Under Alternative A, fuel accumulations would be expected to be reduced in general and stands that have been successfully treated would be maintained. Prescribed fires would occur under environmental and fire behavior parameters designed to create a mosaic of burned and unburned vegetation within a unit, which eastern fox squirrels require for food and cover (Prince et al. 2016). Less intense fire behavior and the presence of unburned refugia and patches of mature oaks, a primary food source, within a burn unit would be expected to remain under Alternative A; an increase in open forest patches would be unlikely, which favors oaks. These conditions would tend to perpetuate existing forest habitat conditions, but not increase the amount of habitat used by eastern fox squirrels. Refugia would continue to exist for prescribed fires, but could be at risk over time if intense wildfires were to occur.

Under Alternative A, upland forests that consist of dense, mature pine and hardwoods with closed overstory and mid-story would remain as a degraded pine forest community, which is unsuitable habitat for fox squirrels and is more suitable for eastern gray squirrels (*S. carolinensis*; Prince et al. 2016). Additionally, increased potential for localized, intense wildfires could remove mature hardwoods that provide food and cover resources, which could limit the abundance and distribution of fox squirrels in the park, thus, decreasing survival and reproduction success (Conner and Godbois 2003, Prince et al. 2016).

Eastern woodrat—Eastern woodrats are a habitat generalist and are known to inhabit bottomland hardwood forests and hardwood pine forests. Under Alternative A, prescribed fires would occur under environmental and fire behavior parameters designed to create a mosaic of burned and unburned vegetation within a unit. Less intense fire behavior that would promote the growth of forbs and grasses, food sources for woodrats, and the presence of unburned refugia within a burn unit would be expected under Alternative A. These conditions would tend to perpetuate forested habitats used by eastern woodrats and provide refugia during fires.

Under Alternative A, upland forests that consist of dense, mature pine and hardwoods with closed overstory and mid-story would have the potential for localized, intense wildfires that could remove remaining mature hardwoods that provide food resources. However, wildfires would provide forest openings, promoting herbaceous cover as a food source and could provide increased coarse woody debris, providing cover and potential nesting sites. The degree and type of impacts would depend on the fire behavior, fire size, location, fuel composition, and time of year.

Birds

Red-cockaded Woodpecker—Prescribed fire would continue to be used to maintain existing open, park-like stands of mature longleaf and loblolly pine in which this species has evolved. Prescribed burns have the ability to control hardwoods and shrubs without damaging the herbaceous layer and soils (FWS 2003). In addition, prescribed fire as a restoration tool emulates historic fire regimes and aids in the reproduction, growth, and maintenance of longleaf pine and other species and aids in reestablishing highly diverse native groundcovers, all important factors of healthy and suitable red-cockaded woodpecker habitat (FWS 2003).

Under Alternative A, dense, mature pine and hardwood (mainly sweetgums) stands would persist in the park due to the inability of prescribed fire to reduce/thin these species, thereby reducing the ecological restoration needed to successfully create a more open, park-like longleaf pine forest community with an abundant herbaceous layer that once dominated the park uplands and the plantation stands in the park. The low and mid-story brush and trees would continue to increase in density and abundance after prescribed burns, which could compete with longleaf pine establishment and prevent growth of an herbaceous layer with grasses and forbs. Overall, Alternative A would be expected to maintain existing open mature longleaf and loblolly pine habitat that would be suitable for Red-cockaded Woodpeckers. However, under Alternative A the spatial extent needed to support a viable Red-cockaded Woodpecker colony would not likely occur as the amount of open, park-like stands of mature longleaf and loblolly pine would not support the required nesting (minimum cluster area size is 10 acres; FWS 2003) and foraging habitat for recolonizing by Red-cockaded Woodpeckers; average year-round home range size in coastal South Carolina was estimated to be 215 acres (FWS 2003).

Wood Stork—Currently, no Wood Storks are known to nest in the park (NPS 2016), but suitable habitat is available. Wood Storks and their habitat are in general not highly susceptible to the effects of fire as they nest in wetlands and forage in water 4–16 inches deep in open areas with only sparse emergent vegetation that would not likely burn. Under Alternative A, prescribed burning would not be used in the floodplains. Wildfires would have the potential to improve stork habitat by reducing vegetation density in foraging areas that may interfere with access to prey. Wildfires may also help to reduce encroachment of woody invasive species in some areas. However, wildfires are expected to be a rare event in the CONG floodplain, thus Alternative A is not expected to have an effect on Wood Stork use in the park.

Swallow-tailed Kite—Kites nest in mature loblolly pines within or adjacent to floodplain forests (SCDNR 2015). Mature loblolly pines suitable for nesting are found within the floodplain and below the bluffs in the park. Under Alternative A, prescribed burning would not be used in the floodplains and wildfires are mostly absent in the floodplains. If Swallow-tailed Kites nested in the upland mature loblolly pine, these trees could be subject to surface level, low-intensity prescribed fires that would not damage the nest tree, but could temporarily displace individuals. However, Swallow-tailed Kites are not known to nest in the park (NPS 2016, Watson 2005) and are listed as a rare, migrant and summer visitor along the Wateree River in the park (NPS 2016, Carter 2005). Individual kites migrating through the park would likely move away from a fire or fire management disturbance. Areas that burn may support better foraging habitat due to improved visibility of prey. In general, these changes would not be anticipated to significantly improve migratory stopover habitat conditions or limit Swallow-tailed Kites. Overall, prescribed fire would improve foraging conditions, habitat maintenance and enhancement, and reduce potential for high-intensity wildfires.

Bald Eagle—Bald Eagles nest and forage in trees or snags near large bodies of water and have been observed along the Congaree River (Byrne et al. 2011). Currently, there is one active Bald Eagle nest in the CONG floodplain (SCDNR 2016). Prescribed fires would not occur in the floodplain habitat where Bald Eagles are most likely to forage and nest in the park. Upland prescribed fires could disturb and/or displace individuals within or near a burn unit area due to smoke. Prescribed burn plans would include mitigation measures to minimize any potential impacts to this species. Impacts would be negligible if mitigation measures are followed.

The potential for increased localized, intense wildfires within and adjacent to dense, mature upland pine and hardwood forests could lead to smoke inhalation by Bald Eagles foraging along creeks and rivers in the park due to smoke drift from prevailing winds. However, it is likely that eagles would move to adjacent riverine areas unaffected by the smoke. Hunting perches and roost sites are not expected to be impacted by wildfires as such fires are typically limited in size and are rare in the floodplain where trees and snags used by eagles occur.

Cooper's Hawks—Cooper's Hawks may react to fire in multiple ways. Nesting habitat could be reduced in intense fire, while thinning of understory habitat from fire could alter numbers and composition of avian species on which hawks rely. On the other hand, , studies have showed that bird abundance and species richness often do not change, or even increase, several years following fire (King et al. 1998, Greenberg et al. 2007). None of these studies showed an overall reduction in bird numbers and thus potential prey. Effects of fire on the conspecific Sharp-shinned Hawk (*Accipiter striatus*) are reported to reduce potential nesting habitat but increase foraging habitat due to opening of forests (Sullivan 1994 and reference therein). Nesting habitat may still be adequate if larger canopy trees are left intact and habitat is not too savanna like.

The potential over time for increased localized, intense wildfires within and adjacent to dense, mature pine and hardwood forests could lead to loss of current and future nest trees and loss of habitat for prey species, thus reducing the abundance of prey available for the Cooper's Hawk.

Little Blue Heron—The Little Blue Heron is a rare summer resident in the park (NPS 2016, Carter 2005) that typically inhabits fresh water ponds, which occur in the CONG floodplain. In general, Little Blue Herons would not be highly susceptible to the effects of fire because prescribed fires would not occur in the floodplain under Alternative A and wildfires in the floodplain are rare events and typically self-limiting due to moist soils and wet conditions.

Prescribed fires may be proposed and carried out in the uplands during heron nesting season under Alternative A depending on conditions that are required to successfully accomplish the objectives of the burn. Prescribed burns would not be expected to impact herons foraging in the scattered wetlands in the uplands as they would likely move to areas unaffected by fire and/or smoke. While there is some potential for adult and fledgling herons to be affected, the likelihood is very small because they tend to forage in water 2–6 inches deep in open areas; these areas are few and scattered in the uplands and would not be likely to burn. If a nesting colony was found in the park uplands, prescribed fire activities would be avoided in that area during the nesting season. Most nesting colonies are well known and monitored and none are presently known to occur in the upland wetland areas. Under Alternative A, fires may help reduce encroachment of woody invasive species in upland wetland areas, which could improve heron foraging habitat by reducing vegetation density that may interfere with access to prey.

Fire management, aviation, wildfire operations, effects monitoring, and other fire-related activities could temporarily disturb herons if present in the uplands. Disturbance resulting from aviation activities and the presence of fire management and monitoring personnel may cause temporary changes in behavior that may affect normal breeding, feeding, and sheltering, and could increase risk of predation of eggs and nestlings if disturbances occur near a nesting colony. Disturbance of nesting birds is unlikely because of mitigation measures to avoid active nesting colonies. Foraging birds are likely to respond to disturbance by moving out of the area.

Red-headed Woodpecker—This woodpecker may nest in open upland forests or in floodplain forests (Smith et al. 2000). The Red-headed Woodpecker would benefit from prescribed fire as snags used for nesting and foraging perches could be created. Additionally, preferred open habitat would be maintained (Davis et al. 2000), and forage availability (e.g., acorns, insects) may increase for several years after burning. Existing nesting and roosting trees if located would be protected by removing hazardous fuels from the base. Impacts would be negligible if mitigation measures are followed.

Under Alternative A, dense, mature pine and hardwood (mainly sweetgums) stands would persist, reducing the ecological restoration efforts to a more open, park-like longleaf pine forest community that once dominated the uplands along the bluff and the plantation parcels in the park. The mid-story brush and trees would continue to increase in density and abundance, which decreases the amount of open habitat preferred by the Red-headed Woodpecker. Hazardous fuel buildup in some stands could lead to intense wildfires that could burn large areas of Red-headed Woodpecker habitat, including snags used for nesting and foraging. Overall, this alternative would be expected to maintain, but not increase the open mature longleaf and loblolly pine habitat that is used by Red-headed Woodpeckers for nesting and foraging.

Reptiles

Timber rattlesnake—The timber rattlesnake may benefit from prescribed fire. Greenberg and Waldrop (2008) found that reptile abundance increased in Appalachian upland forests following prescribed fire. Timber rattlesnakes would not likely be killed during prescribed fires which are typically low intensity surface fires unless burning occurs during shedding (Ulev 2008 and references therein). Denning snakes, which use rocky areas, are not likely to be impacted, but summer habitat could be temporarily impacted because rattlesnakes prefer leaf litter and woody debris (Ulev 2008), which could be reduced. Summer habitat conditions may improve between fire intervals when debris and litter build back up. Data on effects of fire on rattlesnakes are lacking in general.

The increased potential for localized, intense wildfires over time within and adjacent to the dense, mature upland pine and hardwood forests could remove leaf litter and woody debris that timber rattlesnakes prefer, which could lead to loss of summer habitat until revegetation occurred and mortality of individuals. Following a wildfire, burned areas may support better foraging habitat due to increased prey habitat (i.e., rodents), with increased woody debris from dead trees and grass production. Although snakes move across the landscape quickly and retreat to burrows or other refugia when disturbed, some snakes may become caught in fires and these individuals may be injured or killed, especially with ling duration, high intensity wildfires.

Plants

Needleaf Rosette grass—It is anticipated that mortality of individual plants is likely to occur with prescribed fire in upland areas. However, about 65% of rare native plants in the south have evolved with fire creating or maintaining their habitat (Frost and Wilds 2001). Fire management activities carried out under Alternative A would result in reduced fuel loads and subsequently localized, lower intensity ground fires in upland habitats. Additionally, prescribed fires would help to create openings needed for propagating needleleaf rosette grass in the understory; this species is an indicator of a well-established longleaf pine understory (Haywood 2007). Park fire management staff would be able to plan prescribed fires for habitat maintenance. As a result, the timing, frequency, intensity and spatial area would be more predictable and could be modified as new data emerges. Prescribed burn objectives could be modified as more information is learned about this grass species and prescribed fire effects in the park.

High intensity wild fires may result in injury or mortality of individual plants. The likelihood of mortality depends on the intensity of the fire and attendant fuel buildup. Low intensity, surface prescribed fires or wildfires that occur in areas having had past fuels/vegetation management treatments would be expected to have lower fuel loads. These fires are less likely to result in injury or mortality than high intensity fires that could occur in areas with greater fuel loads, such as the dense, mature pine and hardwood forests. These grasses are mostly absent in the mature, dense pine and hardwood forests as they have closed canopies preventing ground cover from growing due to lack of sunlight.

Cumulative Impacts

Actions that could contribute to cumulative impacts on special status species and their habitat under Alternative A include the ongoing development adjacent to the park and fire management actions in the park, traffic along roads and the rail line, and wildland fires on neighboring lands. All of these actions could temporarily or permanently disturb or displace local wildlife species. The continued growth and development in the surrounding area could contribute to the conversion of wildlife habitat to developed lands outside the park. This would increase habitat fragmentation and loss of habitat in the area, which has caused habitat degradation and degradation to ecosystem function in the region. Alternative A would contribute negligibly to adverse cumulative impacts to special status species due to increased noise and disturbance to individuals.

Section 7 Determination of Effect

Alternative A may affect but is not likely to adversely affect the Wood Stork or Red-cockaded Woodpecker. Concurrence in this determination will be sought from the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to special status species and their habitat would be similar to those described under Alternative A, with the spatial extant of reducing hazardous fuels and restoring fire-adapted habitats in the park increasing as managing wildfires for resource objectives, mechanical treatments, prescribed fires in abandoned floodplain agricultural plots, planting of longleaf pines, hardwoods, and grasses, and targeted herbicide application are allowed. Prescribed fire use in the old floodplain agricultural plots (about 125 acres) would only be used if modeling and analysis shows that it would be effective in helping restore these areas to typical Congaree bottomland vegetation types. Upland prescribed fire would be used as described in Alternative A, except that it could be combined with the additional tools resulting in a more effective restoration of forests to historical upland forest conditions.

The management of wildfires for multiple objectives, which could include resource objectives, may help to further reduce hazardous fuels by treating more acres with wildland fire. Wildfires managed for multiple objectives over time under this alternative would further decrease the potential for intense, large wildfires. Wildland fires would move further toward emulating a natural fire regime and having impacts within the range of naturally occurring fires across the landscape, thus over time requiring less suppression activities and reducing attendant impacts from fire suppression activities. Furthermore, wildfire containment boundaries

(existing natural or human made barriers) could be more distant depending on the resource objectives and values to be protected.

Mechanical treatments to reduce hazardous fuel loads, thin dense, mature pine and hardwood forests, and create/maintain defensible space and fuel breaks would increase the probability for lower-intensity ground fires. This would help to protect and maintain special status species and their habitat. Additional mechanical treatments would be small in scale (up to 200 acres annually, which is less than 1% of the total land in the park), but would help to restore longleaf pine habitat and associated special status species by reducing the potential for pine beetle infestation and opening the understory to allow sunlight and nutrients for grasses (e.g., needleaf rosette grass), forbs, and longleaf pine seedlings (Van Lear et al. 2005). Mechanical treatments would also reduce competition for sunlight and nutrients from hardwoods, which would help to promote longleaf pine seedling and ground cover growth. Additionally, collection of viable, local longleaf pine seeds could be done using a mechanical tree shaker that would travel off-road to collect the best seeds. If collection would occur near known needleaf rosette grass locations, then mitigation measures would be implemented to reduce and/or avoid potential impacts. Mechanical treatments could displace or disturb special status animal species within the treatment area until the work is completed from human presence and equipment. However, restoring longleaf pine habitat would benefit associated special status species like the eastern fox squirrel and needleleaf rosette grass.

Planting of longleaf pine seedlings and other native plant species could occur to promote longleaf pine restoration efforts. Planting of longleaf pine seedlings may reduce the grass stage to one or two years (Van Lear et al. 2005), which could increase the resiliency and rate at which longleaf pine forest communities are restored. Speeding up restoration gets the longleaf pine trees to a height that is more resistant to fire damage sooner, and shortens the period for mechanical and herbicide intervention. The sooner longleaf pine forests are restored, the better for associated special status species.

Targeted herbicide application, such as foliar application to specific basal or foliar plant areas, would minimize chances for overspray and applying to non-target plants. Mitigation measures, limited use, low-volume application of herbicide to specific basal or foliar plant areas, and following all labels would minimize chances for overspray and impacting non-target plants. In addition, herbicides commonly used for vegetation management (e.g., triclopyr [Garlon 4/Element 4], glyphosate, imazapyr, sulfometuron, metsulfuron methyl, hexazinone) have been designed to target biochemical processes unique to plants and have low levels of direct toxicity or risk to wildlife species when used in accordance with label specifications (Tatum 2004). For example, past studies have noted the presence of rattlesnakes following herbicide application (Ulev 2008). Herbicides commonly used for vegetation management also degrade quickly upon entering the environment and are neither persistent nor bioaccumulate (Tatum 2004). Over time, using targeted herbicide as a follow-up treatment to mechanical work or prescribed fire would reduce and/or cease the need for repetitive mechanical work, thus minimizing reoccurring disturbances to special status species.

Cumulative Impacts

Adverse cumulative impacts would be the same as described for Alternative A. However, over time aggressive wildfire suppression actions may be less than compared to Alternative A as less fireline construction and holding may be utilized. More acres of fire-dependent habitat may be treated and restored, thus habitat integrity for special status species would improve within the park.

Section 7 Determination of Effect

Alternative B may affect but is not likely to adversely affect the Wood Stork and Red-cockaded Woodpecker. Concurrence in this determination will be sought from the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Under Alternative C, impacts to special status species and their habitat would be similar as described under Alternative B; however, slightly fewer acres would be treated than Alternative B (700 acres). The potential risk for pine beetle infestations and hazardous fuel loads could increase over time in the wilderness uplands (about 700 acres) with no wheeled/tracked equipment (e.g., masticators, mechanical tree shaker) to aid in ecological restoration efforts. Upland forest stands in the wilderness area would not be thinned, which would perpetuate the dense forest stands with increased risk for pine beetle infestations. The increased risk for pine beetle infestations could increase the hazardous fuel loads (dead standing trees or fallen woody debris). These conditions would likely change the behavior of wildland fires that originate and/or spread into the wilderness uplands to be of high intensity. High intensity wildland fires could remove large tracts of vegetation that could reduce the resilience and integrity of special status species and their habitat In addition, without successful ecological restoration (i.e., lower intensity, surface fire mimicking natural fire cycles) fire dependent vegetation, including the needleleaf rosette grass, may decrease in prevalence and vigor. The degree of impacts to special status species and their habitat would vary depending on size of the fire, the location, extent, timing, and other factors related to the fire. An intense wildfire could also kill a substantial portion of canopy trees, further hindering the long-term objective of creating habitat for the Red-cockaded Woodpecker.

Cumulative Impacts

Adverse cumulative impacts would be the same as described for Alternative B. However, over time aggressive wildfire suppression actions may be slightly more than Alternative B as fireline construction and holding actions would be more likely to be needed within and adjacent to the dense upland forests in the wilderness. Additionally, high intensity wildfires in the wilderness uplands would be more likely to spread into the floodplain or adjacent non-wilderness restored upland forests, damaging the edges of those habitats. Overall, fire-dependent habitat would improve benefitting the associated special status species, but less compared to Alternative B.

Section 7 Determination of Effect

Alternative C may affect but is not likely to adversely affect the Wood Stork and Red-cockaded Woodpecker. Concurrence in this determination will be sought from the U.S. Fish and Wildlife Service under section 7 of the Endangered Species Act.

Wilderness

Affected Environment

Approximately 21,700 acres are designated wilderness and 150 acres are potential wilderness in the park (NPS 2014b). Lands identified as being suitable for wilderness designation, wilderness study areas, proposed wilderness, and recommended wilderness (including potential wilderness) must be managed to preserve the wilderness character and values in the same manner as designated wilderness until Congress has acted on the recommendations. Therefore, for the purpose of this FMP, the 150 acres of potential wilderness located in the park would be managed as designated wilderness until Congress takes action. The park visitors primarily experience the wilderness in the park by walking on the boardwalk, hiking, paddling, fishing, and backpacking (NPS 2014b).

The 1964 Wilderness Act defined wilderness as "an area where the earth and its community of life are untrammeled (i.e., unmanipulated) by man." In addition, the act states "except as necessary to meet the minimum requirements for the administration of the area for the purposes of this act, there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."

The NPS is charged with preserving and enhancing the wilderness character of the wilderness areas it administers. According to Director's Order 41: *Wilderness Stewardship* (NPS 2013a), wilderness character can be monitored using five qualities. These five qualities are defined below.

- Untrammeled—Wilderness is essentially unhindered and free from modern human control or manipulation. Actions authorized or unauthorized by the federal land manager that manipulate the biophysical environment are indicators used to identify effects to the untrammeled quality.
- Natural—Ecosystems are substantially free from the effects of modern civilization. Plant and animal species and communities, physical resources, and biophysical processes are indicators used to identify effects to the natural quality.
- Undeveloped—Wilderness retains its primeval character and influence and is without permanent improvements or modern human habitation. Non-recreational structures, installations, and developments, inholdings, use of motor vehicles, motorized equipment, or mechanical transport, loss of statutorily protected cultural resources are indicators used to identify effects to the Undeveloped quality.
- Opportunity for Solitude or Primitive and Unconfined Recreation—Remoteness from sights and sounds of people inside the wilderness, remoteness from occupied and modified areas outside the wilderness, facilities that decrease self-reliant recreation, management restrictions on visitor behavior are indicators used to identify effects to the Solitude or Primitive and Unconfined quality.
- Other Features—Values and features that are not fully covered under the other four qualities, including ecological, geological, scientific, educational, scenic, or historic value.

A brief summary of park's wilderness characteristics are below.

Untrammeled: Wilderness lands in the park are natural and are allowed to function essentially unhindered and free from modern human control or manipulation. Temporary disturbances do occur from management actions to improve the natural quality of the wilderness, such as removing non-native plants and animals, scientific research, implementing prescribed fires, and monitoring and protecting special status species. These activities are authorized by NPS policy and are only implemented when determined necessary for the preservation of the wilderness resource. Additionally, maintaining the Cedar Creek canoe trail, the campground, and the hiking trail system occasionally requires the removal of fallen and downed woody debris. The maintenance of the boardwalk in the wilderness requires occasional repairs from flood damage. Portions of the wilderness have been impacted by past human activities—logging (loblolly plantations), abandoned agricultural features and plots, road and infrastructure construction—that altered the local hydrology.

Natural: The wilderness in the park protects a diverse array of natural habitats that are overall free from the effects of modern civilization. Some upland areas support a small tract of longleaf pine forest, once the predominant forest type in the uplands. Past logging, agricultural practices, and wildland fire exclusion as well as non-native feral hogs and plant species have considerably altered aspects of the natural character. The primary effect visible today are the altered forest types such as dense, even aged loblolly pine stands and lack of a native herbaceous layer. These forests seem visibly "different" from the other forest stands at the park, lacking the diversity and randomness of native vegetation communities. The presence of non-native plants also detracts from the natural quality by replacing natural vegetative communities. Past prescribed burning in the uplands have helped to maintain the ecological integrity of remaining fire-adapted habitats and associated wildlife species. Prescribed fires have also improved vegetation communities in some wilderness areas by diversifying the forest stand structure and native plant species composition.

Undeveloped: Most of the wilderness in the park is undeveloped. The past agricultural activities adjacent to the river and higher elevated areas of the Congaree River floodplain in the wilderness has rebounded erasing obvious signs of past manipulation. Remnant historic structures (e.g., dikes, cattle mounds) remain within the wilderness boundary; most of these structures are listed on the National Register of Historic Places.

The undeveloped quality of wilderness is degraded principally by structures used to facilitate scientific research. These include scientific monitoring equipment, hog traps, and tree tags. The entire wilderness is heavily forested and views within the wilderness are rarely interrupted by development outside the wilderness. The undeveloped quality is temporarily degraded sometimes by the authorized

use of off-road vehicles and mechanized equipment (e.g., chainsaw) by park personnel during emergency incidents or authorized through the MRA process. Human-caused noises outside the park, such as motorboats on the Congaree River, trains on the Norfolk Southern rail line, vehicles on Old Bluff Road, and aircraft overflights, also degrade the undeveloped quality at times.

Opportunity for Solitude or Primitive and Unconfined Recreation: Few trails are maintained in the wilderness the park, and they mostly receive light visitation use, so there are outstanding opportunities for solitude. This quality is degraded by structures used to facilitate visitor use, including the boardwalks near the visitor center, which attract a fair number of users during peak visitation periods, the Bluff Campground, backcountry trail bridges, trail signage, and impacted sites along Cedar Creek, which at times may receive small groups of paddlers that are confined to the creek corridor. Other than the boardwalk and trails, there are no visitor facilities and visitor use is low; the park wilderness provides opportunities for hiking on and off trails, scenic viewing, wildlife watching, paddling, fishing, and camping.

Overall, the park wilderness environment can be considered a difficult environment for humans; use is light during much of the year, so overall there are plenty of opportunities for primitive and unconfined recreation. Occasional work in the wilderness by the NPS includes search and rescue, trail and boardwalk maintenance, exotic plant and feral hog control activities, research, and prescribed burning. Over the course of a year, the actual presence of small work crews or employees is minor and intermittent; crews rarely encounter visitors so have only minor impact on wilderness recreational opportunities.

Opportunities for solitude at the park are also degraded by human-caused noises from boats on the Congaree River, vehicles on Old Bluff Road, trains from the Norfolk Southern rail line, and periodic military aircraft overflights.

Other Features: The CONG wilderness has scattered cultural resources representative of the agricultural, settlement, commercial, and social practices of the South Atlantic Coastal Plain people. These cultural resources consist of old agricultural fields and earthen mounds and embankments built to protect cattle and crops from flooding. The integrity of these cultural resources has been impacted by erosion from periodic flood events and rooting by feral hogs. The cattle mounds and dikes built by slaves before the Civil War are connected to the long-standing use of the CONG wilderness by the local residents, specifically the African Americans. African Americans used the CONG wilderness for work, subsistence, and refuge; many descendants still live, work, and recreate in the area.

Analysis of Alternatives and Impacts on Wilderness

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

Under this alternative, prescribed fire treatments in the upland wilderness forests (about 700 acres out of the 21,700 acres of wilderness; 3%) would continue to emulate the natural fire regime, and to promote upland ecological restoration, hazard fuel reduction, and wilderness conditions. Prescribed fire would benefit wilderness values on a landscape level by minimizing the need for continued fire suppression and allowing fire to be managed in a manner that mimics natural fire regimes and perpetuates natural processes. Prescribed fire treatments alone in wilderness upland forests have not been fully effective in meeting ecological restoration objectives (i.e., opening up the pine stands and longleaf pine establishment), and reducing mature planted pines and hardwoods (i.e., sweetgums). The natural quality of wilderness would be adversely affected in two ways. First, hazard fuel loads (dead standing trees, fallen woody debris, or leaf and needle cast) could continue to accumulate, increasing the potential for intense wildfires that could result in the removal of large tracts of vegetation in the upland forests, altering the structure, composition, and species diversity of vegetation communities. The degree of impacts would vary depending on size of the fire, location, extent, timing, and the level of suppression efforts required. Second, the health and vigor of the upland forest could continue to degrade from natural conditions due to the increased risk of pine beetle infestations and perpetuating the unnatural altered structural diversity and species composition of fire-dependent vegetation communities.

Prescribed fire could increase the diversity of native vegetation and reduce exotic plants, all qualities of a natural wilderness. It is likely that the progression to climax longleaf pine forests in the wilderness uplands could take hundreds of years without human intervention; changes in the climate and ecosystem may not allow this type of climax vegetation to occur at all. In addition, hazard fuels would be reduced in burn treatments, increasing the potential for localized, lower intensity wildfires. Overall, implementing prescribed fire in the uplands would leave little imprint as a human-caused effect, as prescribed fire resembles natural fire processes within the park upland ecosystems that creates a mosaic of effects and intensities. Impacts from control lines to natural and undeveloped qualities of wilderness, if necessary, would last until the regrowth of vegetation on the disturbed area. Control lines would continue to be used as long as they could be maintained by hand or handheld motorized equipment. Control lines could be located inside or outside wilderness boundaries and/or utilizing natural or manmade boundaries such as roads, trails, water features, or the bluff.

Wildfires managed primarily for suppression objectives could require ORVs to transport equipment, helicopters for reconnaissance, bucket drops, or transporting equipment and supplies, or the use of handheld motorized equipment to cut or remove vegetation (e.g. snags threatening a control line). Because of the few fire control features in wilderness, these actions are unlikely or rarely to occur in the CONG wilderness. The NPS would minimize these types of actions to rare or unusual occasions necessary for specific objectives, and utilizing the MRA process to define the minimum methods and tools to be used for a typical initial response to a wildfire. The presence and associated noise of mechanized (e.g. ORVs, helicopters, pumps) and handheld motorized equipment (i.e. chainsaw) deemed necessary for wildfire management by the MRA process would temporarily affect the undeveloped quality of wilderness and outstanding opportunities for solitude or a primitive and unconfined type of recreation. These impacts from mechanized and handheld equipment would only last as long as firefighters and equipment were present in wilderness. The occasional use of ORVs to move essential equipment such as pumps and supplies, the use of handheld motorized equipment or tools to alter vegetation or fuels, and fire aviation activities in the wilderness would also impact the natural quality of wilderness from the disruption and compaction of vegetation or soils. The type of ORV and options for use are limited and subject to the MRA process and Superintendent Approval, which may limit the number of trips and equipment present in the wilderness; this reduces soil tracks and disturbance to minimize post-fire visible impacts. Aviation activities such as helispot construction and water drops could impact the natural quality by removing or damaging vegetation and displacement of wildlife within the burn area.

The CONG fire program does not anticipate using ORVs, aviation water drops, pumps, or installing control lines in wilderness, but these may be used to protect values at risk, such as a threatened and endangered species site located in wilderness from a high-intensity wildfire spreading towards it, or a fire that threatens values outside the park boundary. ATVs/UTVs would be used during prescribed fire operations to safely secure firelines by treating burning vegetation and snags up to 100 feet inside the Wilderness boundary. Wheeled or tracked equipment for wildfire control is generally not practical in the CONG wilderness due to wet conditions, but could be considered with Superintendents approval if dry conditions existed and important/high values were at risk. These uses would be pre-determined and analyzed in a programmatic MRA as a component of the revised FMP.

Implementation of prescribed fires and wildfire suppression activities would degrade the untrammeled quality of wilderness by continued human manipulation of the natural fire regime. The extent of impacts to the untrammeled quality of wilderness from wildfire suppression efforts would depend on the fire size, behavior, time of year, fuel conditions, and fire intensity. Additionally, during prescribed fire treatments and wildfire suppression activities, visitors may be excluded from burn areas for safety reasons, which would impact opportunities for solitude or primitive and unconfined recreation as long as the area is closed. Prescribed fire management actions would continue to improve the ability to protect and preserve cultural resources, an ancillary attribute and quality of wilderness character. Fire management activities are designed to protect cultural resource values within wilderness and would be expected to have little to no adverse impacts on cultural resources. Wildfire suppression activities that occur in wilderness are more of an emergency action and may inadvertently damage undocumented cultural resources.

Cumulative Impacts

Past, present, and reasonably foreseeable actions that contribute to cumulative impacts on wilderness values include wild pigs and regional growth and development. Implementing the Wild Pig Management Plan would may continue to minimize impacts of wild pigs on wilderness resources and values by reducing the number of wild pigs and their associated impacts to wilderness character.

Regional growth and development in the surrounding area is expected to continue, which could lead to increased noise disturbances from outside the park and increased visitation and use of the CONG wilderness. Increased visitation to the CONG wilderness from current visitation numbers could lead to additional conflict with opportunities for solitude and primitive and unconfined recreation, especially on trails or the Cedar Creek watercraft route. Alternative A, the No-action Alternative, combined with the past, present, and reasonably foreseeable actions would result in a continued contribution to adverse cumulative impacts on wilderness character from fire management actions.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to wilderness would be similar as described for Alternative A for prescribed fire treatments and wildfire suppression actions, with the spatial extent of adverse and beneficial impacts increasing as wildfires would be managed for multiple objectives including resource objectives, additional mechanical treatments (mastication) with wheeled/tracked equipment, targeted herbicide treatments to follow-up mechanical work or wildland fire to control re-sprouting of saplings, and planting of native species such as longleaf pines would be allowed in the park. These activities would all occur on the uplands in the wilderness (about 700 acres). Prescribed burning, planting of native species, and targeted herbicide use may also be considered in the abandoned agricultural plots (about 125 acres) within the CONG floodplain. The proposed activities would have the indirect effect of lessening the intensity and size of wildfires, and increasing the ecological integrity of the altered upland forests and floodplain forests in the abandoned agricultural plots. The improved ecological integrity would be due to increased diversity and structure of native vegetation.

Management of wildfires for multiple objectives including resource objectives could increase the health and vigor of fire-dependent vegetation communities as well as the spatial extent of hazardous fuel reduction. The potential for localized, lower-intensity wildfires in the wilderness uplands would increase, which would help to emulate the historic fire regime. Over time, wildfires managed for multiple objectives including resource objectives could be managed as naturally occurring wildfire events. Most wildfires are managed with multiple objectives; one flank may be suppressed where it is approaching infrastructure or other values to be protected outside wilderness while another flank may be allowed to burn in order to achieve resource objectives in wilderness. The primary resource objective of wilderness wildfires would be to restore and maintain natural fire regimes and reduce natural hazardous fuels which threaten values-at-risk. These objectives support ecosystem biodiversity, resiliency, and stability by maintaining vegetative fuel conditions within a range of natural variability.

Conducting the proposed fire management activities would have varying effects on wilderness character, depending on the action. Mechanical equipment, targeted herbicide application, and planting efforts used to improve the natural quality of wilderness character would degrade the untrammeled and undeveloped qualities of wilderness due to human manipulation from potential compaction of soils, and alteration of trees and vegetation. However, over time the amount of human manipulation in the wilderness would decrease as the upland forests and native floodplain forest in wilderness were restored and uplands could be maintained using prescribed fires or wildfires. The floodplain forest would not need periodic fires to be maintained, and thus would not be re-burned after the initial prescribed fire for restoration. In the upland, hazardous fuels would be reduced and natural habitats would be restored and maintained to a greater extent, thereby increasing the potential for localized, lower-intensity ground fires and wildfires managed for multiple objectives, including resource objectives where necessary. Management/suppression actions would occur outside wilderness as much as possible, thereby reducing the amount of human manipulation and control of the fire regime and vegetation in the wilderness. Prescribed fires and wildfires managed for multiple objectives including resource objectives would increase the amount of acres maintained in fire-adapted vegetation communities, and enhance

associated wildlife and the diversity of vegetation, thus increasing the spatial extent of beneficial impacts to the natural quality.

Impacts to cultural resources in the wilderness under Alternative B would be the same as discussed for Alternative A. However, especially in the wilderness uplands, the overall protection and preservation of cultural resources would increase with the augmented amount of hazardous fuels reduced, thus increasing the probability for lower intensity surface fires over time in treated areas.

Mechanical thinning in the wilderness upland forests would over time improve the health and vigor of the forest stands by opening the canopy, which would promote growth of a herbaceous layer consisting of grasses, forbs, and longleaf pine seedlings, increase the structural diversity of the forest stands, and reduce the potential risk for pine beetle infestation. Mechanical treatments (e.g., thinning, masticators) could temporarily disrupt the natural quality with soil compaction and rutting, removing some trees, and creating open patches in the forest stands. These impacts would last until regrowth of vegetation in the ground layer occurred. Targeted herbicide application and planting native species would benefit the natural quality of wilderness by aiding in ecological restoration of native vegetation communities, including longleaf pine forests. The native vegetation communities would reflect a more natural state by improving species composition, abundance, diversity and forest stand structure, all values benefitting the natural quality of wilderness.

The presence of small work and planting crews, fuels reduction activities (such as mastication), targeted herbicide treatments, and the use of power tools (such as chainsaws and brush cutters) and mechanized wheeled equipment would affect the undeveloped quality and opportunities for solitude or primitive and unconfined recreation from the presence of equipment, noise, emissions, and visual intrusions. Mechanical treatments deemed necessary for wilderness restoration by the MRA process would temporarily affect the undeveloped quality and opportunities for solitude or primitive and unconfined recreation as long as the equipment and crews were present in wilderness. Additionally, the opportunities for solitude or primitive and unconfined recreation could be impacted more under Alternative B than Alternative A as treatment areas in wilderness uplands (about 700 acres) and abandoned agricultural plots (about 125 acres) would be closed to visitors during the treatments. The extent of closures would depend on the duration of the treatment and location, with the extent of impacts depending on time of year it occurs (low versus high visitor seasons).

Cumulative Impacts

Cumulative impacts to wilderness character from past, present, and reasonably foreseeable actions are similar to those described under Alternative A. Alternative B in combination with past, present, and reasonably foreseeable actions would contribute to adverse cumulative impacts as well as beneficial cumulative impacts to wilderness resources. There would be contribution to beneficial cumulative impacts to wilderness due to the increased ability to restore fire as a natural ecological process, improving the health and vigor of native vegetation communities, and maintenance and restoration of fire-adapted vegetation communities. While there would be some initial disruption of wilderness qualities as initial restoration steps were taken, these would be expected to decrease over time as the wilderness quality improved and less active management was required.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Impacts from Alternative C to wilderness would be similar as described for Alternative B. However, there would be no use of tracked or wheeled equipment to reduce fuels or to collect longleaf pine seeds in wilderness uplands (about 700 acres) under Alternative C. This would remove the temporary impacts to the undeveloped quality and opportunities for solitude or primitive and unconfined recreation associated with increased noise and vegetation and soil disturbance from mechanical equipment used to thin the upland forests and reduce hazardous fuels. However, this would make creating openings, restoring native upland forest species and structure, and increasing native plant and wildlife diversity more problematic and less likely in portions of the wilderness uplands. This would lead to corresponding adverse effects to the natural quality of wilderness character. Portions of the upland forests in the wilderness would remain as dense, mature pines, a visible reminder of past logging and agricultural impacts. The altered structure and species composition, such as lack of understory grasses and forbs and diverse forest structure and age classes, does not reflect the native

vegetation community. Retaining the mature, closed canopy forest stands would decrease the health, vigor, and resilience of these forest stands, and diminish the natural quality of wilderness. Additionally, the potential increase of tree mortality from pine beetle infestations would increase the potential for localized, intense and stand replacement wildfires. As discussed under Alternative A, the natural quality of wilderness would be impacted by wildfire suppression actions that may require more frequent use of motorized equipment and hand tools to remove vegetation, and ORVs and vehicles to carry personnel and equipment. The natural quality could also be impacted by stand replacing wildfires, which would be an uncharacteristic change in this environment. The lack of mechanical treatments could also increase fire risk to cultural resources within and adjacent to the wilderness over time.

Cumulative Impacts

Cumulative impacts to wilderness character from past, present, and reasonably foreseeable actions are similar to those described under Alternative A. Alternative C in combination with the past, present, and reasonably foreseeable future actions would contribute to adverse as well as beneficial cumulative impacts as described under Alternative B. Under Alternative C, cumulative impacts to wilderness would initially be less than described under Alternative B. However, Alternative C would have increased adverse cumulative impacts to wilderness over time due to the lack of restored fire-adapted forest stands, increased potential risk for pine beetle infestations and intense wildfires, and more suppression activities.

Cultural Resources

Affected Environment

The meandering of the Congaree River has likely destroyed many cultural resources over time as evidenced by cultural resources found on sandbars and the mosaic of oxbow lakes in various stages of eutrophication. The floodplain itself with its frequent flooding and moist conditions would tend to discourage human utilization. Utilization of the floodplain area most likely included limited activities, like harvesting of flora and fauna for subsistence, minimal cultivation, and grazing by livestock. However, research suggests that more people may have inhabited the floodplain during the 18th and the first half of the 19th centuries than previously thought (Hardy 2008).

The cultural resources in the park span from pre-European contact to the present and represent the South's bottomland subsistence heritage and related agricultural and commercial practices. There are twenty-eight historic or cultural sites that have been documented within the park of which 9 are listed in the National Register of Historic Places (NRHP; Michie 1980). These structures include levees and cattle mounds, as well as late 18th century bridge abutments. Other sites potentially eligible for listing on the NRHP include the Bates Old River Causeway, various road traces, and all archeological sites. Michie (1980) and Hardy (2008) documented that many of the recorded sites were spurious in deposition and resulted from imported soils used to fill and maintain roads prior to the establishment of the park. There were also attempts at building roads and a bridge through the floodplain along with flood control attempts through the use of dikes. The majority of historic resources is located within the floodplain and consists of mounds or dikes that were built to protect cattle and crops from flooding. All of these attempts to harness the floodplain resources were relatively small in scope and short in duration. There are four archeological sites located in the current burn units. These include whiskey stills, a former house site, and the remains of a structure and well.

All cultural resources, whether listed or eligible for listing in the National Register, would be treated the same under each alternative.

Analysis of Alternatives and Impacts on Cultural Resources

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

The CONG fire management staff coordinates with the cultural resource staff (the park and NPS Southeast Regional Office), Southeast Archeological Center, and appropriate tribal groups to avoid known cultural sites. Resource protection measures included in the 2004 FMP serve to protect cultural resources by limiting ground

disturbance intensity using hand tools, blowers, and hand and/or chainsaws to construct firelines and not using fire retardant. The current fire management tool, prescribed fire, protects cultural resources by helping to reduce hazardous fuel loads, which increases the potential for wildland fires to be localized, lower intensity, surface fires, thus reducing the potential risk of damage to cultural resources. All prescribed burns have plans that allow for advance clearance and mitigation measures for cultural resources. Should new archaeological resources be identified during prescribed burns, all work would cease in the immediate vicinity of the discovery until the resource could be identified and documented and an appropriate mitigation strategy developed in consultation with the State Historic Preservation Officer. Any known archaeological resources would be marked with special flagging and mitigation measures would be taken to protect identified resources from prescribed burns.

Wildland fire suppression activities could result in displacement of surface materials, exposure of surface materials due to ground disturbance from fire management activities, or disturbance to materials immediately below the surface from vehicles due to earth moving or compaction. Indirect adverse impacts could include exposure of artifacts from erosion and loss of vegetation near cultural sites, which could increase looting. Mitigation measures (see Mitigation Measures Section) would reduce or eliminate many impacts from wildland fire suppression actions.

Portions of the upland forests with mature loblolly pine and sweetgums would remain dense forest stands with increased hazardous fuel loads (i.e., ladder fuels and ground cover) as prescribed fire alone does not effectively thin these areas. This could lead to increased potential for intense wildfires, which could cause discoloration of surface artifacts, burning perishable materials, checkering or cracking of glass and ceramic artifacts, melting of metals, and distortion of historic structures from expansion of materials (Ryan et al. 2012). Archeomagnetic dates and pollen counts could also be altered from a high intensity wildfire. Overall impacts would depend on the timing, location, intensity, and extent of the wildfire and the mitigation efforts that could be implemented.

Cumulative Impacts

Activities that could contribute to cumulative impacts to cultural resources include feral hogs, past road construction, logging, and agricultural development, and natural erosion along the Congaree and Wateree rivers. Cultural resources are nonrenewable, so damage or loss from any activity would gradually diminish the types and numbers of cultural resources present. Alternative A would continue to reduce hazardous fuel loads, reducing the potential risk to cultural resources by intense wildfires. Alternative A would contribute negligibly to adverse cumulative impacts due to the minimal soil disturbance associated with fireline construction and vehicles.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts to cultural resources would be similar to those described under Alternative A for wildland fire suppression actions and prescribed fires. The additional use of mechanical treatments, wildfires managed for multiple objectives including resource objectives, and targeted herbicide application would increase the degree and range of protection for cultural resources by reducing hazardous fuel loads adjacent to cultural resources, maintaining/creating defensible space around and near cultural resources, and increasing the ability to achieve desired resource conditions.

As discussed under Alternative A, wildfire management activities have the potential for ground disturbance in and near cultural resources. However, wildfires managed for multiple objectives including resource objectives would have less impact on soils and vegetation from ground disturbance compared to full suppression of wildfires.

The use of mechanical treatments to thin the mature, dense upland forests and the use of mechanical shaker to collect longleaf pine seeds would result in ground disturbance from vehicle use or compaction, which could physically damage, disturb, or expose artifacts. Erosion and looting of cultural resources could be augmented from the exposure of artifacts. Mechanical treatments could also result in the displacement of cultural resources from their original spatial context. However, with avoidance of known cultural resources and implementation of mitigation measures, the impacts would be minimized.

Targeted herbicide application applied by hand to specific basal or foliar plant areas would minimize chances for overspray and migration into the soil. Additionally, targeted herbicide application would use herbicides that do not have short- or long-term residual implications to soils. Implementation of mitigation measures, limited use as a follow-up treatment to selected mechanical treatments would also help to minimize impacts to cultural resources by minimizing vegetation cutting and ground disturbance.

Cumulative Impacts

Cumulative impacts to cultural resources would be similar to those described under Alternative A. Cultural resources are nonrenewable, so damage or loss from any activity would gradually diminish the types and numbers of cultural resources present.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Impacts to cultural resources would be similar to those described under Alternative B. However, the hazardous (about 700 acres) fuel loads could increase in the upland areas in the wilderness with no use of wheeled/tracked equipment. Upland forest stands in the wilderness area would remain dense mature forest stands with increased risk for pine beetle infestations and attendant increase of hazardous fuels. These areas would have an increased potential for intense wildland fires that could impact unknown, unrecorded, and known cultural resources. Intense wildland fires could require full suppression activities, which could increase ground disturbance to cultural resources. The degree of impacts would vary depending on size of the fire, fire behavior, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Alternative C would have similar cumulative impacts to Alternative B, except that cultural resources in the wilderness upland forests could have increased adverse cumulative impacts due to the increased potential risk for intense fires and associated risks to cultural resources in the upland forests in the wilderness.

Visitor Use and Experience

Affected Environment

Over the past decade, visitation to the Park has increased from less than 50,000 to over 120,000 people per year (NPS 2014b). People visit the park to experience the remnant old-growth bottomland hardwood forest. Visitor activities include hiking, fishing, bird watching, canoeing, and camping. Most visitor use takes place on the 2.4-mile boardwalk loop that goes through the floodplain and connects to a network of hiking trails. There are two walk-in campgrounds and primitive camping throughout the backcountry. The Congaree River Blue Trail from the Congaree River downstream to the Bates Bridge Landing is a National Recreation Trail used for canoeing.

Analysis of Alternatives and Impacts on Visitor Use and Experience

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

There would be temporary visitor use restrictions within treatment areas so that no visitors are near where fuel management and/or restoration actions are actively being applied (i.e., prescribed fire, mechanical treatments) or where wildfires are present. Noise associated with mechanical treatments such as chainsaws or masticators near the park buildings could temporarily disrupt the visitor experience. The noise disturbance would cease once the treatment was completed.

Wildland fires could produce smoke, altering or reducing the visibility of scenic views, odors, and limited blackened areas that could affect visitor experience if near the visitor center, boardwalk, or other high use visitor areas. However, the presence of fire, smoke, and blackened areas could present an opportunity for education and interpretive programs of natural resources and the benefits of prescribed fire as emulating a natural process to aid in restoration of fire-dependent ecosystems such as the longleaf pine.

Portions of the upland forests would continue to have dense stands as prescribed fire treatments are ineffective in reducing mature loblolly pine and larger sweetgums (Waldrop et al. 1987). These areas would have an increased risk for pine beetle infestations and attendant hazardous fuels from dead standing trees and woody debris. These conditions would increase the likelihood for intense wildfires fires that could result in longer closures in portions of the park to visitors, increased smoke emissions to visitors and surrounding lands, and could result in the removal of large tracts of vegetation in the upland forests reducing the visitor experience until revegetation occurred.

Cumulative Impacts

Activities that could impact visitor use and experience include fire management activities planned by other agencies and landowners, wildfires occurring on adjacent lands, noise from vehicles, trains, and boats, and maintenance activities within the park. Continued population growth in the Richland County area could increase the amount of local visitors to the park. Increased visitation during fire management activities could have beneficial impacts by educating more visitors about the fire-adapted ecosystems and the importance of fire in resource management (e.g., restoration). The impacts of Alternative A would contribute negligibly to adverse cumulative impacts to visitor use and experience as the closures would be temporary and site-specific. Additionally, the use of prescribed fires to reduce hazardous fuel loads and defensible space work around park infrastructure would decrease the potential for intense wildfires in portions of the park.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Impacts under Alternative B would be similar as described for Alternative A, in regards to wildland fires and mechanical treatments. The additional mechanical work, wildfires managed for multiple objectives including resource objectives, planting of native plants, and targeted herbicide application could increase the potential for temporary closures to visitor use areas. However, these additional vegetation/fuel management tools would increase the spatial extent of hazardous fuels reduced in the forest stands, thus, further decreasing the potential for intense wildland fires. Specifically, the increased use of mechanical works would improve the health, vigor, and resilience of the upland pine forest stands, thus reducing the risk to pine beetle infestation and the resultant increased hazardous fuels. The decreased potential for intense wildfires would reduce the need for wildfire management/suppression activities, resulting in fewer disturbances from noise and closures to visitors.

Targeted herbicide application, increased mechanical works, planting of native tree and grass species, and wildfires managed for resource objectives would increase the ability to restore fire-adapted communities such as longleaf pine, by opening the canopy and mid-story, which promotes growth and germination of ground cover (e.g., grasses, forbs, and longleaf pine seedlings). Increasing the ability to restore native, fire-adapted communities and associated native wildlife species would enhance the visitor experience of the southern bottomland hardwood forest ecosystem.

Cumulative Impacts

Adverse cumulative impacts to visitor use and experience for Alternative B are similar to Alternative A. However, over time Alternative B would contribute to beneficial cumulative impacts to visitor use and experience due to the increased ability to restore native plant communities, which would enhance wildlife viewing opportunities and experiencing the southern bottomland hardwood forest ecosystem.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Alternative C impacts would be similar to those described for Alternative B. However, portions of the upland pine forests in wilderness (about 700 acres) would remain as dense, mature stands with increased risk of pine beetle infestation followed by increased hazardous fuels from dead standing trees and woody debris. The potential increased tree mortality from pine beetle infestations would also increase the potential for localized, intense wildfires. Intense wildfires could require longer closures to visitors until the fire is suppressed or burns out and the area is rehabilitated if needed. The degree of impacts would vary depending on size of the fire, fire behavior, the location, extent, timing, and other factors related to the fire. Additionally, smoke emissions from

intense wildfires could impact a larger area affecting visitors using other areas in the park as well as surrounding lands.

The perpetuation of the upland forest structure of dense mature pines and hardwoods in the wilderness would reduce the health and vigor of these forest stands, thus reducing the aesthetics and native vegetation and wildlife viewing opportunities for visitors.

Cumulative Impacts

Alternative C would have similar cumulative impacts to Alternative B. However, visitor use and experience in the wilderness upland forests could have increased adverse cumulative impacts due to the reduced visitor experience from increased potential risk for intense fires and reduced aesthetics of the stands and associated wildlife compared to Alternative B.

Human Health and Safety

Affected Environment

The health and safety of firefighters, visitors, employees, and surrounding residents and neighbors of the park is a primary objective of this FMP. The park neighbors, visitors, local residents, and adjacent communities would be notified of all fire management activities that have the potential to impact them. Fire management activities and wildfires can pose unplanned, unforeseen risks to the public and employees, but firefighters and CONG staff face direct risks when engaged in suppression-related activities. Smoke on roads, rail lines, and waterways in and adjacent to the park is a visibility concern for traffic. In addition, smoke emissions from wildland fires can be an air quality issue to surrounding residents and the visiting public. The flaming front of a fire can put members of the visiting public, residents, park employees, and firefighters at risk. Accidents and unintended consequences can be more prevalent in chaotic, emergency wildfire situations. For this reason, risk areas from wildfires or prescribed fires will be closed to the public; mitigations will be implemented as soon as recognized and practical, such as media information issuances, closures and/or restrictions, and traffic control for smoke visibility.

The past and current fire management program in the park has worked to mitigate the long-term threat to the safety of visitors, employees, local residents, and surrounding landowners. These actions include removing hazardous fuels loads using prescribed fire, defensible space work within 50 feet of park buildings and interior access roads, and additional maintenance activities that contribute to creation of defensible space (e.g., mowing and cutting of brush, removal of fallen trees and debris in developed areas or on trails). These activities would continue under all alternatives.

Analysis of Alternatives and Impacts on Human Health and Safety

Impacts of Alternative A—Continue Current Fire Management at CONG (No-action Alternative)

There would be adverse impacts to firefighter health and safety from wildland fire suppression efforts, such as intense exposure to heat, smoke inhalation, accidental spills, injures from the use of firefighting equipment, and in severe cases injuries from wildland fires. Impacts to the public could include smoke inhalation, and in severe cases injuries from wildland fires.

Under Alternative A, wildfires would be managed for multiple objectives, excluding resource objectives, but with an emphasis on suppression objectives as outlined in the 2004 FMP. Some unplanned ignitions, such as those in the Congaree River floodplain, would continue to be managed with confine/contain strategies, where firefighter safety and/or cost objectives would prevent active firefighter engagement with the fire; due to the dampness of the floodplain, these fires would be self-limiting and usually go out on their own.

In the uplands, wildfires would be more aggressively managed due to their potential spread in drier fuels. In most cases the NPS would utilize indirect tactics to contain the fire at nearby roads, trails, or natural barriers, depending on conditions. New fireline construction does not usually happen due to access, safety, terrain limits, but could occur when utilizing MIST tactics to minimize effects on resources. Fuel break construction

during wildfire suppression efforts could pose safety risks to firefighters from the use of equipment. Each crew member is trained in the use of firefighting equipment, but accidental injuries may still happen. Adherence to guidelines concerning firefighter accreditation and equipment and procedural safety guidelines would minimize accidents.

Acute smoke inhalation by firefighters from wildland fires starts with acute eye and respiratory irritation and shortness of breath and may progress into headaches, dizziness, and nausea depending on the duration of exposure. Most firefighter exposure to smoke has been considered nonhazardous, with a small percentage exceeding recommended exposure limits for carbon monoxide, the primary inhalation hazard, and respiratory irritants (USDA 2000).

Portions of the upland forests would retain dense stands that could increase the potential for severe wildfires that are harder to suppress/manage and increase smoke emissions which would increase the risk to human health and safety. The degree of impacts would vary depending on size of the fire, the location, extent, timing, and other factors related to the fire. In the event of a potentially severe wildfire within the park, the fire staff would coordinate public notification, restrictions, closures, and evacuation efforts with park law enforcement staff and local emergency response agencies. The extent of public notice would depend on the specific fire situation. Assuring visitor, local residents, and staff safety would take priority over other park activities.

Prescribed fire and defensible space works around park buildings involve more pre-planning and implementing activities under defined conditions. This normally allows for better health and safety protections and precautions under planned and controlled workplace conditions than the inopportune times that often occur during wildfires, which is usually during more severe weather and fuel conditions. Health and safety of staff would be enhanced when additional fire personnel would be brought in, as needed, from interagency cooperators for prescribed fires. Human safety is the primary objective for prescribed burns and all park activities; additional staff brought in would help to ensure safety mitigations were implemented. Therefore, the potential for impacts associated with management actions (though it is not possible to eliminate all risk) would be reduced overall.

Cumulative Impacts

Actions outside the park that could have an impact on public health and safety include continued development of lands adjacent to the park. Continued development would increase the wildland urban interface boundaries, which could increase hazardous fuel loadings and the number of homes and structures at risk, thus increasing the risks to firefighters and the public in those areas during an intense wildfire. The impacts of Alternative A would contribute negligibly to adverse cumulative impacts to human health and safety due to the temporary and localized exposure to associated fire risks (e.g., heat, smoke inhalation) and the continued use of prescribed fires to reduce hazardous fuel loads and defensible space work around park infrastructure, decreasing the potential for intense wildfires and associated risks to people and structures.

Impacts of Alternative B—Comprehensive Ecological Restoration and Management Strategies (Proposed Action)

Human health and safety impacts would be the same as described under Alternative A in regards to wildland fire suppression and fuels/vegetative management activities. The use of managing wildfires for multiple objectives including resource objectives in the park could over time lead to treating more acres, which could help decrease hazardous fuels, thus help reduce active suppression actions on park wildfires. In addition, wildfires managed or partly managed for resource objectives could sometimes use natural or manmade features as containment boundaries that are more distant from the fire, depending on the resource objectives and values to be protected, rather than requiring immediate direct suppression.

The additional mechanical works, targeted herbicide use as a follow-up treatment to mechanical works or fire, and wildfires managed for multiple objectives including resource objectives would increase the ability to reduce hazardous fuel loads, increase defensible space around structures, and develop fuel breaks along the park boundaries. The additional vegetation/fuels management tools would be expected to increase the probability for lower-intensity, surface wildfires that are easier to suppress/manage, thus less risk to human health and safety.

All herbicide treatment areas would have individual treatment plans and would only use US EPA approved herbicides. Targeted herbicide use would be implemented after signage was placed at all entryways to the treatment area and all visitors were out of the area. All staff utilizing herbicide would be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures. Furthermore, the Federal Insecticide, Fungicide, and Rodenticide Act and federal water quality monitoring indicate that the use of herbicides in forestry practices, such as ecological restoration efforts and prescribed fire, constitutes low risk to humans (Shepard et al. 2004). The areas to be treated would be relatively small (up to 25 acres annually across the park) and targeted applications (hand, backpack sprayer), so the risk to human health and safety would be minimal.

Cumulative Impacts

Actions outside the park that could have an impact on public health and safety include continued development of lands adjacent to the park and management activities. Continued development would increase the wildland urban interface boundaries, which could increase hazardous fuel loadings and the number of homes and structures at risk, thus increasing the risks to firefighters and the public in those areas during an intense wildfire. The impacts of Alternative B would contribute negligibly to adverse cumulative impacts to human health and safety due to the temporary and localized exposure to associated fire risks (e.g., heat, smoke inhalation). Alternative B would also contribute negligibly to beneficial cumulative impacts to human health and safety due to the continued use of prescribed fires with the additional mechanical works and wildfires managed for resource objectives would further reduce hazardous fuel loads, decreasing the potential for intense wildfires and associated risks to people and structures.

Impacts of Alternative C—Comprehensive Ecological Restoration and Management Strategies, Except No Use of Wheeled/Tracked Equipment in Wilderness

Public health and safety impacts under Alternative C would be similar as described for Alternative B. However, with no use of wheeled/tracked equipment, the dense pine forest stands in the wilderness uplands (about 700 acres) would remain, which could increase the risk of pine beetle infestations followed by increased hazardous fuels loads (dead standing trees and woody debris). Fire behavior of wildfires originating in the wilderness forest uplands could be more intense and larger, thus increasing risks to firefighters, adjacent neighbors, and structures, CONG employees, and visitors. The degree of impacts would vary depending on fire behavior, size of the fire, the location, extent, timing, and other factors related to the fire.

Cumulative Impacts

Alternative C would have similar cumulative impacts to Alternative B, except that human health and safety risks in and adjacent to the wilderness upland forests could have increased adverse cumulative impacts due to the increased potential risk for intense fires and associated risks to firefighters, adjacent neighbors and structures, employees, and visitors.

Consultation and Coordination

Agency Consultation

In accordance with the ESA, the Park consulted with the FWS with regards to federally listed species. A copy of the EA will be sent to the FWS for review along with a request for their concurrence with the determination of effects on federally listed species for this EA.

In accordance with Section 106 of the NHPA, as amended in 1992 (54 USC 306108 *et. seq.*), NPS contacted the South Carolina Historic Preservation Office (SHPO) by letter dated December 18, 2015, during the public scoping period asking for information concerning cultural resources. A copy of this EA will be sent to South Carolina SHPO for review and comment.

Agency consultation correspondence received at the date of publication of the Draft EA for public review is in Appendix B.

American Indian Consultation

The 16 affiliated American Indian tribes (see list below) were contacted by scoping letter dated December 18, 2015, informing them of the proposed action and soliciting comments. Information from the tribes also was requested to determine if any ethnographic resources are in the project area and if the tribe wanted to be involved in the environmental compliance process. As of the date of this EA, no comments were received. The tribes that are traditionally associated with CONG will have an opportunity to review and comment on this EA.

American Indian Tribes contacted include the following:

Absentee Shawnee Tribe of Oklahoma

Alabama-Quassarte Tribal Town

Catawba Indian Nation

Cherokee Nation

Chickasaw Nation

Eastern Band of Cherokee Indians—Qualla Boundary Reservation

Eastern Shawnee Tribe of Oklahoma

Kialegee Tribal Town

Miccosukee Tribe of Indians of Florida

Muscogee (Creek) Nation

Poarch Band of Creek Indians

Seminole Tribe of Florida

Shawnee Tribe

Thlopthlocco Tribal Town

Tuscarora Nation

United Keetowah Band of Cherokee Indians in Oklahoma

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Appendix A: MRA Step 1: Determination

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: **Update Congaree National Park Fire Management Plan**

MRDG Step 1: Determination

Determine if Administrative Action is Necessary

Description of the Situation

What is the situation that may prompt administrative action?

Congaree National Park (hereafter Congaree or park) is revising and updating its Fire Management Plan (FMP) to comply with Director's Order 18 (DO-18) and Reference Manual-18 (RM-18), which states that "all parks with burnable vegetation must have an approved fire management plan". Updating the FMP considers the use of additional tools and techniques that would be used in select areas of the park, including the park wilderness. All fire management activities affecting wilderness must utilize the minimum requirement analysis (MRA) concept defined in NPS Reference Manual 41. Since the park is considering mechanical treatments, herbicide use, and planting of native species in wilderness, these typically prohibited activities are analyzed here.

Federal fire policy allows wildland fires, which includes both prescribed fire and wildfire, to be managed concurrently for multiple objectives, including resource objectives. Wildland fire is typically considered a compatible use in NPS wilderness as it complements or continues natural processes. Policy allows this use in wilderness as long as the FMP includes a programmatic MRA and documentation as to whether proposed actions are necessary or appropriate in wilderness. While prescribed fire has been utilized in the Congaree wilderness, wildfires currently cannot be managed to achieve resource objectives at the park until there is an approved and updated FMP.

The purpose of the FMP revision is to enhance ecological restoration and allow natural

processes to resume by allowing for the use of unplanned ignitions (wildfires) for multiple objectives, including resource objectives. Prescribed fire would continue to be utilized in some areas to mimic the natural fire regime and also as a restoration tool. The use of mechanical fuel treatments, targeted herbicide application, and planting of native plants to support resource management restoration objectives would be considered in identified areas that have been altered by past human activities. In park wilderness, these fire management activities would be considered for approximately 700 acres of uplands and 125 acres of abandoned agricultural plots in the floodplain.

Currently, the Congaree fire management program suppresses all wildfires, allows prescribed fires in the uplands (planned ignitions for resource management objectives), and allows creation of defensible space within 50 feet of park buildings.

Through observation, monitoring, and research, the Congaree fire staff has learned that prescribed fire alone cannot effectively achieve forest restoration objectives for fire-dependent communities located in the upland areas above the bluffs on the north side of the park. Historically, the uplands were a fire-adapted ecosystem consisting mostly of open stands of native longleaf pine (*Pinus palustris*) with grass and forb understories.

Historically, the longleaf pine communities burned every 1–3 years, mostly with low intensity surface fires ignited by lightning. Prior to creation of the park, logging and plantation style replanting with loblolly pines (*Pinus taeda*), agricultural practices, and fire suppression have resulted in the loss of most of the native open, longleaf pine communities in the park uplands (approximately 1,460 acres with about 700 acres in wilderness).

Once common throughout the southeast United States, longleaf pine forests have declined by 98% with less than 3.8 million acres remaining. Restoring the longleaf pine community at Congaree would contribute to the recovery of the globally threatened forest community, as well as associated plants and animals, including the red-cockaded woodpecker (*Picoides borealis*). Additionally, the current successional forests (mostly planted) with closed upper and mid-story canopies, and greater stems per acre have increased threats from pests (e.g. Southern pine beetle) and the risk of stand-replacing crown fires. These conditions promote wildfires that may become larger in size and intensity than historic fires in the region. These wildfires are more difficult to control and may become more frequent during drought conditions and projected climate change. This could lead to permanent changes to current forest conditions in this area.

The original idea in the 2004 FMP to use prescribed burning to reduce sweetgum saplings and thin loblolly forests to allow longleaf pine regeneration has proved difficult as the sole fuel/vegetation management tool to restore the upland stands. As loblolly pine and larger sweetgums mature, they grow above the height or develop thick bark that could be effectively reduced by surface prescribed fire alone. Typically, young sweetgums are top-killed by prescribed fires and re-sprout prolifically while larger sweetgums become resistant to fire damage. The herbaceous understory, once dominated by grasses and forbs, is now sparse to bare due to shading and competition from the closed over-story and mid-story canopies. Currently, there are isolated open patches where prescribed fires have been more successful

and longleaf pine recruitment with grass and forb herbaceous understory has occurred.

When the wilderness boundary was created in Congaree, approximately 700 acres of park uplands and 125 acres of abandoned floodplain agricultural plots were included in the wilderness that had been significantly altered by past logging, agricultural and settlement activities. These wilderness lands are immediately adjacent and ecologically similar to the non-wilderness uplands; the abandoned agricultural plots are adjacent to pristine wilderness floodplain forest. The NPS has a goal of restoring the historic forest and vegetation associations and diverse species that occupied the park before human alteration; this is especially relevant in the park wilderness as it is managed for the preservation and protection of its natural conditions.

Options Outside of Wilderness
Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES **STOP – DO NOT TAKE ACTION IN WILDERNESS**

☒ NO **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

Explain:

Approximately 21,850 acres (82%) of Congaree National Park is wilderness. Restoration outside the wilderness would not contribute to restoring the disturbed upland wilderness areas (700 acres) or altered wilderness floodplain (125 acres) as described above.

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☐ YES ☒ NO

Explain:

There are no valid existing rights in the Congaree National Park Wilderness that require NPS to undertake the proposed action. Similarly, the proposed action is not necessary to fulfill any requirement of the legislation that established the wilderness.

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

☒ YES ☐ NO

Explain:

The purpose of the Endangered Species Act of 1973 as amended is to protect and recover threatened and endangered species and their ecosystems to which they depend. The Red-cockaded Woodpecker, a federal endangered species, has been extirpated from the park in the last 20 years, but still exists in nearby longleaf pine forests. The loss of the Red-cockaded Woodpecker in the park is directly attributed to the loss of its preferred habitat, the fire-adapted longleaf pine ecosystem. The Endangered Species Act requires federal agencies to help in the restoration of endangered species habitat whenever possible. Restoring the longleaf pine forest community at the park would contribute to the recovery of the globally threatened forest community, as well as associated plants and animals, including the red-cockaded woodpecker.

C. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character, including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?

UNTRAMMELED

☐ YES ☒ NO

Explain:

The definition of untrammeled quality is the lack of human control of natural processes or manipulation. This quality is typically preserved when no action is taken to control, hinder, or manipulate the natural functioning of the ecosystem. Fire management actions manipulate the wilderness environment and natural processes by its very nature. Such manipulation is necessary to improve the natural quality of the wilderness and to protect adjacent non-wilderness lands.

Until the park has a revised FMP, wildfires within the wilderness would be fully suppressed, which is also a human manipulation. Fire and fuel management activities under an updated FMP would trade one type of manipulation for another, but with the benefit that the updated plan would allow fires to reflect a more natural process. The updated plan would foster lower intensity, surface fires that would not require a larger-scale manipulation of full fire suppression. The proposal to consider managing wildfires for multiple objectives, including resource objectives is a necessary action to continue natural processes that preserve and enhance the natural quality of wilderness.

UNDEVELOPED

☐ YES ☒ NO

Explain:

The undeveloped quality is preserved by retaining the primeval character and influence and is without permanent improvements or modern human habitation. Fire and fuel management activities are not needed to preserve the undeveloped quality of wilderness or adverse impacts from the use of motor vehicles, motorized equipment, or mechanical transport.

NATURAL

☒ YES ☐ NO

Explain:

Fire management activities (prescribed fire, wildfire for multiple/resource objectives, some mechanical and herbicide, and planting of native species) within the altered upland and floodplain wilderness areas would enhance the natural quality over time. As described under the "Description of the Situation," prescribed fire alone is inadequate to provide restoration of altered native vegetation associations. Therefore, the wilderness functions less naturally than it did prior to past human agriculture and logging activities.

A wilderness area is to be protected and managed to preserve its natural conditions, meaning wilderness ecological systems are substantially free from the effects of modern civilization. To preserve the natural quality and address the scenic and conservation public purposes of wilderness, it may be necessary to take action to restore areas exhibiting unnatural conditions, such as planted pine plantations and agriculture plots. Fire is an existing natural process that occurs in the wilderness, thus effects from fire would emulate the natural fire regime. In addition, the proposed activities would have the indirect effect of improving the natural quality due to increased structural diversity, composition, and species diversity in the upland forests and native floodplain forests in the abandoned agricultural plots.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☐ YES ☒ NO

Explain:

It is not necessary to take the proposed action to preserve the solitude or a primitive and unconfined type of recreation quality. This quality is about people having the opportunity to

experience wilderness in terms of the visitor's sense of solitude and their expectation of an undeveloped environment with minimal restrictions. This opportunity already exists within the wilderness at Congaree. Thus it is not necessary to implement fire management activities to provide it. However, fire is an existing natural process that occurs in the wilderness that can contribute to feelings of solitude or primitive and unconfined recreation.

OTHER FEATURES OF VALUE

☒ YES ☐ NO

Explain:

The wilderness at Congaree has scattered cultural resource sites representative of the agricultural, settlement, commercial, and social practices of the South Atlantic Coastal Plain people. It is necessary to implement fire management activities in the wilderness to protect some of these identified cultural resources. The likelihood of surface damage has increased in recent years due to disruption of the natural fire regime in portions of the upland forests and the risk of uncharacteristically severe wildfire. The action to restore more natural fire intensities and fire return intervals in the upland forests would decrease the likelihood of damage to cultural resources.

Step 1 Decision

Is administrative action necessary in wilderness?

Decision Criteria

A.	Existing Rights or Special Provisions	☐ YES	☒ NO
B.	Requirements of Other Legislation	☐ YES	☒ NO
C.	Wilderness Character		
	Untrammeled	☐ YES	☒ NO
	Undeveloped	☐ YES	☒ NO
	Natural	☒ YES	☐ NO
	Outstanding Opportunities	☐ YES	☒ NO

MRDG Step 1: Determination 6

Other Features of Value	☒ YES ☐ NO

Is administrative action necessary in wilderness?

☒ YES **EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG**

☐ NO **STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain:

Fire management activities within the wilderness at Congaree are necessary to restore and maintain the altered upland forests and the native floodplain forests in the abandoned agricultural plots and to protect and maintain cultural resources. Wildfires managed for multiple objectives, including resource objectives will also be considered when conditions are appropriate on all park lands, including wilderness. The NPS has a goal of restoring the historic forests, vegetation associations, and diverse species that occupied the park before human alteration, which includes restoring the logged areas and abandoned agricultural plots.

Historically, the uplands were a fire-adapted ecosystem consisting mostly of open stands of native longleaf pine with grass and forb understories. Periodic surface fires occurred which rejuvenated soils with nutrients, perpetuate ground cover growth of grasses, forbs, and longleaf pine seedlings, maintained open vegetation structure, and enhance the diversity, structure, composition, and integrity of fire-dependent vegetation communities. Although periodic surface fires tend to maintain fire-dependent communities, extreme fire conditions can dramatically alter forest stands, plant communities, and animal distribution. Such extreme conditions often develop where past human activities have dramatically altered the vegetation and are followed by fire suppression. The existing mature, dense loblolly pine stands would have increased risk for pine beetle infestations, which could increase the hazardous fuels from the dead pine trees left standing or as woody debris from fallen trees and branches. These areas would have an increased potential for intense wildfires that could result in the removal of large tracts of vegetation in the upland forests. High intensity wildfires could permanently alter the vegetation and soil organic matter (duff/litter), altering soil resources (e.g., kill rhizomes and mycorrhizae), which could lead to dramatic changes in vegetation species composition, structure, and diversity.

The proposed FMP revision is needed to restore the natural quality of wilderness in the uplands and the abandoned agricultural plots by enhancing ecological restoration efforts and allowing natural processes to resume. In addition, restoring the natural fire regime in the upland forests would decrease the likelihood of damage to cultural resources from severe wildfires. All these activities would decrease the risk of intense wildfires over time within Congaree, including the wilderness.

Per DO-41, "As a result of many factors including past fire management practices within wilderness and the need to control wildfires on adjacent lands, fire may not be adequately functioning as a natural change agent. In those cases, augmenting natural ignitions with

prescribed fire or other fuel treatments within wilderness may be necessary to restore or maintain ecological function if that is a goal identified in the park's Wilderness Stewardship Plan or FMP." This direction has been followed as Congaree updates its FMP and associated environmental compliance documentation.

Appendix B: Agency Consultation

January 19, 2016

South Carolina Archives & History Center
History & Heritage For All Generations

J. Tracy Stakely, Superintendent
Congaree National Park
100 National Park Rd.
Hopkins, SC 29061

Re: Fire Management Plan, EA Notice
Congaree National Park, Richland County, South Carolina
SHPO Project No. 15JS0665

Dear Mr. Stakely:

Thank you for your December 18, 2015 letter, received by our office on December 23, regarding the above referenced Environmental Assessment for a new fire management plan being developed at Congaree National Park. The State Historic Preservation Office is providing comments to the National Park Service pursuant to Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR 800. Consultation with the SHPO is not a substitution for consultation with Tribal Historic Preservation Offices, other Native American tribes, local governments, or the public.

Our office concurs with the management considerations noted in 3.4.2 and 10.1.

III.C.7 of the Programmatic Agreement provides for streamlined review only if the park has an approved fire management plan or forest management plan. This information could be added to the new fire management plan. Based on this provision, our office would concur that the proposed fire management activities should not require consultation with our office.

p. 81, 10.1: according to a review of our records 10 properties appear to be listed in the National Register. Table 8 appears to list all the listed properties except the "Bridge Abutments," which may be what is listed in the Table as "Huger's Bridge."
Note, page 91 also states "The sites are listed in figure 9 and..." They do not appear to be listed, nor should they be, considering they are address restricted National Register listings, and archaeological sites primarily.

Table 8 caption: The site ID number is assigned by the South Carolina Institute of Archaeology and Anthropology (SCIAA), not the National Register. The National Register nominations do not even appear to contain the archaeological site numbers.

It is not clear from Table 8 if the sites/properties are National Register listed properties, eligible properties, or unassessed/requires testing for National Register evaluation. Provided that they receive the same proposed management treatments this may not be an issue, except for when Section 106 compliance matters come into play.

S. C. Department of Archives & History • 8301 Parklane Road • Columbia • South Carolina • 29223-4905 • (803) 896-6100 • http://scdah.sc.gov

If you have any questions or need further assistance please don't hesitate to contact me at (803) 896-6129 or sylvest@scdah.sc.gov; for archaeological concerns contact Emily Dale at (803) 896-6181 or edale@scdah.sc.gov. Thank you.

Sincerely,

John D. Sylvest
Project Review Coordinator
State Historic Preservation Office
SC Department of Archives & History