Gulf Coast Ecosystem Restoration Council
Finding of No Significant Impact
Tribal Youth Coastal Restoration Program Expansion
EAXX-586-00-000-1723164698

The Gulf Coast Ecosystem Restoration Council (Council) hereby adopts U.S. Department of Interior (DOI) National Park Service (NPS) Environmental Assessment for the Big Thicket National Preserve (BITH) Fire Management Plan, August 2012 (EA). The Council adopts the EA in order to address requirements of the *National Environmental Policy Act*) (42 U.S.C. §§ 4321 et seq.) (NEPA) associated with the approval of the expansion of the Tribal Youth Conservation Corps program geographic boundary to include potentially working with the Alabama-Coushatta Tribe of Texas on land owned by the NPS within the BITH ("Program Expansion"). The adoption of the EA covers any potential fire mitigation activities that could be conducted under a program Expansion. The Council is also adopting a DOI Categorical Exclusion to cover other Program Expansion activities that are independent of any fire mitigation work.

The Council has reviewed the EA and determined that it addresses the environmental effects of a Program Expansion. On July 18, 2024, the Council provided the public with a 30-day review period in which to comment on the proposed Program Expansion and the associated environmental compliance documentation, including the EA. The Council has reviewed and responded as appropriate to public comments applicable to the Program Expansion. The Council has determined that approval of the Program Expansion would not result in a significant effect on the human environment. Following is a brief description of the Program Expansion, the EA and contact information pertaining to this action.

Approved Activity

The Council is approving the Program Expansion as part of the Council's Funded Priorities List 3b (FPL 3b), which has been developed pursuant to the *Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States Act of 2012* (RESTORE Act) (33 U.S.C. 1321(t) and *note*). No additional funding is being approved as part of the Program Expansion.

The Council originally approved $927,000 for planning and implementation activities for the Tribal Youth Coastal Restoration Program (Program), sponsored by the U.S. DOI, on behalf of the Bureau of Indian Affairs (BIA), as part of FPL 3b. The goal of the Program is to educate and train tribal youth through Gulf restoration projects. This Program builds on the success of the FPL 1 Tribal Youth Conservation Corps activities and anticipates having restored approximately 2,000 acres by the conclusion of FPL3b activities.

As originally approved in FPL 3b, restoration work under the Program may take place within coastal Florida, Alabama, Mississippi, and Louisiana working with (1) the Chitimacha Tribe; (2) the Mississippi

Band of Choctaw Indians; (3) the Poarch Band of Creek Indians; (4) the Seminole Tribe of Florida; (5) the Miccosukee Indian Tribe, and (6) the Coushatta Tribe of Louisiana. The Program Expansion comprises expanding the geographic boundary for the location of the Program to include potentially working with the Alabama-Coushatta Tribe of Texas (Tribe) on land owned by the NPS within the BITH. The Tribal youth efforts supported by the Program Expansion will be a collaboration between the Tribe and the already-existing youth programs at BITH, including a number of restoration activities such as collection of environmental data, water inventory for flood conveyance planning, water and soil sampling, trail restoration, coastal habitat improvements, preservation of cultural resources, invasive species removal, and hazardous fuels reduction.

More information on the RESTORE Act, FPL 3 and the Tribal Youth Conservation Corps program can be found at www.restorethegulf.gov.

Environmental Assessment Adopted

The EA is hereby incorporated by reference into this Council finding, consistent with the Council's NEPA Procedures (80 FR 25680-25691 (May 5, 2015)). Prepared pursuant to NEPA, the EA analyzes potential management alternatives for fire management activities on BITH, Texas. The EA includes an assessment of alternatives and associated environmental consequences, including potential cumulative effects. The analysis of environmental consequences includes information pertaining to other potentially applicable environmental laws, including the *National Historic Preservation Act* and the *Endangered Species Act*.

Environmental Conditions

In addition to NEPA, the Council has an independent responsibility to comply with all other applicable Federal laws. The Council has received concurrence on the Finding of No Significant Impact (FONSI) set forth below and the associated FPL 3b funding approval from the Federal agencies with responsibility for administering the laws applicable to the Program Expansion. To ensure compliance with applicable laws, the Council's funding award for the Program Expansion will require that the sponsor adhere to all applicable conditions set forth in the EA. Adherence to these conditions is nondiscretionary and serves to limit the environmental effects of an action to those that are insignificant, discountable or beneficial and never result in take or adverse effects to designated critical habitat. The DOI is also responsible for ensuring that any contractors who may work on the Program Expansion are aware of and comply with all of these environmental compliance requirements.

Finding of No Significant Impact

Based on an independent review of the information and analysis provided in the EA, the Council hereby issues this FONSI for the Program Expansion. This determination is based on consideration of the Council on Environmental Quality's (CEQ) NEPA regulations (40 CFR Parts 1500 Through 1508), May 1, 2024. The EA is attached to this FONSI and is incorporated herein by reference. In making this determination, the Council has coordinated with the DOI, the sponsor of the Program Expansion, and the DOI NPS, the author of the EA. The Council has authorized the Executive Director of the Council to execute the FONSI on its behalf.

Determination by Responsible Official

I have determined that this proposed activity would not have a significant effect on the human environment.

Mary S. Walker
Executive Director, Gulf Coast Ecosystem Restoration Council

(Signature) MARY WALKER Digitally signed by MARY WALKER Date: 2024.09.26 13:31:01 -05'00'

For Further Information

For further information, please contact John Ettinger, Director of Policy and Environmental Compliance, Gulf Coast Ecosystem Restoration Council, at (504) 444-3522 or by e-mail at john.ettinger@restorethegulf.gov.

National Park Service
U.S. Department of the Interior
Big Thicket National Preserve
Texas

Fire Management Plan

Environmental Assessment

Prepared for:
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U.S. Department of Interior
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Big Thicket National Preserve Fire Management Plan Environmental Assessment

Summary

Big Thicket National Preserve (BTNP) is proposing to update their Fire Management Plan (FMP) to formally lay out the process and actions to add targeted herbicide application as a fire management tool. National Fire Policy has changed in recent years and the updated terminology and policy would be incorporated into the FMP; these policy and terminology changes have been analyzed and approved on an interagency basis at the national level. Due to updates in environmental regulations and adding targeted herbicide application as a management tool, the National Park Service (NPS) has determined that it is necessary to do a NEPA analysis.

This Environmental Assessment (EA) evaluates 2 alternatives; a No Action Alternative (I), and the Preferred Alternative (II).

Alternative I, No Action Alternative—This alternative represents what would occur at BTNP if the fire management program is limited to presently approved and occurring fire management activities (i.e., prescribed burns, mechanical and manual fuels management). This alternative provides a baseline for comparing and evaluating the impacts to the environment by the action alternative. The approved fire and fuels management program at BTNP would continue, but herbicide use would not be utilized in ecological restoration, maintenance, or hazard fuel reduction activities unless separate, project specific NEPA processes occurred. This would likely hinder successful reduction of invasive mid-story brush in many areas, and may cause an increase in mechanical manipulations and more aggressive prescribed burning. This would result in reduced resilience of BTNP ecosystems to continued stress from hurricanes, drought, pest outbreaks, and wildfire. It would also allow the retention and buildup of hazardous fuels in some critical areas immediately adjacent to communities or infrastructure and invasive mid-story brush, which may allow wildland fires to burn with more severity, and be more difficult to control. These wildfires could threaten visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities both within and adjacent to NPS lands

Alternative II, Preferred and Environmentally Preferred Alternative—Under this alternative, the BTNP fire management program would continue as it currently exists, with the addition of utilizing targeted herbicide application. Targeted herbicide application would only be used after the Integrated Pest Management (IPM) process has been completed, a Pesticide Use Proposal has been approved by the Regional IPM Coordinator, and when mechanical methods and prescribed burning or other alternatives have a low chance of success to meet objectives. Targeted herbicide application would help to more effectively reduce invasive mid-story brush and increase success on some critical hazard fuel reduction jobs, reducing uncharacteristic wildfire risk and reducing making prescribed burn implementation safer and wildfire control more successful next to communities. This would provide better protection than the “no action alternative” for visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities..

This EA has been prepared in compliance with the National Environmental Policy Act (NEPA) and National Historic Preservation Act (NHPA) to provide the decision-making framework that:

1) analyzes a reasonable range of alternatives to meet objectives of the proposed plan;
2) evaluates potential issues and impacts to the natural and cultural resources of Big Thicket National Preserve; and
3) identifies specific and required mitigation measures that are designed to lessen the degree or extent of these impacts.

Resource topics determined to potentially be affected by the alternatives include: Air Quality, Geologic and Soil Resources, Vegetation Resources (including Invasive Weeds), Wildlife, Special Status Species, Water Resources, Riparian/Wetlands, Archeological, Historic Resources, Oil and Gas Development, Adjacent Landowners and Uses, Visitor Use and Experience, and Human Health and Safety. Other resource topics were examined and dismissed because it was determined that this plan would result in only negligible or minor effects to those resources. No major effects are anticipated as a result of this program.

Public Comment

External scoping was conducted by distributing a scoping letter to inform the public and various agencies of the proposed addition of targeted herbicide application as a fire management tool and to solicit feedback on the EA. The scoping letter dated January 10, 2012 was mailed to various federal and state agencies, and affiliated Native American tribes. The Big Thicket National Preserve FMP EA will be available via the internet at http://parkplanning.nps.gov/Plans.cfm. If you wish to make a comment on this EA, please submit written suggestions, comments, and concerns regarding the proposed project online at the NPS Planning, Environment, and Public Comment (PEPC) website at: http://parkplanning.nps.gov/. Click on Texas in the "Choose a State" pulldown menu, then click on the Big Thicket National Preserve in the "Choose a Park" menu, then click on the "BITH Fire Management Plan Environmental Assessment," then click on "Open for Public Comment" on the left sidebar, then click on the document and finally click on "Comment on Document".

If you are not able to submit comments electronically and wish to comment on this EA, please mail your comments to the name and address listed below. The EA will be available for public comments for 30 days; the comments are due by ___2012. Please note the names and addresses of comments received become public record. If you wish your name and/or address to not be used, then you must state this at the beginning of your comments. All submissions made by organizations, businesses, and individuals identifying themselves as representatives or officials of organizations or businesses will be available for public review in their entirety.

Please address comments to:
Deanna Boensch; Attn: Big Thicket National Preserve; 860 CR 1040, Woodville, TX 75979.

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1.0 PURPOSE AND NEED

1.1 Introduction

Big Thicket National Preserve (BTNP) presently consists of nine land units and six water corridors encompassing approximately 108,208 acres and is located in Jefferson, Hardin, Liberty, Polk, Tyler, Jasper, and Orange counties in southeast Texas (Figure 1). This region is often referred to as a "biological crossroads", one of the richest ecological environments in the continental United States, where diverse vegetation thrives in the long, warm growing season with abundant moisture. BTNP nurtures the convergence of plant and animals from four distinct ecosystems—the moist eastern hardwood forest, the southwestern desert, the southeastern swamp, and the central prairie.

The Preserve contains over 50 vegetation alliances (associations of dominant plants) that are still being mapped and described by ecologists (personal communication Deanna Boensch, BTNP fire ecologist, 11-16-11). A number of these habitats are classified as "highly fire-dependent", natural systems that contain plant and animal species that require periodic fire to support their renewal, survival and ecological integrity.

Historically wildfires helped shape the native vegetation and ecosystems of southeast Texas. Before Euro-American settlement, fires from lightning and Native Americans frequented the uplands, slopes, and drier sites every 3-10 years, renewing grasslands, reducing brush and woody debris while longleaf pine (*Pinus palustris*) and other fire dependent species thrived in open stand conditions (Henderson 2006, Chapman 1944, Wright and Bailey 1982). Damp and humid hardwood bottoms or associated wetlands along streams and rivers acted as natural barriers to fire spread in most years. These riparian areas burned infrequently or only partially with low severity, or in the driest of years. It is likely that higher intensity fires occurred in dry years following hurricane blow downs, as a result of the greater buildup of down woody fuels. The BTNP area was a diverse environment where the distribution of vegetation types was controlled by the interaction between topography, vegetation, water, soils, climate, etc. Fire played a constant role in shaping each of these niches.

Euro-American settlement changed the environment of southeast Texas and BTNP. From the 1800's to present logging, managed forest planting, livestock grazing, clearing, settlement, railroads, farming, road building, and oil and gas development all brought profound localized changes.

Logging in the area began in the 1850's, but became prevalent after the railroad arrived in the 1880's. Lumbering and turpentine camps were common by the 1900's. Logging was usually accomplished via clearcutting of longleaf pines; seed trees were seldom left (Henderson, 2006). As the vast forests were fragmented by logging activities, wildfires were controlled and reduced beginning about 1925. The absence of fire altered the ecosystems dependent upon periodic, frequent interruption and renewal by wildfire. Fire history studies indicate that high severity, stand replacing wildfires were rare until modern times (Henderson, 2006).

About fifty years of fire suppression prior to BTNP's creation resulted in numerous vegetation changes—from fire dependent communities such as open pine savannahs and sandhills, with dense herbaceous ground cover, toward mixed pine/hardwood with dense brush understory (NPS 2011). Replaced were predominant open-stand longleaf pine stands with herbaceous ground cover. Yaupon (*Ilex vomitoria*), wax myrtle (*Morella cerifera*), and other hardwoods, both brushy and canopy height species migrated upslope to dominate the understory of upland vegetation (Gilliam and Platt 1999). Loblolly pine (*Pinus taeda*) also moved upslope from the floodplains and replaced altered longleaf pine habitat as a dominant canopy tree in many areas. The absence of fire disrupted natural plant succession processes that are dependent upon periodic renewal by wildfire (Means et al. 2004, Owen and Brown 2005, Waldrop et al. 1991).

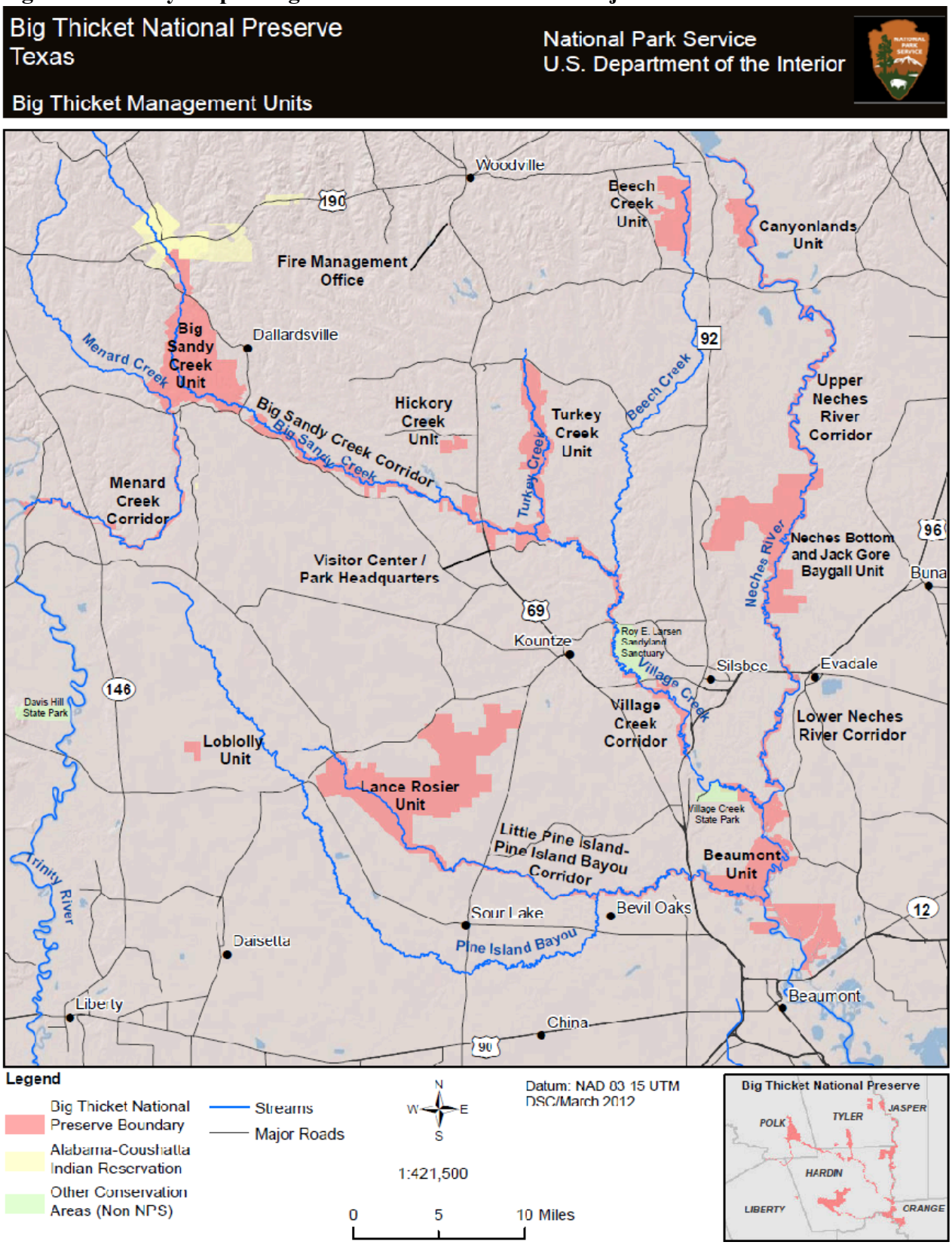
Despite these changes, pockets of natural vegetation or less changed areas remained. Congress recognized the unique ecological values that were disappearing and in 1974 created the Big Thicket National Preserve.

In 1982, BTNP began using prescribed fire for habitat maintenance and hazard fuel reduction. BTNP conducted restoration treatments on former timberlands by introducing prescribed fire to longleaf pine areas. BTNP found some burn units did not respond well to prescribed fire because of a lack of continuous fine fuels within dense brush/hardwood stands or a low intensity fire behavior that did not reduce woody vegetation (Jacqmain et al. 1999). After the hurricanes of 2005 and 2008, mechanical treatments increased as a way to reduce hazardous fuels and make prescribed burning safer. The National Park Service (NPS) confirmed the value of mechanical treatments in ecological restoration, especially in the initial stages of converting former timber plantations to native vegetation. Mitigations were introduced by the NPS to prevent long-term damage from mechanical equipment.

Despite the above tools, mid-story brush and invasive species remained a problem because they were so well established and competed so strongly with native plant and tree associations in restoration efforts (Hodgkins 1958). Recent hurricanes brought excessive mature canopy blowdown; the already well-established brush species thrived with increased light limiting native tree re-establishment. BTNP now has more brush to contend with than ever. In some areas of dense mid-story vegetation, brush was controlled by targeted herbicide application in conjunction with mechanical treatments, allowing native canopy species to establish. Mechanical and targeted herbicide treatments in combination with prescribed fire were successful in restoration of native grasses and forbs and should continue to improve habitat conditions with regular burning.

In accordance with NPS 2006 Management Policies, the BTNP FMP plan will be designed to protect the health and safety of the public and employees; minimize potential impacts associated with fire to properties adjacent to the park and to park facilities and infrastructure; and protect, preserve, and enhance natural and cultural resources. The preservation of natural and cultural resources within BTNP is fundamental to its continued use and enjoyment by park visitors as a national preserve with natural resource values preserved as part of the National Park System.

Figure 1. Vicinity Map of Big Thicket Natural Preserve Project



One goal of the new FMP would be to affirm firefighter and public safety as the highest priority of every fire management activity. A secondary goal is to restore fire dependent ecosystems to natural species diversity and stand characteristics by using mechanical manipulation, targeted herbicide application, planting where necessary, and prescribed fire. These tools would be used to control invasive brush, promote natural herbaceous ground or shrub cover, restore longleaf pine or other dominate canopy species, control exotic plant species, and restore and improve native wildlife habitat.

1.2 Description of the Park

BTNP was created by Congress in 1974 "to assure the preservation, conservation, and protection of the natural, scenic, and recreational values of a significant portion of the Big Thicket area". Once vast, the original "Big Thicket" area covered between 1–3 million acres in southeast Texas; BTNP presently consists of 108,208 acres in nine land units and six water corridors. BTNP has approximately 615 miles of boundary due to the geographically separate arrangement of the units.

BTNP was the first national preserve and is relatively "young" as a NPS unit. The Congressional enabling legislation allows for oil and gas exploration and some development as well as hunting and trapping. Roadways, power lines, and oil and gas pipelines run through many of the units. Oil and gas production fields and approximately 638 miles of associated pipelines occur within or near the preserve.

BTNP is surrounded primarily by private land that is utilized in various ways including timber plantations, subdivision communities, small farmland, grazing areas, oil and gas developments, small towns and small settled communities. Commercial timber management is the most prevalent adjacent land-use activity, occurring along approximately 621 miles of boundary. Rural homesite and residential subdivision developments occur along about 132 miles of boundary.

During dry periods when vegetation is flammable, the structures on surrounding lands pose substantial wildland fire/urban interface problems as vegetation of various types exists as fuelbeds between NPS and private lands. There are not large blocks of other federal lands immediately adjacent to BTNP, but there is a large parcel preserved by The Nature Conservancy within the Village Creek Corridor Unit. The Alabama-Coushatta Indian Reservation is also immediately adjacent to the Big Sandy Creek Unit. A recent land donation acquired Preserve property adjacent to Village Creek State Park.

BTNP's significance is explained by the following:

- BTNP was fashioned to protect the complex biological diversity of this region. The combination of pine and cypress forest, bottomland hardwoods, pitcher plant bogs, arid sandhills, streams and rivers, coastal wetlands, and blackwater swamps is but a remnant. BTNP serves as a refuge for a variety of plant and animal species and natural communities that include elements from four distinct vegetation types: the southwestern desert, central plain, eastern forest, and southeastern swamp.

- BTNP has an extensive, dynamic system of hydrologic processes and associated dependent systems important to maintain the diverse yet specific ecological make-up of the Big Thicket. These include contiguous riverine and wetland systems. BTNP provides examples of blackwater systems, which are more typically found in the Amazon Basin and southeastern United States. BTNP also exhibits baygall wetlands that exemplify the original and seemingly impenetrable Big Thicket.
- Nearly 186 kinds of birds live or migrate through BTNP. BTNP was designated as a Globally Important Bird Area in 2001 by the American Bird Conservancy because it provides critical cover and forage to migrant neo-tropical birds using the Central and Mississippi Flyways.

- BTNP was designated an international biosphere reserve in 1981 by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to promote cooperation with neighboring communities, individuals, agencies, and institutions to "ensure the preservation of the biological diversity, provide for research, and promote the use of the Big Thicket National Preserve for environmental education, training, and solutions to common problems."

- In a state where public lands are not widely available, BTNP offers the visitor a wide array of recreational and educational opportunities in a natural setting within close proximity to large urban areas.

- BTNP has a rich cultural history spanning centuries and cultures – prehistoric to modern American Indians, Spanish explorers, and early settlers to today's modern users. While the climate, thick vegetation and subsequent land uses have erased many of the artifacts and signs of the past, remaining resources include remnants of historic land use activities and structures, traces of travel corridors, and archeological sites.

1.2.2 Climate

The southerly latitude and proximity to the Gulf of Mexico creates a warm, humid climate and a long growing season for vegetation. The absence of significant long duration freeze events in most years is important to many plants. Average annual temperature is 67.1ºF with an average monthly minimum of 51.1ºF in January, and an average maximum of 81.7ºF in August. Summers are hot and humid with typical daytime temperatures between 85 and 95 degrees Fahrenheit. Mid-50s are normal for winter (NPS 2004).

Average annual precipitation ranges between 46 to 52 inches from north to south over the BTNP region, and is reasonably well distributed through the year. March and July are typically the driest months. Winter precipitation is generally associated with frontal activities and uniformly blankets the area. Summer precipitation is generated by the Gulf of Mexico and more heavily impacts the southern units of BTNP. That precipitation demonstrates frequent, heavy rains of short duration (NPS 2004).

Thunderstorm frequency is high and occurs on an average of 63 - 70 days annually. Tornados may occur in the region during these periods. Hurricanes are not unusual in the late summer/fall;

several major events have occurred since 2000. Saturated soils found during thunderstorm and hurricane events can intensify tree blowdown from strong winds (NPS 2004).

In 2010–2011 BTNP, like much of Texas, experienced an unprecedented drought. The BTNP forests exhibed increased tree mortality. These areas may increase the difficulty of controlling wildfires for decades to come, especially when coupled with the blowdown from two recent hurricanes. Research indicates that mature, fire maintained forest areas (such as upland longleaf pine stands) are the most resilient and least affected by tree mortality from drought, hurricane force winds, and intense wildfires (Johnson et al. 2009, Gilliam amd Platt 1999, Goldammer 2003, Finney et al. 2005).

1.3 Purpose and Need

This Environmental Assessment (EA) has been prepared in compliance with the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA),), regulations of the Council on Environmental Quality (CEQ) (40 CFR §1508.9), and the National Park Service (NPS) Director's Order (DO) 12 to provide the decision-making framework that:

1) analyzes a reasonable range of alternatives to meet the objectives for a proposed, new Fire Management Plan (FMP);

2) evaluates potential issues and impacts to the natural and cultural resources of Big Thicket National Preserve; and

3) identifies specific and general mitigation measures that are designed to lessen the degree or extent of these impacts.

1.3.1 Purpose

The purpose of the proposal is to comply with DO-18 "all parks with vegetation that can sustain fire must have a fire management plan", and to replace the use of the Healthy Forest Initiative Categorical Exclusion (CE), per NPS direction to discontinue the use of that CE.

1.3.2 Need

BTNP is proposing to rewrite and update its 2004 Fire Management Plan to more clearly articulate new management activities. These revisions have been prompted by updated science and field techniques related to fire and fuel reduction activities at BTNP dealing with 2 major hurricanes, significant hazard fuel accumulations, an ongoing drought, and numerous large and small ecological restoration and hazard fuel projects. Changes in fire science and ecological understanding necessitate a rewrite of the FMP. National Fire Policy and terminology have changed in recent years and these updates would be incorporated into the FMP; these policy and terminology changes have been analyzed and approved on an interagency basis at the national level. BTNP fire management includes planning, preparedness, prevention, suppression, restoration and rehabilitation, monitoring, research, and education; all are conducted on an interagency basis and frequently involve cooperators and partners.

BTNP has successfully implemented prescribed fire for habitat maintenance and hazard fuel reduction since the early 1980's. BTNP will continue these activities to uphold the Preserve's mission "to preserve, conserve, and protect the natural, scenic, and recreational values of a significant portion of the Big Thicket with a particular emphasis on maintaining the ecological integrity of the Preserve." However, BTNP management staff encountered areas that do not respond well to prescribed fire treatments with fire alone as the management tool. The staff found that prescribed fire was not successful in reducing established brush/hardwoods due to low fire intensity, limiting the ecological restoration to native habitat. Fire intensity that is hot enough to destroy low and mid-story brush and hardwoods may damage or kill the mature canopy of desirable tree species.

Mechanical use increased after the hurricanes of 2005 and 2008 as a way to reduce hazardous fuels and make prescribed burning safer; NPS confirmed its value in ecological restoration, especially in the initial stages of converting former timber plantations to native vegetation and forest associations (Haywood et al. 2005, Brooks and Stouffer 2011, Haywood 2010).

Even when managers used prescribed fire and mechanical tools, mid-story brush and invasive plant species remained a problem because they are so well established, and competed strongly with native plant and tree associations during restoration efforts. In addition, recent hurricanes brought excessive blowdown that reset initial successional paths, while re-establishment of native forest associations was inhibited by well-established mid-story brush and hardwood species. BTNP now has more brush to contend with than ever. Herbicide was tried in several projects and successfully utilized as a tool of ecological restoration, where brush was controlled by targeted herbicide application, allowing native plant species to thrive and become established. The NPS would like to consider the use of herbicide as a vegetation management tool to use in conjunction with mechanical and prescribed fire restoration.

This analysis examines the increasingly complex scope and effects of ecological restoration activities by BTNP fire management staff. Prescribed fire, wildfire management, mechanical treatments, and herbicide application are all discussed in a programmatic manner as tools that may aid the ecological restoration process. It is important to understand that there is not one recipe for widespread ecological restoration; the characteristics and vegetation of each stand and area must be examined to determine the appropriate mix of actions to assist in restoration and recovery for each unique area. Additional NEPA analysis will not occur for individual BTNP fire management projects unless the scale, scope, or effects move outside the range of this analysis.

In summary the following objectives of this proposed action, rewriting the BTNP Fire Management Plan, are:

- To continue BTNP fuel manipulation and ecological restoration activities including prescribed burning, mechanical, planting, seeding, and consider biomass removal on a case-by-case basis as an aid to ecological restoration and hazardous fuel reduction.
- To consider adding targeted herbicide use to the above list of fuel manipulation activities as an aid to ecological restoration, maintenance, and hazard fuel reduction.
- To respond safely and efficiently to wildfires.

- To provide effective rehabilitation of wildfire areas (BAER).
- To continue interagency cooperation and coordination, and public outreach about BTNP fire management and restoration activities.
- To update policy and terminology language and discussions in the FMP document.
- To continue active monitoring of fire program field actions, support sound resource management science, and utilize adaptive management to improve the program.

1.4 Relationship to Other Plans and Policies

The proposed action is consistent with the draft 2011 Draft General Management Plan/Environmental Impact Statement BTNP (GMP), Resource Management Plan for BTNP (NPS 1996), the BTNP Fire Management Plan (FMP; NPS 2004), the 2011 Fire Management Plan Review and Update BTNP, the Guide to Managing the National Park System, 2006 Management Policies (NPS 2006), and Director's Order 18, Guidance for Wildland Fire, (DO-18).

While the BTNP GMP process is still underway, this project is consistent with guidance developed so far in that draft document and EIS. The new FMP must meet resource management, health, and public and firefighter safety objectives. The FMP will follow management strategies, goals, and objectives for the management of fire at the Preserve in the final, approved GMP. The GMP proposes the use of prescribed fire, mechanical and chemical treatments to manage fire-adapted vegetation communities and allows fire to function in its natural ecological role, restore ecosystem balance, and manage hazardous fuels in the urban interface.

BTNP fire management activities are presently planned, prioritized and structured by its 2004 FMP.

In accordance with the 2006 Management Policies, the wildland fire management program should 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 park visitors, employees, and developed facilities.

The authority for implementing prescribed fire is included in the National Park Service Organic Act of 1916. National Park Service (NPS) land managers are tasked with the mission to "preserve unimpaired the natural and cultural resources and values of the national park system for the enjoyment, and education of future generations."

DO-18 states that "every NPS unit with burnable vegetation must have an approved FMP." DO-18 defines what an approved FMP must include; emphasizing that firefighter and public safety is the first priority and 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.

1.5 Scoping

Scoping is a process to identify the affected environment that may be impacted by the proposed project, and to identify alternatives for achieving the proposed action, while minimizing the potential impacts. NPS conducted both internal scoping with appropriate BTNP personnel, and external scoping with the general public and interested/affected groups and agencies.
Internal scoping was conducted on November 16, 2011 by an interdisciplinary team of professionals from BTNP and the Intermountain Regional Office including representatives from fire management, resource management, NEPA specialists, the Superintendent, and the private contractor working on the EA. The interdisciplinary team discussed the purpose and need for the project, discussed potential alternatives to address these needs, did preliminary determination of potential environmental impacts, and discussed past, present, and foreseeable projects that may have cumulative effects, and potential mitigation measures.

The internal scoping group agreed to 7 components that should be considered when analyzing alternatives:
1) herbicide application for ecological restoration and hazard fuel reduction,
2) prescribed burning for ecological restoration, maintenance in fire dependent ecosystems, and hazard fuel reduction,
3) mechanical uses, both manual (e.g., chainsaws) and equipment (e.g., mowers, masticators), for ecological restoration, maintenance in fire dependent ecosystems, and hazard fuel reduction,
4) full suppression of wildfires, both direct and indirect attack, including the process to approve the use of foam and retardant,
5) Burned Area Emergency Rehabilitation (BAER) via an approved plan after large wildfires,
6) ecological restoration, including planting and seeding activities, and
7) biomass utilization, as a byproduct of ecological restoration or hazard fuel reduction, not as a stand-alone goal.

External scoping was conducted by distributing a scoping brochure dated January 10, 2012 to inform the public of the proposal and sending a letter to potentially affected neighbors and agencies, to solicit feedback for the EA. The brochure was also made available to the visiting public at the Preserve Visitor Center. The brochure was mailed to 207 addressees, including adjacent land owners, various federal and state agencies, affiliated Native American tribes, and local agencies. The announcement was also published on the NPS Planning Environment and Public Comment (PEPC) website.

There were three comment letters received from external scoping:

Letter #1 requested that the NPS increase the scale and frequency of its prescribed burning to better preserve NPS resources and continue ecological restoration of BTNP lands, including drier forests and wetlands such as pitcher plant bogs. Generally, the NPS agrees with these comments; however, much of the pace of restoration efforts is dictated by personnel and funding. BITH does not anticipate receiving major increases in vegetation restoration funding over the next 5–15 years, and does not anticipate the ability to increase these efforts. However, the schedule and prioritization of burning may be addressed in the new FMP.

Letter #2 contains information on fire effects, research, climate change, and the difficulties in determining the reference conditions for sections of the Preserve, and that these conditions are forever dynamic and changing. The commenter made the point that determining what is a "fire dependent ecosystem" is judgmental, and that 2011 conditions showed that even hardwoods and creek bottoms have a fire return interval. The commenter suggested allowing fires to travel down-slope without firelines as much as possible, to allow some burning in transition zones. The commenter also suggested careful consideration before using dozers or masticators in non-disturbed areas. Mitigations should be utilized when equipment use is necessary to prevent unintended damage to the trunks of desirable trees, root systems, and increased fire effects from mastication chips that will later be burned. Mitigations should also be utilized when chemical treatments are utilized to prevent excessive fire intensity on following prescribed fires. Fire monitoring plots should be re-sampled in some areas. Generally, the NPS agrees with these comments and will work on addressing some of them in the EA and the new FMP.

Letter #3 was extensive, relating to fire history research, reference forest conditions, ecological change by humans that has altered much of BTNP, climate change, utilizing natural fire, and numerous fire principles that BTNP should consider when restoring BTNP. Some comments generally aligned with some of Letters #1 and #2. There were comments against the use of salvage logging or transport of woody debris for biomass-to-energy projects. There were comments related to utilization of mechanical treatments and herbicide application, and their use, effects, scale, mitigations, etc. The commenter stated CEQ requirements to develop an adequate cumulative effects analysis.

Letter #3 also made numerous suggestions that BTNP has already incorporated into its 2004 FMP, in BTNP fire operations, and additional suggestions found in national interagency fire policy. BTNP plans to carry these principles forward in the new FMP and BTNP fire management activities. Some suggestions were related to the scope and detail of the new Fire Management Plan and may be addressed in that document.

Letter #3 also contained suggestions that were outside the scope of this EA, such as adopting an overall comprehensive ecosystem restoration plan, obliterating roads, trails, power lines, oil and gas facilities, and right-of- ways, etc. Other suggestions have been considered or adopted in other non-fire park plans or documents, or are under consideration in the new General Management Plan process. Overall, there were many comments that the BTNP will address in this EA and FMP process.

1.6 Impact topics Retained for Further Analysis

Impact topics for this project have been identified on the basis of federal laws, regulations, and orders, including the NPS 2006 Management Policies, and NPS knowledge of resources at BTNP. Impact topics that are carried forward for further analysis in this Environmental Assessment are those where the proposed action may have a measurable effect. There were 14 impact topics retained for further analysis. The rationale for retaining each of these topics is briefly listed below with a description of the existing setting or baseline conditions (i.e. affected environment) within the project area. Some impact topics were dismissed from further

consideration when the environmental effects were estimated to be either minor or negligible. The following impact topics were retained for further analysis:

Natural Resources

1) Air Quality
2) Geologic and Soil Resources
3) Vegetation Resources
4) Wildlife
5) Special Status Species
6) Water Resources
7) Riparian/Wetlands
8) Invasive Plants

Cultural Resources

9) Archeological
10) Historic Resources

Socioeconomic Resources

11) Oil and Gas Development
12) Adjacent Landowners and Uses

Social Resources

13) Visitor Use and Experience
14) Human Health and Safety

Natural Resources

1) Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) established federal programs that provide special protection for air resources and air quality related values associated with NPS units. Specifically, Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. BTNP is designated as a Class II air quality area under the Clean Air Act, which means emissions of particulate matter and sulfur dioxide are allowed up to the maximum increase in concentrations of pollutants over baseline concentrations as specified in Section 163 of the Clean Air Act. In addition, the Clean Air Act gives the federal land manager the responsibility to protect air quality related values (i.e., visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts. This was retained as an impact topic since smoke is a byproduct of prescribed burning.

2) Geologic and Soil Resources

The 2006 NPS Management Policies states the NPS will preserve and protect geologic features and processes from disturbances. These policies also state NPS will aim to understand and preserve the soil resources and to prevent unnatural erosion, removal, or contamination of them. The Proposed Action requires hand or mechanical treatments for construction of firelines,

herbicide treatments, and prescribed burning, which have the potential to have a measurable impact on the geology and soil resources; therefore impacts to this topic will be analyzed further.

3) Vegetation Resources

The 2006 NPS Management Policies states the NPS will preserve and maintain all plants native to the naturally evolving park unit ecosystems by preserving and restoring the abundances, diversity, dynamics, habitats, distributions, and natural processes of native plants. The construction of firelines, herbicide, hand and mechanical treatments, and prescribed burning would remove or change areas of native and invasive vegetation for fuels reduction. Planting or restoration of native vegetation in ecological restoration would also have an influence on vegetation resources. However, the BTNP fire program would restore longleaf pine habitat, maintain beneficial hardwoods, and protect or restore other native vegetation habitats; thus the topic of vegetation was retained for further analysis.

4) Wildlife

The 2006 NPS Management Policies states the NPS will preserve and maintain animals native to the naturally evolving park unit ecosystems by preserving and restoring the abundances, diversity, dynamics, habitats, distributions, and natural processes of native animals. BTNP hosts a large selection of wildlife; about 60 mammal species, 90 reptile and amphibian species, more than 1,800 invertebrates, and almost 100 fish species The proposed action would alter or disturb wildlife habitat and individual animals, but would be beneficial by restoring native vegetation and wildlife communities; thus the topic of wildlife was retained for further analysis.

5) Special Status Species

The Endangered Species Act of 1973 requires an environmental assessment for projects on federally-managed lands to determine potential effects to all federally-listed endangered, threatened, and candidate species. Section 7 of the Endangered Species Act (ESA) requires all federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that any action authorized, funded, or carried out by the agency does not jeopardize the continued existence of federally listed species or designated critical habitats. In addition, the 2006 NPS Management Policies and Director's Order 77 *Natural Resources Management Guidelines* require the NPS to examine the impacts on federal candidate species, as well as state-listed endangered, threatened, candidate, rare, declining, and sensitive species. The proposed action could potentially disturb federally-listed species or habitat, but may be beneficial in restoring native habitats that are critical in maintaining sensitive species populations. Therefore the topic of special status species was retained for further analysis.

6) Water Resources

NPS policies require protection of water quality consistent with the Clean Water Act. The purpose of the Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters." To enact this goal, the U.S. Army Corps of Engineers has been charged with evaluating federal actions that result in potential degradation of waters of the

United States and issuing permits for actions consistent with the Clean Water Act. The U.S. Environmental Protection Agency also has responsibility for oversight and review of permits and actions, which affect waters of the United States. The proposed action includes treatment units that either contain or are adjacent to perennial streams, and BTNP also contains several minor hydrologic units (e.g., sloughs, oxbows); thus the topic of water resources was retained for further analysis.

7) Riparian/Wetlands

For regulatory purposes under the Clean Water Act, the term wetlands means "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

Executive Order 11990 *Protection of Wetlands* requires federal agencies to avoid, where possible, adversely impacting wetlands. Further, Section 404 of the Clean Water Act authorizes the U.S. Army Corps of Engineers to prohibit or regulate, through a permitting process, discharge of dredged or fill material or excavation within waters of the United States. NPS policies for wetlands as stated in 2006 Management Policies and Director's Order 77-1 *Wetlands Protection*, strive to prevent the loss or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. In accordance with DO 77-1 *Wetlands Protection*, proposed actions that have the potential to adversely impact wetlands must be addressed in a Statement of Findings for wetlands.

Approximately 40% of BTNP has been categorized as palustrine, riverine, or lacustrine wetland. In addition, riparian areas exist throughout BTNP wherever creeks, rivers, or sloughs are present. Five of BTNP's management units are riparian corridors. The proposed action has the potential to influence riparian resources. Therefore, the topic of riparian/wetlands was retained from further analysis.

8) Invasive Species

There are no federal laws governing vegetation in general; however, NPS has developed policies and guidance on vegetation management. Section 4.4 of NPS 2006 Management Policies addresses biological resource management, including management of native plants and animals. This policy states that NPS will maintain all native plants as parts of the natural ecosystems of parks. BTNP promotes management practices to limit potential impacts to vegetation, to protect sensitive vegetation resources, and to prevent or limit invasive species. Under the proposed action, there is a risk of invasive species introduction and spread associated with any ground or vegetation disturbing activity. Therefore, invasive plants were retained for further analysis.

Cultural Resources

9) Archaeological Resources

Section 106 of the National Historic Preservation Act (NHPA), as amended in 1992 (16 USC 470 *et. seq.*); the NPS's Director's Order 28 *Cultural Resource Management Guideline*; and NPS 2006 Management Policies require the consideration of impacts on historic properties that are listed, or eligible to be listed, in the National Register of Historic Places. The National Register is the nation's inventory of historic places and the national repository of documentation on property types and their significance. The above-mentioned policies and regulations require federal agencies to coordinate consultation with the State Historic Preservation Officer regarding the potential effects to properties listed on or eligible for the National Register of Historic Places.

The NPS, as steward of many of America's most important cultural resources, is charged to preserve historic properties for the enjoyment of present and future generations. Management decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources. The NPS will protect and manage cultural resources in its custody through effective research, planning, and stewardship in accordance with the policies and principles contained in the NPS 2006 Management Policies, federal laws, and the appropriate Director's Orders. Prescribed burns and mechanical and manual hazard fuel reductions could potentially disturb archeological resources. Therefore, archeological resources will be further analyzed.

10) Historic Resources

The National Park Service, as steward of many of America's most important cultural resources, is charged to preserve historic properties for the enjoyment of present and future generations. According to the National Park Service's 2006 *Management Policies and* Director's Order-28 *Cultural Resource Management, m*anagement decisions and activities throughout the National Park System must reflect awareness of the irreplaceable nature of these resources (NPS 2006). The National Park Service will protect and manage cultural resources in its custody through effective research, planning, and stewardship and in accordance with these policies and guidelines.

Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation an opportunity to comment in the consultation process. The term "historic properties" is defined as any site, district, building, structure, or object eligible or listed in the National Register of Historic Places, which is the nation's inventory of historic places and the national repository of documentation on property types and their significance. More information about this consultation can be found in the *Consultation and Coordination* chapter.

The term "historic structures" refers to both historic and prehistoric structures, which are defined as constructions that shelter any form of human habitation or activity. The Staley Cabin was the only historic building determined eligible for listing in the National Register of Historic Places, although other historic resources may be discovered in the future during BTNP projects. Impacts

to historic resources would be negligible; however, historic resources were retained for further analysis due to the importance of preserving cultural heritage in BTNP.

Socioeconomic Resources

11) Oil and Gas Development

There are currently 5 active well sites and 638 miles of transpark oil and gas pipelines with 1.5 miles of associated access roads. Prescribed fire and hand and mechanical fuel reduction treatments may be introduced around oil and gas facilities that have high vegetation fuel loads, to create a safety barrier and defensible space from future wildfires. Oil and Gas operations access may be temporarily affected due to activities in the Proposed Action; thus oil and gas was retained for further analysis.

12) Adjacent Landowners and Uses

Adjacent land uses include residential development, commercial and private forestry, industrial development (oil and gas; forest products), agriculture, and publicly owned facilities (e.g., Town Bluff Dam, water diversion, and sewage treatment facilities). Approximately 95% of the land uses immediately adjacent to BTNP are commercial and private forestry (Harcombe and Callaway, 1997). Prescribed burns and manual and mechanical fuels reduction treatments could have beneficial impacts by reducing fuel loads and wildfire potential. Projects and activities could cause limited disturbance to adjacent landowners and associated uses; thus, this resource topic was retained for further analysis.

Human Resources

13) Visitor Use and Experience

NPS 2006 Management Polices states the fundamental purpose of all parks is for the enjoyment of park resources and values by the people of the United States. NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks, and will provide opportunities specifically suited for the natural and cultural resources found within each park area. BTNP enabling legislation allows for hunting, in addition to the typical range of opportunities found in natural areas. Some temporary disruption to visitor activities may occur during some “on the ground” fire management activities or from wildfires. These effects are expected to be minor and short-term, and in some cases beneficial, with a temporary effect to the overall visitor experience. However, this topic was retained for further analysis due to the fundamental NPS goal of providing for visitor enjoyment.

14) Human Health and Safety

NPS 2006 Management Polices states park managers should strive to protect human life, by providing injury free visits and a safe and healthful environment for visitors and employees. Under the Proposed Action, manual and mechanical fuels reduction treatments, herbicide use, and prescribed burning would be beneficial by reducing hazardous brush areas, making wildfire

control more successful. Managed properly, the use of prescribed fire mechanical, and herbicide treatments produce manageable and minor risk to employees. The reduced fuels would improve the safety for visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities from intense wildfires. Wildland fires pose a significant risk to the health and safety of firefighters, personnel, and the general public. Because activities addressed under the proposed action have the potential to impact human health and safety in the vicinity of the fire management projects, thus human health and safety was retained for further analysis.

1.7 Impact topics Considered, but Dismissed from Further Analysis

1) Floodplains

Executive Order 11988 *Floodplain Management* requires all federal agencies to avoid construction within the 100-year floodplain unless no other practicable alternative exists. The NPS guided by the 2006 Management Policies and Director's Order 77-2 *Floodplain Management* will strive to preserve floodplain values and minimize hazardous floodplain conditions. According to Director's Order 77-2 *Floodplain Management*, certain construction within a 100-year floodplain requires preparation of a Statement of Findings for floodplains.

Historically, fire was a natural process that occurred every 3–10 years and helped shape the native vegetation. The Proposed Action would not involve the filling or alterations of floodplain areas, and would not require the construction of structures or firelines within floodplains. Limited prescribed fire and targeted herbicide treatments would not affect floodplain values; the topic of floodplains was dismissed from further analysis.

2) Cultural Landscapes

The National Park Service defines cultural landscapes as settings humans create in the natural world. They are intertwined patterns of things both natural and constructed, expressions of human manipulation and adaptation of the land (NPS's Director's Order 28 *Cultural Resource Management Guideline*). Cultural Landscape Inventories have not been completed for BTNP. These inventories assess the character of the natural world that includes and encompasses historic districts. Such inventories describe a landscape's physical development over time, and evaluate its significance and integrity.

Although a cultural landscape inventory has not been conducted for BTNP, there are several historic sites that may have associated cultural landscapes. In many cases, these landscapes have been significantly altered by later human activities and major, obscuring vegetation growth. The potentially eligible historic cultural landscapes associated with historic sites primarily reflect the late 19th and early 20th century homestead activities and the logging and timber industry. Potential historic cultural landscape features may also be present in historic ferry landings, wagon roads and trails, farmsteads, and oil and gas exploration activities and camps. Under the Proposed action, the BTNP Fire Management Plan would be utilized to identify and protect natural, cultural features, or facilities. Because the proposed action is consistent with §1.4.7.1 of

NPS *Management Policies* 2006 and no new impacts to cultural landscapes are expected, this topic has been dismissed from further consideration**.**

3) Ethnographic Resources

Director's Order 28 (DO-28), *Cultural Resource Management*, defines ethnographic resources as any site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of an associated traditional group. According to DO-28 and Executive Order 13007, *Indian Sacred Sites*, the NPS should preserve and protect ethnographic resources. The proposed action would be designed to minimize any impacts to known cultural resources and to restore native plant communities that could be identified as ethnographic resources. BTNP regularly consults with tribes and associations and plans to continue such collaboration efforts. BTNP has the goal of avoiding and minimizing impacts to ethnographic resources. If prescribed burn or fuel treatment activities are proposed that would significantly alter the physical characteristics of a site all the tribes claiming cultural affiliation to BTNP will be notified and given at least 30 day notice to comment. However, the proposed action would have negligible effects on ethnographic resources; thus ethnographic resources were dismissed from further analysis.

4) Paleontological Resources

The 2006 Management Policies for the National Park Service (NPS) states the paleontological resources (fossils), including both organic and mineralized remains in body or trace form, will be protected, preserved, and managed for public education, interpretation, and scientific research. There are no known paleontological resources within BTNP. Therefore, there would be no impacts to paleontological resources as a result of the Proposed Action and the topic was dismissed from further assessment.

5) Museum Collections

The Director's Order 24 *Museum Collections* states that NPS is required to consider the impacts on museum collections (historic artifacts, natural specimens, and archival and manuscript material), and provides further policy guidance, standards, and requirements for preserving, protecting, documenting, and providing access to, and use of, NPS museum collections. No museum collection items would be disturbed as a result of the proposed action. Therefore, museum collections were dismissed from further analysis.

6) Soundscape Management

In accordance with the 2006 Management Policies for the NPS and Director's Order 47 *Sound Preservation and Noise Management*, an important component of the NPS's mission is the preservation of natural soundscapes associated with national park units (NPS 2006). Natural soundscapes exist in the absence of human-caused sound. The natural ambient soundscape is the combination 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 varies among NPS units as well as potentially throughout each monument, being generally greater in developed areas and less in undeveloped areas.

Impacts to the soundscape could occur from mechanical equipment (e.g., chainsaw, bush hog) used for reduction of hazardous fuels. These impacts should be minor and temporary and should not exceed the typical levels of man-made noise present during visitor season or regular operations. Therefore, soundscape management was dismissed as an impact topic for further analysis.

7) Lightscape Management

The 2006 Management Policies for the NPS states the NPS will strive to preserve natural ambient landscapes, which are natural resources and values that exist in the absence of human caused light (NPS 2006). NPS strives to limit the use of artificial outdoor lighting to the amount necessary for basic safety requirements. There should be no impacts to lightscape management; thus, this topic was dismissed from further analysis.

8) Prime and Unique Farmlands

The Farmland Protection Policy Act of 1981, as amended, requires federal agencies to consider adverse effects to prime and unique farmlands that would result in the conversion of these lands to non-agricultural uses. Prime or unique farmland is classified by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS). Prime farmland is defined as land that has the best combination of physical and chemical properties for producing food, forage, fiber, and oil seed, and for other uses (e.g., pasture land, forest land, and crop land). Unique farmland is defined as land other than prime farmland that can produce high value and fiber crops, such as fruits, vegetables, and nuts. There are no prime and unique farmlands designated in the project area; thus this topic was dismissed from further analysis.

9) 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. BTNP is a public holding and is not considered Native American trust resources and do not have any designated Native American trust resources. Therefore, Indian Trust Resources was dismissed as an impact topic for further analysis.

10) Environmental Justice

Executive Order 12898 *General Actions to Address Environmental Justice in Minority Populations and Low-income Populations* requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on

minorities and low-income populations and communities. The proposed action would not be expected to have disproportionate health or environmental effects on minorities or low-income populations or communities as defined by the US EPA Environmental Justice Guidance (US EPA 1998). Therefore, environmental justice was dismissed from further analysis.

11) Wilderness

The 2006 Management Policies, Section 6 states, "The National Park Service will evaluate all lands it administers for their suitability for inclusion within the national wilderness preservation system. For those lands that possess wilderness characteristics, no action that would diminish their wilderness suitability will be taken until after Congress and the President have taken final action. The superintendent of each park containing wilderness will develop and maintain a wilderness management plan to guide the preservation, management, and use of the park's wilderness area, and ensure that wilderness is unimpaired for future use and enjoyment as wilderness." There are no lands designated as wilderness or proposed wilderness in or near the proposed action. Thus, wilderness was dismissed for further analysis.

12) Park Operations

Park operations include changes that may affect the current facilities or that may require a new level of maintenance or staffing. Under the proposed action, targeted herbicide treatments may be more effective in reducing the size, severity, and crown fire risk from wildfires. This may reduce the potential level of staffing effort for future wildfires at BTNP. The proposed action would not significantly change overall park operations; thus, park operations were dismissed from further analysis.

2.0 ALTERNATIVES CONSIDERED

2.1 Alternative 1: No Action Alternative - Continue Current Fire Management Activities

This alternative represents what would occur if the BTNP fire management program is limited to presently approved and occurring fire management activities. This alternative provides a baseline for comparing and evaluating the impacts to the environment by the action alternative. The approved fire and fuels management program at BTNP would continue, but herbicide use would not be utilized in ecological restoration, maintenance or hazard fuel reduction activities unless separate, project specific NEPA processes occurred.

The inability to utilize herbicides to limit brush competition would greatly reduce the number of acres of altered timber company lands successfully restored to longleaf pine, and hinder restoration and maintenance of other unique vegetation areas that are being taken over by brush, (an artifact of reduced fire occurrence in fire dependent ecosystems). Preventing herbicide use could increase the number and frequency of mechanical intrusions/manipulations to sections of the BTNP landscape as mechanical methods would be used more frequently to cut and limit brush competition. More aggressive prescribed burning might be utilized in attempts to control brush; this could result in more unsuccessful restoration attempts that would cost more with little

benefit, or burning too hot that could reduce desired canopy survival in some areas. This would result in reduced resilience of BTNP ecosystems to continued stress from hurricanes, drought, pest outbreaks, and wildfire. It would also allow the retention and buildup of hazardous fuels in some critical areas immediately adjacent to communities or infrastructure, which may allow wildland fires to burn with more severity, and be more difficult to control. These wildfires could threaten visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities both within and adjacent to NPS lands.

Major activities of this program that would continue under this alternative include:

- wildfire management and suppression utilizing the appropriate response, (includes both direct and indirect attack, and use of foam and retardant),
- vegetation manipulation for hazard fuel reduction, ecological restoration and maintenance (including mechanical reduction of vegetation by hand and equipment, and prescribed burning), and removal of invasive plants where feasible,
- planting and seeding of native species according to NPS policies,
- biomass removal as an assist to ecological restoration or hazard fuel removal, only where removal would assist or speed-up the field restoration process,
- monitoring of field activities and adaptive management by the NPS,
- Burned Area Emergency Rehabilitation (BAER) activities, and
- interagency coordination, cooperation and related program activities.

2.2 Alternative 2: NPS Preferred Alternative – Utilize Herbicide as Additional Treatment Tool

Under this NPS preferred alternative, the BTNP fire management program would utilize targeted herbicide use for ecological restoration and some hazard fuel reduction activities. The major fire management program activities discussed above in the "No Action Alternative" would also occur under this alternative.

Among federal agencies, the NPS has one of the most rigorous approval programs for herbicide use due to NPS natural resource preservation mandates. Chemicals in parks must only be utilized in accordance with NPS Management Policy 4.4.5 and must adhere to IPM Guidelines (NPS Management Policy 4.4.5.2). Herbicides can only be used after the IPM process has been completed, a Pesticide Use Proposal has been approved by the Regional IPM Coordinator, and when mechanical methods and prescribed burning or other alternatives have a low chance of success to meet objectives. One objective is to reduce mid-story brush competition to allow re-establishment of native plant species, such as longleaf pine, grasses, forbs, and wildflowers. The subsequent goal is to return fuel loading to historic levels in longleaf pine or other natural ecosystems, then allowing prescribed fire to be the primary maintenance tool, (simulating periodic natural fires). These more natural forest conditions would decrease potential fire intensity during wildfire conditions and would promote re-establishment of historic fire dependent vegetation and habitats.

This proposed action satisfies all current NPS requirements to carry out management practices ensuring effective, efficient resource protection and management, and to insure the safety of park employees, adjacent landowners, and visitors.

2.2.1 Scope and Details related to Herbicide Treatment Techniques

BTNP is committed to its role as natural resource stewards, and dedicated to protecting the land, waters, wildlife, and people who live nearby, work there and visit. While utilizing NPS and EPA approval processes, the Preserve will use the best available science to examine proposed herbicide uses for risk versus benefit.

This alternative includes the use of herbicide spraying as a management tool, but wants the flexibility to consider and use improved techniques, technology, and newly approved herbicides in the future if more environmentally acceptable alternatives are developed. The use of targeted herbicide application, such as hand application of herbicide to specific basal or foliar plant areas, would minimize chances for overspray. Use of these targeted applications would reduce future repeated manipulation of brush and vegetation in specific landscape units, helping return vegetation communities to the range of natural variation where prescribed burning could be utilized as the primary natural change agent. In general, this would reduce disturbance by repeated mechanical intrusions over the long term, leading to a less disturbed and more natural area. Less mid-story brush would foster growth and germination of grasses, forbs, wildflowers, and longleaf pine seedlings, allowing a higher rate of success during ecological restoration activities. Being able to more successfully reduce mid-story brush removes a significant fuel hazard in prescribed burns, making prescribed burning safer for employees and nearby residents.

Increased successful ecological restoration efforts would usually change the fuel model to less hazardous vegetation associations by establishing an herbaceous understory, reducing high intensity wildfire risk (Goldammer 2003, Gillian and Platt 1999, Chapman 1932). Wildfire or prescribed fires after restoration would usually be limited to grass, forb, and leave/needle fuels on the ground, decreasing opportunities for stand replacing crown fire (Finney, McHugh and Grenfell 2005). Targeted herbicide spraying would lead to increased success on some critical hazard fuel reduction jobs (such as a fuel break next to a community), which would help create reduced brush areas, making wildfire control more successful next to communities. This would then provide better protection than the “no action alternative” for visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities.

Plan implementation will include a BTNP internal evaluation and prioritization process for proposed ecological restoration or fuels management projects; herbicide would be considered if more traditional tools (such as prescribed fire) would not be reasonably successful in achieving project restoration objectives. Little of BTNP remains unaltered by human activities due to past timber harvest and exclusion of natural and prescribed fire. The NPS believes a more effective ecological restoration program must occur to regain lost ecosystem function and protect sensitive species and biodiversity. An active fire maintenance program must also occur if BTNP is to protect and preserve remaining ecological function and diversity.

Herbicide application in NPS areas may only be utilized by following NPS Management Policy 4.4.5 and 4.4.5.2, and Director's Order 77-7, which outlines the NPS approval process. To get approval, BTNP’s IPM Coordinator submits a pesticide use proposal into the NPS Pesticide Use Proposal System. Approval comes only after regional and national level staff consider numerous factors including: the target use, location where the application will occur, potential T&E

species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, type of application (example, spot spraying), etc. A product may be approved or not depending on the above factors and alternative treatment possibilities. An herbicide application map and treatment plan will be developed for each treatment area.

Approved herbicides must have undergone EPA environmental and toxicological testing, and then must be EPA approved and labeled, (as required under the Federal Insecticide, Fungicide and Rodenticide Act of 1972—the process to determine whether or not the product is safe for human health and environmental purposes). Application methods and rates must be followed by the NPS as identified on the product label. BTNP must utilize the NPS designated recordkeeping system for purchasing, storing, tracking and maintaining each approved product. BTNP approved applicators would be trained in spill response procedure, which would include actions to prevent leaks, spills, and accidental exposures.

Treatments would consist of herbicide applications to target understory or mid-story hardwoods including, but not limited to species such as yaupon, wax myrtle, white bay, sweet gum, blue jack oak, and Chinese tallow. The decision to use herbicide in a particular area is not solely dependent on what species are present, but more to the density of the brush (understory) and mid-story trees as an impediment to ecological restoration. If the density and species makeup of an area would preclude successful restoration by reasonable application of prescribed fire, manual, and/or mechanical methods, then targeted herbicide application would be considered.

BTNP has an active fuel, vegetation, and fire effects monitoring program that scientifically examines and tracks effects in all restoration plots, regardless of the tools used (e.g., prescribed fire, mechanical, herbicide). BTNP has a small professional monitoring staff dedicated to monitoring vegetation manipulation effects (i.e., prescribed fire, mechanical, herbicide, control areas). Systematic monitoring will occur after an area has been treated to determine vegetation mortality and progress toward meeting treatment objectives. Additional targeted herbicide treatments might occur after vegetation re-growth to control re-sprouts and decrease the competition for germinating grasses/forbs and longleaf pine seedlings. Additional prescribed fire treatments may not occur for several years after re-establishment of seedlings or small plants because there is a sensitive period where fire may damage developing seedlings or desirable species re-establishment. The need to protect seedlings versus allowing prescribed burns or targeted herbicide varies by site and vegetation associations.

In most cases more effective ecological restoration can occur by combining prescribed fire, mechanical, manual, and chemical treatments.

- Prescribed fire is the necessary disturbance that is most successful at maintaining fire dependent ecosystems, and is most effective when fuel loads and species mixes approach natural conditions.
- Increased mature tree mortality (longleaf pine or hardwoods) can result from prescribed fires or wildfires that are too hot. Ineffective prescribed burns that do not remove understory brush can result from burning in too cool or too moist conditions, or lack of fine fuels on the ground. Prescribed fire effects on ecosystems are highly variable based on vegetation structure, fuel loading and moisture levels, weather, and overall fire behavior.

- Prescribed burns often do not effectively reduce non-native exotic plant species; herbicide treatment is usually the most effective method of removing or reducing exotics.
- Mechanical treatments have been used to remove over-story trees, pole trees, and some mid-story brush. Mechanical is not as selective as targeted herbicide spraying as to which brush and small trees it reduces. Since wheeled or tracked equipment is used, mechanical use must consider additional factors such as soils and ground cover present, time of year, presence of desirable species, cultural sites, etc.
- Manual treatments, such as utilization of chain saws, power cutters, and brush cutters can be effective on a limited scale or for particular areas where specific results are required. But the sheer abundance of brush and vegetation at BTNP make it impractical for larger scale ecological restoration. Since it requires humans to operate extensively in thick vegetation in rigorous conditions, widespread use on a large scale poses risk and safety considerations that cannot be mitigated.
- Targeted herbicide has been used to top-kill selected vegetation and fight re-sprouts to allow for native herbaceous vegetation and longleaf pine seedlings to establish, while protecting native overstory canopy where it exists. Herbicide is primarily used for reducing excessive brush during the initial stages of ecological restoration.
- Prior mechanical and herbicide reduction of vegetation fuels greatly reduces the number of holding resources needed to conduct prescribed fires, making them safer, plus aids in the control of wildfires.

A combination of the above methods, tailored to specific sites, followed up with prescribed fire, is the most effective and potent tool in ecological restoration (Haywood et al. 2001, Brooks and Stouffer 2011, Rice and Harrington 2005, Haywood 2010).

BTNP has done spot spraying according to the above procedures on individual projects in the past decade and has developed considerable experience in the process. Primary target brush species are smaller hardwoods including but not limited to species such as, yaupon, holly, wax myrtle, white bay, sweet gum, and Chinese Tallow. These species have become established in dense thickets in former timber plantations; due to lack of periodic fire they have encroached uplands and wetland savannas and established a closed mid-story that prohibits herbaceous vegetation establishment at ground levels.

In the past during pre-settlement times, periodic, frequent, low-intensity fires would have reduced the prevalence and success of these brush species. Because of their height and density, they are now more resistant to prescribed fire intensities. If prescribed fires are of high enough intensity to kill brush, they are usually difficult to control and may also damage or kill mature overstory trees.

The initial entry/manipulation of a site would be the primary time herbicide would be used. The brush species need to be reduced before the NPS conducts further restoration treatments, such as longleaf pine seedling plantings. Eliminating competing brush and hardwood species allow for higher survival rates of longleaf pine seedlings and other planted natives. Once longleaf pine seedlings are established periodic, frequent prescribed burning would be the planned maintenance activity. Once longleaf pines are established, they are extremely resistant to prescribed and wildfires.

BTNP estimates that in the past approximately 15,000 upland acres was populated by longleaf pine associations before timber harvest and replacement with exotic slash pine, loblolly pine, or hardwoods. The Preserve wants to eventually re-establish most of those 15,000 acres with longleaf pine/native plant associations due to the critical importance of this endangered habitat type. The native plant association (ground cover) will vary by site.

The future scope and scale of BTNP's planned herbicide treatments is modest due to funding and staffing limitations and the need to coordinate these activities with mechanical reduction, prescribed burning, and planting activities. Targeted herbicide spraying on foot is a labor intensive, slow process but ensures applying the minimal amount of herbicide needed to achieve treatment objectives. Areas to be restored will be planned, mapped, delineated and reviewed prior to beginning each treatment effort. A treatment prescription will be developed by the BTNP fire and resource management staff detailing the specific needs for the restoration and maintenance of the longleaf pine–vegetation alliance at that site.

The BTNP fire staff estimates that they could accomplish 200-400 acres of longleaf restoration treatment per year utilizing targeted herbicide for the initial restoration treatment, although shrinking funding and staffing constraints may further limit that estimate. There could be some small scale re-treatments with herbicide if brush resurged into a restoration area before the longleaf seedlings are well established, or if prescribed burning is frequently postponed due to local burn-bans, (which have increased in the drought of 2010-2011). Hazard fuel reduction and/or other potential ecological restoration projects where targeted herbicide might be used, such as savanna or pitcher plant bog restoration, could account for an additional 100 acres per year. The maximum expected BTNP acreage that could be spot treated with herbicide is estimated at 500 acres per year. This is most likely an overestimate for most years, but will serve the purposes of this analysis.

Past Use of Herbicide at BTNP

One purpose of this EA analysis is to consider the general programmatic concept of approved herbicide utilization by the BTNP fire management program. While detailed consideration of specific herbicides is outside the scope of this analysis, past use is an indication of future use. Thus, information is included here for evaluation and comparison purposes.

BTNP received limited, conditional NPS approval on past projects to utilize Garlon 4, (EPA Reg. No. 62719-40, or the generic equivalent called Element 4, with the same EPA Reg. No.). The approved use was for vegetation management related to ecological restoration. Garlon 4 Material and Safety Data Sheet may be found at Dow AgroSciences webpage (http://www.dowagro.com/ca/prod/garlonfour.htm).

BTNP considers Garlon an acceptable product at this time. However, the NPS wants to be able to consider new, more effective, and even less persistent or more environmentally acceptable herbicides if they are developed and approved in the future. Past use of Garlon 4 and/or Element 4 by BTNP is listed in the table below.

Table 1. Past use of Garlon 4 or generic equivalent Element 4 within BTNP

Year Treated	Acres	Land Management Unit	Purpose and Results
2008	91	Hickory Creek Unit Middle to North	Garlon used to reduce yaupon re-sprouts, after mastication the previous year, to enable longleaf pine savannah restoration in reasonable timeframe. Achieved objectives
2004	30	Hickory Creek unit Sundew Trail Area	Garlon used to reduce yaupon and low-level brush. No mastication needed. Excellent results
2004	321	Hickory Creek Unit, West of pipeline to Wildwood strip	Garlon utilized prior to mastication to top kill mid-story—yaupon mid-story brush prevented burning due to canopy scorch risk. Mastication and RX burning followed. Immediate understory grass and forb response and hazard fuels reduced.
2003	7	Hickory Creek Unit Off power-line ROW	Experimental plots to test effects of 3 herbicides, Garlon, Arsonal, and Accord. Garlon avoided unintended kill of non-target species and more effective against waxy leaf species such as yaupon.
2002	32	Hickory Creek Unit West side adjacent to Wildwood homes	Yaupon mid-story brush adjacent to Wildwood homes prevented burning due to canopy scorch risk. First test of Garlon; difficult for applicators to navigate in thick brush. Learned that ideal might be to masticate, then spray yaupon re-sprouts with Garlon. Hazard fuels reduced and good understory grass and forb response.

2.3 Alternatives Considered and Rejected

One additional alternative (Alternative 3) was considered at the internal scoping session, but dismissed.

Alternative 3 would not allow the use of mechanical equipment or prescribed burning activities at BTNP. This alternative was dismissed because it would not maintain healthy natural resources in a fire dependent ecosystem, thus it would not comply with the NPS mandate for maintaining healthy ecosystems. In addition, stopping vegetation reduction by mechanical and prescribed burning would ensure a build-up of hazard fuels that could result in a more flammable environment which would lead to dangerous, uncontrollable wildfires that could threaten safety of visitors, employees and nearby residents. These fires would have high potential to damage or destroy NPS infrastructure, NPS cultural and natural resources, oil and gas facilities, and adjacent private lands and communities.

Two additional alternatives (Alternatives 4 and 5) were considered as a result of external scoping, but dismissed.

Alternative 4 would delay implementing fire management activities until extensive, new fire history research is completed. The commenter suggested that BTNP based its fire related ecological restoration activities on faulty objectives based solely on a limited set of photos or reference condition documents, and needs more fire history information before continuing BTNP fire management activities.

BTNP has not based its fire management activities on sole information, but has used a diversity of information sources to influence and set ecological restoration goals. BTNP has access to an abundance of fire records, historical records, recent and older scientific research, fire history studies, BTNP field surveys, climate change related records, southeast Texas ecological research, and ongoing research and field studies. Research delineating vegetation alliances and their relationship to fire frequency and reference conditions is ongoing and improving.

The NPS recognizes vegetation community fire history as an important reference condition. The year round damp, warm climate at BTNP accelerates the deterioration of dead wood, which complicates tree wood history reconstructions. The BTNP area fire history is complicated by major pre-Preserve human disturbances that vary for each plot of ground. While more is constantly learned about vegetation associations and their response to fire, a study involving BTNP longleaf pine stands has been completed and reinforces the frequent fire burn interval that other research indicated prevails in the SE Texas area (Henderson 2006).

Lack of adequate documentation as to the extent and scope of past human historical disturbances makes an exact restoration prescription or reference condition for each area a constantly changing recipe. In addition, the conditions on the ground are changing as vegetation matures, new disturbances such as drought and hurricanes occur, and other natural processes continue.

Numerous studies confirm the critical importance of frequent, low intensity fire to longleaf pine vegetation and wildlife communities (Means et al. 2001, Pessin 1933, Jacqmain et al. 1999, Glitzenstein et al. 1995).

BTNP knows that many areas of the Preserve have been altered significantly, and delaying treatments or ecological restoration increases the risk of ecosystem conversion to new, unnatural habitat types. This may also accelerate the potential to lose sensitive and T&E species. Moving forward with a new FMP utilizing the best available science and information creates the best opportunity to preserve the resources that BTNP was created to protect. The new BTNP FMP will acknowledge the need for continued fire history learning, and utilize adaptive management to consider the best and latest science to develop fire related ecological restoration and habitat maintenance activities. These activities will be integrated with their BTNP General Management Plan and other Resource Management goals.

Based on all these factors, the proposed alternative would not maintain healthy natural vegetation resources in a fire dependent ecosystem, thus it would not comply with the NPS mandate for maintaining healthy ecosystems. Delay would lead to more build-up of hazard fuels that could

result in a more flammable environment, which would lead to dangerous, uncontrollable wildfires that could threaten the safety of visitors, employees and nearby residents. These fires would have high potential to damage or destroy NPS infrastructure, NPS cultural and natural resources, oil and gas facilities, and adjacent private lands and communities; therefore this alternative was dismissed from further discussion.

Alternative 5 would emphasize and increase the role of natural fire (lightning caused ignitions) in BTNP ecosystem restoration and maintenance. This alternative was dismissed as it conflicted with BTNP resource preservation and human health and safety goals.

The first reason this alternative was dismissed is due to the randomness of lighting ignitions, the relatively small size of BTNP units, the irregular boundaries of BTNP that do not often follow natural features, and the difficulty and high cost in limiting natural ignitions to NPS lands without threatening adjacent private property and human lives. Another reason to limit natural ignitions is the abundance of brush and vegetation resultant from past human landscape level alterations such as logging, grazing, and fire suppression. The growth and density of brush, the buildup of down and dead woody debris, and lack of frequent fire has created more volatile vegetation associations than would be found naturally in this area. Allowing natural fires to burn in many areas could introduce uncontrollable, stand-replacing fire into an altered, but surviving forest. This surviving forest is unable to accept fire as it could have during pre-logging, pre-altered conditions. Using natural fire as a restoration and maintenance tool would likely lead to increased brush species and conversion to new habitat types. Therefore, unlimited natural fire may accelerate ecosystem loss and the loss of species and communities that BTNP is supposed to protect. The NPS acknowledges the need for ecosystem restoration, but believes it can be done more effectively without eliminating present species through stand replacing disturbance events.

Lastly, national interagency fire policy allows BTNP some flexibility to manage wildfires according to certain criteria and objectives related to firefighter safety, cost, safety of residents and visitors, protection of private property, and protection of natural and cultural resources. The circumstances are very limited in smaller acreage areas, such as the units of BTNP. Thus BTNP already has the flexibility to utilize natural fire when conditions and circumstances are appropriate, which is rare. It has used natural fire in limited circumstances in the past when compatible with resource and community protection objectives, and plans to utilize this practice under appropriate and limited conditions under the future FMP and the constraints of national fire policy. An example of a past successful use of this policy was the decision to stop a wildfire at an existing road in BTNP, rather than utilize a large number of firefighters on foot to build an extensive handline in thick brush. Appropriate conditions to use natural fire as an ecosystem restoration and maintenance tool includes, but is not limited to the following:

- fire weather conditions are not extreme, and not expected to deteriorate;
- drought is not significant, so vegetative fuels are not overly dry;
- the natural ignition occurs in a larger BTNP unit where restoration thinning has occurred in some of the area and widespread stand replacing wildfire is unlikely;
- the ignition area is bounded by significant roads, wetlands, and a river, which would eventually limit fire size and extent to BTNP lands; no houses, private lands, oil and gas facilities, or power lines are threatened;

- cost to manage an ignition this way is less than aggressive, direct suppression actions; and
- it is safer to manage an ignition this way than to utilize firefighters for aggressive suppression techniques.

Due to the limits discussed above, this alternative was dismissed as a major way to manage fire and to conduct ecosystem restoration at BTNP. Utilizing natural fire as the primary restoration tool could possibly lead to more escaped wildfires, delay in ecosystem restoration, and loss of ecosystem components. These fires would have higher potential to damage or destroy NPS infrastructure, NPS cultural and natural resources, oil and gas facilities, and adjacent private lands and communities.

2.4 Mitigation Measures during the Proposed Action

The resource management staff from the BITH Resources Management Division will work with the Fire Management staff to ensure that natural and cultural resource management issues and concerns are considered on all planned projects in the Preserve. Resource Advisors (READ's) will be assigned to wildfires of significance to prevent and reduce adverse impacts from suppression or control activities. The BITH Fire Management Officer and Incident Commanders have direct responsibility for public and staff safety, evacuations, etc. On emergency incidents of significance they will work with local authorities, such as county judges and local law enforcement, and the Texas Forest Service to ensure public safety. The Superintendent has overall responsibility and oversight for all BITH activities and staff; he/she sets goals, approve BITH restrictions and closures, and approves the FMP and other major fire documents and plans.

The following specific mitigation measures will help minimize potential effects of BITH fire management activities on resources, staff, and the public. They would be incorporated into the new FMP and fire management work at BITH as appropriate if the Preferred Alternative is adopted. *Mitigation measures in italics would be eliminated if the No Action alternative is selected.*

Air Resources

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, and not be used during 8 mph or greater eye level wind, or when temperatures will be 90 degrees or higher.*
- *Prescribed fire would not occur sooner than 2 weeks after herbicide has been utilized in an area; in most cases fire would not be utilized until the full effects of the herbicide treatment become visible, which might typically be 1-2 months. Longer delays may be planned to allow target vegetation time to dry out and burn better during prescribed burning. This delay time would also allow the herbicide to be absorbed into the target plant tissue and naturally decompose before burning the vegetation it has been applied to. Generally, the class of herbicides that BTNP utilizes attack plant hormones and are not harmful to non-plants.*

- Fire staff will perform other agency and public notification procedures for all BITH prescribed burns, focusing on residents that might be impacted by smoke from BITH prescribed burns.
- BITH will follow state burning regulations issued by the Texas Commission of Environmental Quality (TCEQ).
- Prescribed burns would be postponed when Texas or County air regulatory agencies declare air pollution episodes where smoke from fires would worsen bad air quality.
- Coordination with the Superintendent will occur in advance to fully consider the effects of prescribed fire smoke during holidays or periods of heavy public visitation and hunting activities.
- Whenever possible prescribed burns will be conducted when fuel moistures are relatively low to provide better combustion, more transport and lofting of smoke column, and less residual burning.
- Smoke transport winds will be assessed by prescribed fire managers to determine smoke impacts to sensitive receptors and population areas.
- Timing and methods of ignition will be constantly assessed on prescribed burns to minimize smoke impacts.
- Coordination with adjacent agencies and landowners will occur regarding the total number of prescribed fires simultaneously occurring in the area, to limit cumulative smoke impacts.
- Smoke monitoring will occur throughout and immediately after BITH prescribed fires; data will be saved as part of the burn documentation records.
- On significant wildfires, BITH incident commanders will work with public information officers to regularly update local residents on expected smoke impacts.

Soils

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, and would not maintain a long term active residue in soils.*
- *Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention and catchment systems. These sites should be away from streams or standing water.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Water diversion devices would be utilized on all firelines to prevent erosion.
- Constructed firelines would be built to the minimum width needed for safe control operations.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.

- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Steam or water crossings should be avoided when possible by firelines or equipment. When necessary they should be carefully constructed to minimize disturbance and erosion to the watercourse. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Dozer and/or dozer plow would seldom be used in the interior of BITH units; consider only with consultation of resource management and Superintendent.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.
- Mop-up on fires will be done utilizing methods to minimize soil disturbance.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- After major wildfires, Burned Area Emergency Rehabilitation (BAER) will be considered in consultation with regional office and resource specialists.
- Utilize ATV's or balloon tired vehicles if possible when off road travel is required.
- Fireline explosives are not usually used at BITH; utilize only upon written permission of Superintendent.

Water, Wetlands, and Riparian Resources

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, considering the effects on water resources and watersheds.*
- *Herbicide would not be used within 3 hours of predicted precipitation or in areas of standing or flowing water.*
- *Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention and catchment systems. These sites should be away from streams or standing water.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Water diversion devices would be utilized on all firelines to prevent erosion.

- Constructed firelines would be built to the minimum width needed for safe control operations.
- Natural, manmade features, or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Steam or water crossings should be avoided when possible by firelines or equipment. When necessary they should be carefully constructed to minimize disturbance and erosion to the watercourse. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.
- The preferred rehabilitation of firelines will utilize replacement of slash or organic debris as the preferred method, but waterbars, check dams, or other diversion devices may be constructed if necessary in steep slope areas to prevent runoff and sedimentation.
- Chemical retardant, foam, and gasoline refueling will not be utilized within 200 feet of standing water or streams.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- Helicopter dipping will only be allowed from approved water sources.
- After major wildfires, Burned Area Emergency Rehabilitation (BAER) will be considered in consultation with regional office and resource specialists.
- Utilize ATV’s or balloon tired vehicles if possible when off road travel is required.

Vegetation

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, with EPA approved storage, transport, application procedures, etc.*
- *Herbicide would not be used within 3 hours of predicted precipitation, during 8 mph or greater eye-level winds, when temperatures will be 90 degrees or higher, or in areas of standing or flowing water.*
- *Systematic monitoring would be implemented to measure the effects of herbicide use on target vegetation and adjacent areas.*
- *An herbicide application map and treatment plan will be developed for each treatment area.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Constructed firelines would be built to the minimum width needed for safe control operations.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values. Avoid extensive falling and bucking of trees.
- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Steam or water crossings should be avoided when possible by firelines or equipment. When necessary they should be carefully constructed to minimize disturbance and erosion to the watercourse. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- After major wildfires, Burned Area Emergency Rehabilitation (BAER) will be considered in consultation with regional office and resource specialists.
- Utilize ATV’s or balloon tired vehicles if possible when off road travel is required.

Wildlife, including Special Status Species

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, considering the effects on wildlife.*
- *Herbicide would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area to ensure hunters have the opportunity to be informed.*
- *Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention and catchment systems.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Steam or water crossings should be avoided when possible by firelines or equipment. When necessary they should be carefully constructed to minimize disturbance and erosion to the watercourse. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.
- Before initiating non-emergency field fire management activities, NPS biologists or resource specialists will be consulted to determine presence or effects on sensitive species. If present, mitigation actions will be developed to minimize impacts on species of concern.
- Low level aviation use may be curtailed by the fire staff in consultation with resource management if certain sensitive wildlife species could be impacted.

- Existing roads will be utilized by vehicles and equipment as much as possible.
- Chemical retardant, foam, and gasoline refueling will not be utilized within 200 feet of standing water or streams to protect fisheries and aquatic animal life.
- Helicopter dipping will only be allowed from approved water sources under established conditions to help prevent wildlife disturbance.
- Helicopter use will be minimized, and flight levels kept high, in raptor and waterfowl areas to prevent collisions with aircraft.

Invasive Plants

- *Herbicide would be used to eliminate exotic invasive plants according to established safety and application procedures.*
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Incoming vehicles, engines, and equipment from outside the immediate area will be cleaned (including the undercarriage) upon arrival to remove invasive weed seeds.
- Resource managers will work with fire staff to prevent cross-contamination from aircraft water drops that may utilize natural water sources with species foreign to BITH.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- Utilize ATV's or balloon tired vehicles if possible when off road travel is required.

Cultural Resources

- Compliance with section 106 of the National Historic Preservation Act will occur before prescribed burn or fuel treatment projects.
- Water diversion devices would be utilized on all firelines to prevent erosion.
- Constructed firelines would be built to the minimum width needed for safe control operations.
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.

- Educate fire personnel about the significance of cultural sites, how to identify those sites, and appropriate actions and notifications to be made if sites are encountered.
- Identify cultural sites in advance of wildfire, prescribed fire, or fuels treatment activities in order to plan and devise avoidance strategies when possible.
- Avoid building firelines and ground disturbance in cultural site areas.
- Utilize defensive and protection tactics, collaborating with cultural specialists, to prevent damage to historic, cultural, archeological, ethnographic, or landscape sites.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- Continue to collaborate and coordinate with BITH affiliated tribes to prevent damage to ethnographic resources, even if unrecorded, before planned projects.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Flush cut stumps in cultural sites rather than remove. Avoid ground disturbance as much as possible in and around cultural sites.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- During wildfires, fire managers will regularly update the BITH resource specialist with cultural responsibilities on initial and extended attack response strategies, ground disturbance, and extent of fire area to facilitate focus on cultural resources.
- BITH cultural and historic site base maps will be immediately available to incident commanders to allow them to avoid impacts to cultural sites.
- Spot monitoring or accompaniment of heavy equipment use during wildfires will occur by Resource Advisors (READ's) to ensure avoidance of damage to archeological or cultural sites.
- Special flagging will be utilized to identify archeological and historic sites; flagging must be monitored as fire threat passes and may need early removal to prevent undue attention to cultural sites.
- Avoid low level aircraft flights over the Alabama-Coushatta Indian Reservation.
- Utilize ATV's or balloon tired vehicles if possible when off road travel is required.

Oil and Gas Development

- *Herbicide would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area.*
- Fire staff will perform other agency and public notification procedures for all BITH prescribed burns.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate

precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.
- Emphasize the safety of fire staff and the public as the highest priority in all fire management activities.
- BITH neighbors, visitors, and local residents will be notified of all fire management activities that have the potential to impact them.
- BITH will monitor fuel, weather, and fire condition parameters and may limit public access and activities in BITH when extreme conditions develop, as delegated in Preparedness Level planning.
- Existing roads will be utilized by vehicles and equipment as much as possible.

Adjacent Landowners

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, considering effects on human health and safety.*
- *Herbicide would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area.*
- *Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention and catchment systems. These sites should be away from streams or standing water.*
- *An herbicide application map and treatment plan will be developed for each treatment area.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Fire staff will perform other agency and public notification procedures for all BITH prescribed burns.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Emphasize the safety of fire staff and the public as the highest priority in all fire management activities.
- BITH neighbors, visitors, and local residents will be notified of all fire management activities that have the potential to impact them.
- BITH will monitor fuel, weather, and fire condition parameters and may limit public access and activities in BITH when extreme conditions develop, as delegated in Preparedness Level planning.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- Initial attack staff will determine the proximity of fire to visitors, adjacent landowners, and communities. They will coordinate with local agencies to inform them of the potential hazard and evacuate as necessary.

- As burned areas are opened to visitors, signs will be posted informing the public of potential hazards in the burned areas.

Visitor Use and Experience

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, considering effects on human health and safety.*
- *Herbicide would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area.*
- *An herbicide application map and treatment plan will be developed for each treatment area.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Fire staff will perform other agency and public notification procedures for all BITH prescribed burns.
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.
- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Rehabilitate constructed firelines after fires are out to prevent erosion and visual effects.
- Steam or water crossings should be avoided when possible by firelines or equipment. When necessary they should be carefully constructed to minimize disturbance and erosion to the watercourse. Crossings should promptly be restored and rehabilitated in consultation with resource specialists.
- Equipment operators will be trained to minimize soil and vegetation disturbance, compaction, and displacement.
- Equipment use will avoid operation on steep slopes or highly erosive soils.
- When possible, mowing or mastication will be utilized for firelines to avoid exposing mineral soils. When scraping is needed, it will be to the minimum depth necessary for safe fire control operations.
- Utilize less sensitive travel routes for firefighters, vehicles, and equipment whenever possible.
- Identify slash disposal areas that have no cultural resources or sensitive natural resources.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.

- Emphasize the safety of fire staff and the public as the highest priority in all fire management activities.
- BITH neighbors, visitors, and local residents will be notified of all fire management activities that have the potential to impact them.
- BITH will monitor fuel, weather, and fire condition parameters and may limit public access and activities in BITH when extreme conditions develop, as delegated in Preparedness Level planning.
- Existing roads will be utilized by vehicles and equipment as much as possible.
- After major wildfires, Burned Area Emergency Rehabilitation (BAER) will be considered in consultation with regional office and resource specialists.
- Initial attack staff will determine the proximity of fire to visitors, adjacent landowners, and communities. They will coordinate with local agencies to inform them of the potential hazard and evacuate as necessary.
- The fire management staff will work with protection staff and local agencies on posting smoke hazard signs if smoke will impact roadways.
- As burned areas are opened to visitors, signs will be posted informing the public of potential hazards in the burned areas.
- Utilize ATV's or balloon tired vehicles if possible when off road travel is required.

Human Health and Safety

- *Herbicide would only be utilized after undergoing the NPS national and regional approval process, considering effects on human health and safety.*
- *Herbicide would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area.*
- *Herbicide and application devices would be worked on, filled and mixed only utilizing approved leak prevention and catchment systems. These sites should be away from streams or standing water.*
- *Herbicide and application devices would only be utilized by trained staff aware of safety and leak prevention procedures, and proper application, transportation, storage, and recordkeeping processes.*
- *A herbicide application map and treatment plan will be developed for each treatment area.*
- *No visible leakage of chemicals will be allowed from equipment used for transporting, storing, mixing, or applying chemicals.*
- *Staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures.*
- Fire staff will perform other agency and public notification procedures for all BITH prescribed burns.
- Natural, manmade features or vegetation change barriers will be utilized whenever possible to minimize the need for fireline construction. Indirect/confine type strategies will be the preferred strategy for most wildfires.
- Vegetation will be removed, cut or manipulated along firelines to the minimum necessary for fire control or to protect human, natural or cultural values.
- Firefighters will utilize Minimum Impact Suppression Tactics (MIST) to minimize impacts of fire response operations whenever possible.

- Utilize water, pumps, and hose lines when available for wetlines or to back-up smaller firelines to minimize the amount of fireline construction.
- Equipment with fluid leaks will not be utilized. Refueling or filling or mixing of gas and other fluids will be avoided in the field when possible; when necessary appropriate precautions will be taken to prevent spills. Reasonable procedures will be developed to prevent spills of foam and fire retardant chemicals. These actions will be taken away from streams and watercourses.
- Emphasize the safety of fire staff and the public as the highest priority in all fire management activities.
- Safety briefings outlining known hazards and mitigations will occur before engaging in fire management activities.
- BITH neighbors, visitors, and local residents will be notified of all fire management activities that have the potential to impact them.
- BITH will monitor fuel, weather, and fire condition parameters and may limit public access and activities in BITH when extreme conditions develop, as delegated in Preparedness Level planning.
- Helicopter use will be minimized, and flight levels kept high, in raptor and waterfowl areas to prevent collisions with aircraft.
- Initial attack staff will determine the proximity of fire to visitors, adjacent landowners, and communities. They will coordinate with local agencies to inform them of the potential hazard and evacuate as necessary.
- Prescribed fire burn boss will work with local residents in close proximity to burns to ensure their safety.
- The fire management staff will work with protection staff and local agencies on posting smoke hazard signs if smoke will impact roadways.
- As burned areas are opened to visitors, signs will be posted informing the public of potential hazards in the burned areas.

2.5 Environmentally Preferred Alternative

The environmentally preferred alternative is determined by applying the criteria suggested in the National Environmental Policy Act of 1969 (NEPA), which is guided by the Council on Environmental Quality (CEQ). The CEQ provides direction that "the environmentally preferable alternative is the alternative that will promote the national environmental policy as expressed in NEPA's Section 101." Section 101 of the National Environmental Policy Act states that "…it is the continuing responsibility of the Federal Government to:
(1) fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
(2) assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings;
(3) attain the widest range of beneficial uses of the environment without degradations, risk to health or safety, or other undesirable and unintended consequences;
(4) preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment which supports diversity and variety of individual choice;

(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
(6) enhance the quality of renewable resources and approach the maximum attainable recycling of resources."

Alternative 1, no-action alternative, would minimally meet the above six criteria because maintenance, ecological restoration, and hazardous fuels reduction treatments would be limited to prescribed fire and mechanical tools increasing the risk of future high, severity wildfires and reducing the amount, extent, and effectiveness of successful ecological restoration. In addition, the increased wildfire risk could threaten visitors, adjacent communities, NPS infrastructure, and oil and gas facilities both within and adjacent to NPS lands. These wildfires and brush encroachment could also have adverse effects on park natural and cultural resource values.

Alternative 2 is the environmentally preferred alternative because it best addresses the six evaluation criteria listed above. Alternative 2, *Utilize Herbicide as Additional Treatment Tool*, would use targeted herbicide application to reduce future manipulation of brush and vegetation in specific landscape units. In general, Alternative 2 would reduce disturbance by repeated mechanical intrusions over the long term, leading to a more natural and less disturbed area. Less mid-story brush would compete with longleaf pine seedlings, allowing a higher rate of success during ecological restoration activities. Being able to more successfully reduce mid-story brush removes a significant fuel hazard in prescribed burns, making prescribed burning safer for employees and nearby residents. Increasing success on some critical hazard fuel reduction jobs (such as a fuel break next to a community) would also help to create reduced brush areas, making wildfire control more successful. This would then provide better protection than the "no action alternative" for visitors, adjacent communities, NPS infrastructure, NPS cultural and natural resources, and oil and gas facilities.

No new information came forward from public scoping or consultation with other agencies to necessitate the development of any new alternatives, other than those described and evaluated in this document. Because it meets the purpose and need for the project, the project objectives, and is the environmentally preferred alternative, alternative 2 is also recommended as the National Park Service preferred alternative. For the remainder of the document, alternative 2 will be referred to as the preferred alternative.

Table 2 compares the ability of these alternatives to meet the project objectives (the objectives for this project are identified in the *Purpose and Need* chapter). As shown in the following table, Preferred Alternative meets each of the objectives identified for this project, while the No Action Alternative does not address all of the objectives

Table 2. Summary of the Proposed Action Objectives and Alternatives

Objectives	No Action Alternative	Preferred Alternative
To continue the BITH fuel manipulation and ecological restoration activities (prescribed burning, mechanical,	No, maintenance, ecological restoration, and hazardous fuels reduction treatments would be limited to	Yes, including targeted herbicide application as fuel management tool would satisfy all current NPS requirements to continue to carry out fire and resource management activities to insure effective, efficient resource protection

Objectives	No Action Alternative	Preferred Alternative
planting, seeding, and consider biomass removal on a case-by-case basis) in the most efficient and safe manner possible.	prescribed fire and mechanical tools increasing the risk of future high, severity wildfires and decreasing the amount of ecological restoration.	and management, and to insure the safety of park employees, adjacent landowners, and visitors and would enhance ecological restoration efforts.
To utilize targeted herbicide application as an aid to ecological restoration, maintenance, and hazard fuel reduction	No, fuel management would be limited to prescribed fire and mechanical tools increasing the risks of future uncontrollable wildfires and reducing the amount, extent, and effectiveness of successful ecological restoration.	Yes, including targeted herbicide application would increase successful ecological restoration efforts and more successfully reduce hazardous fuels, making prescribed burning safer for employees and nearby residents. More successful ecological restoration and fuel reduction projects would decrease the risk from wildfires.
To update FMP terminology and policy	No, would continue using the older, outdated terminology and policy possibly causing confusion to the public, staff, and interagency cooperators which would hinder efficient fire operations.	Yes, would implement updated terminology and policy to conform to current interagency standards providing consistent communications to the public, staff, and interagency cooperators allowing for more efficient fire operations.
To provide effective rehabilitation of wildfire areas (BAER)	Yes, allows for rehabilitation activities after wildfires.	Yes, allows for rehabilitation activities after wildfires
To continue active monitoring of fire program field actions, support sound resource management science, and utilize adaptive management to improve the program	No, limiting fuels management to prescribed fire and mechanical tools would not allow NPS the flexibility to consider and use improved techniques, technology, and newly approved herbicides in the future if more environmentally acceptable alternatives were developed.	Yes; BITH has found prescribed fire and mechanical tools do not reduce mid-story brush and invasive species effectively and including targeted herbicide application would allow NPS to use adaptive management to improve the program and would allow flexibility to consider and use improved techniques, technology, and newly approved herbicides in the future if more environmentally acceptable alternatives were developed.
Does the alternative meet project objectives	No	Yes

Table 3. Comparison of Alternatives

Components	Alternative 1 No Action	Alternative 2 Proposed Action
Prescribed Burn	Prescribed burns would continue to be used according to fire regimes and condition classes for each fire management unit. Maintaining and expanding the prescribed fire program would continue to be a priority in restoring longleaf pine ecosystems. Prescribed burning would involve more understory and mid-story brush that would not be reduced by targeted herbicide use, increasing the risk on prescribed burns.	Prescribed burns would continue to be used according to fire regimes and condition classes for each fire management unit. Maintaining and expanding the prescribed fire program would continue to be a priority in restoring longleaf pine ecosystems. Prescribed burning would be safer as more understory and mid-story brush would be reduced by targeted herbicide application, decreasing the risk on prescribed burns.
Fire Suppression Tactics	All wildland fires within BITH boundaries would be suppressed using the appropriate response, utilizing both direct and indirect tactics, depending on the specifics of each fire. Tactical alternatives that require suppression actions on private lands would be coordinated with local fire agencies and landowners. Fire control actions in certain areas would be more challenging due to less reduction of understory and mid-story brush.	All wildland fires within BITH boundaries would be suppressed using the appropriate response, utilizing both direct and indirect tactics, depending on the specifics of each fire. Tactical alternatives that require suppression actions on private lands would be coordinated with local fire agencies and landowners. Fire control actions in certain areas would be less risky due to fuel reduction of understory and mid-story brush by targeted herbicide application.
Mechanical and Manual (**Mechanical** includes wheeled and tracked equipment, such as mowers, grinders, brush cutters, and masticators) (**Manual** includes chainsaws powered weed cutters, blowers, hand mowers, and hand motorized equipment	Mechanical and manual treatments would be used to reduce hazardous fuel in wildland-urban interface areas, prep units for prescribed burning, or to assist on ecological restoration goals within BITH. Focused treatment may occur near developments, cultural, natural, and other resources.	Mechanical and manual treatments would be used to reduce hazardous fuel in urban interface zones, prep units for prescribed burning, or to accelerate ecological restoration goals within BITH. Focused treatment may occur near developments, cultural, natural, and other resources. Internal NPS and

Components	Alternative 1 No Action	Alternative 2 Proposed Action
operated by an individual walking with the equipment)	Internal NPS and programmatic processes would be utilized to plan in advance and ensure protection of natural and cultural resources.	programmatic processes would be utilized to plan in advance and ensure protection of natural and cultural resources.
Chemical	Chemical treatments would not be used as a fuel management tool, so ecological restoration and fuel reduction acreage would be less.	Targeted herbicide treatments may be utilized, following NPS approval processes, to help reduce understory and/or mid-story brush, and to control and/or limit the establishment of exotic invasive species. Treated/restored acreage would be increased and more effective combined with mechanical and prescribed burning.

2.6 Summary of Environmental Consequences by Alternative

Table 4 summarizes the anticipated environmental impacts for alternatives I and II. Only those impact topics that have been carried forward for further analysis are included in this table. The *Environmental Consequences* chapter provides a more detailed explanation of these impacts.

Table 4. Environmental Impacts Summary by Alternative.

Resource Topic	Alternative I No Action	
Air Quality	Direct, minor, adverse, short-term, localized impacts from particulate matter and smoke produced from prescribed burns. Direct, localized, short-term, and negligible to minor from air pollutants due to mechanical and manual hazardous fuel treatments. Indirect, minor, adverse, short-term, localized, and minor due to reduced visibility along roadways, reductions in recreation values due to visibility limitations, smoke and odors, and possible health effects to sensitive receptors, such as residents and visitors. Indirect, moderate, beneficial, long-term, regional impacts due to decrease in fuel loading.	Direct, minor, adverse, short-ter Potential reduced mechanical ma Indirect, minor, adverse, short-te recreation values due to visibilit residents and visitors. Larger acreage of reduced mid-s moderate, beneficial, long-term,
Geologic and Soil Resources	Direct, adverse, short-term, minor, localized impacts from prescribed fire; and benefits to soil development and soil nitrification. Direct, negligible to minor, adverse, localized impacts to the soil due to fire suppression tactics. Indirect, adverse, long-term, minor to moderate, localized, impacts due to increased potential for locally severe fire effects on soil from fuel buildup due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure.	Direct, adverse, short-term, minc nitrification. Indirect, beneficial, long-term, n wildfires over time as the amoun brush).
Vegetation Resources	Direct, minor to moderate, beneficial, long-term, localized impacts by restoring the native vegetation structure, composition, and function of historically fire-maintained vegetation associations. Indirect, adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects on vegetation from fuel buildup due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure. Climate change—Indirect effects would be beneficial, long-term, and localized due to reduced fuels and fire behavior potential in treated areas.	Potential increased acreages suc long-term, localized impacts by fire-maintained vegetation assoc Indirect, beneficial, minor to mo wildfires and increasing the pote and fuel hazard reduction increa Climate change—Indirect effect potential in treated areas.
Wildlife	Direct, minor, adverse, short-term, and localized impacts due to temporary displacement and mortality of individual wildlife species. Mechanical and manual treatments used for hazardous fuel reduction would have direct, short-term, adverse, localized impacts on wildlife species that are less mobile due to stress and disturbance. Indirect, moderate, long-term, beneficial, localized impacts due to improved wildlife habitat quality from return of natural fire regime.	Direct, minor, adverse, short-ter wildlife species. Mechanical and manual treatme impacts on wildlife species that

Resource Topic	Alternative I No Action	
	Indirect, adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects on wildlife habitat and individuals from fuel buildup due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure.	Potential increased acreages suc localized impacts due to improv function of historically fire-mai Indirect, beneficial, minor to mo wildfires and increasing the pote and fuel hazard reduction increa
Special Status Species	Minor to moderate, long-term, adverse, localized impacts on all federally listed species habitat (e.g., destruction and reduced quality) and destroy individual Texas trailing phlox plants and/or populations due to increased potential for locally severe fire effects from fuel buildup due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure. Prescribed fire could have minor to moderate, long-term, beneficial, localized impacts by maintaining/restoring habitat quality and for all federally listed species. The Preserve does not support any known populations or contain designated critical habitat for the Red-cockaded Woodpeckers, Louisiana black bears, Louisiana pine snake, or Navasota ladies' tresses, but does have suitable habitat for these species. This would equate to a "may affect but not likely to adversely affect" determination for Texas trailing phlox, and a "no effect" determination on the other listed species.	Potential increased acreages suc prescribed burning to foster rest phlox. A minimum 50-feet buff opportunity for herbicide spray, foliar plant areas, and following Neither direct nor indirect short- Red-cockaded Woodpeckers, Lo preserve does not support any kn This would equate to a "may aff effect" determination on the othe
Water Resources	Indirect, minor to moderate, short-term, beneficial, and localized impacts due to prescribed fire maintaining natural aquatic vegetation communities; and direct, minor, adverse, short-term, and localized impacts due to temporary increase in soil erosion. Potential greater use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities could result in greater direct, adverse, localized, short-term, negligible to minor impacts could due to trampling of stream banks or similar disturbances by felled and/or dragged trees and to indirect. Indirect, adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects (i.e., increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water).	Direct, minor, adverse, short-ter vegetation along the stream bank maintaining natural aquatic vege Potential reduced use of mechan adjacent to communities compar impacts could due to trampling c Potential increased acreages suc long-term and localized impacts intensity ground fires over time a mid-story brush).
Riparian/Wetlands	Indirect, minor to moderate, short-term, beneficial, and localized impacts due to prescribed fire maintaining natural aquatic vegetation communities; and direct, minor, adverse, short-term, and localized impacts due to temporary increase in soil erosion. Potential greater use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities could result in greater direct, adverse, localized, short-term, negligible to minor impacts could due to trampling of riparian/wetland banks or similar disturbances by felled and/or dragged trees and to indirect. Indirect, adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects (i.e., increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water).	Direct, minor, adverse, short-ter vegetation along the riparian/we due to maintaining natural aquat Potential reduced use of mechan adjacent to communities compar impacts could due to trampling c Potential increased acreages suc long-term and localized impacts intensity ground fires over time a mid-story brush).

Resource Topic	Alternative I No Action	
Archaeological Resources	Direct, long-term, minor, adverse, site-specific effects on unknown archaeological resources; direct, minor to moderate, long-term, beneficial, and site-specific due to reduced probability of severe wildfires by conducting prescribed burns. Direct and indirect, localized, short-term, and minor due to fire suppression tactics and mechanical and manual hazard fuel reductions. Direct, long-term, minor to moderate, adverse, and localized due to increased potential for locally severe fire effects from fuel build up due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure.	Direct, long-term, minor, adverse long-term, beneficial, and site-sp Direct and indirect, localized, sh fuel reductions. Potential increased acreages succ long-term, localized impacts by intensity ground fires over time a mid-story brush).
Historic Resources	Direct, long-term, minor, adverse, site-specific effects on unknown historic resources; direct, minor to moderate, long-term, beneficial, and site-specific due to reduced probability of severe wildfires by conducting prescribed burns. Localized, negligible to minor, short-term to long-term direct and indirect adverse effects on historic structures due to fire suppression tactics and hazardous fuel reduction (mechanical/manual). Direct, long-term, minor to moderate, adverse, and localized due to increased potential for locally severe fire effects from fuel build up due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure.	Direct, long-term, minor, adverse long-term, beneficial, and site-sp Localized, negligible to minor, s suppression tactics and hazardou Potential increased acreages succ long-term, localized impacts by intensity ground fires over time a mid-story brush).
Oil and Gas	Direct, long-term, minor to moderate, beneficial, site-specific impact due to reduced potential for fuel build; direct, short-term, adverse, negligible to minor, and site-specific impacts due to road closures. Indirect impacts would be localized, short-term to long-term, negligible to minor, and beneficial due to mechanical and manual hazardous fuels reduction. Direct, long-term, minor to moderate, adverse, localized due to increased severe wildfire risk rom fuel build up due to reduced number of acres restored successfully and treated in some critical areas adjacent to communities or infrastructure.	Direct, long-term, minor to mod short-term, adverse, negligible to Indirect impacts would be localiz manual hazardous fuels reductio Potential increased acreages succ long-term, localized impacts by intensity ground fires over time a mid-story brush).
Adjacent Landowners and Uses	Direct, short-term, adverse, negligible to minor, and localized due to road closures. Direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires.	Direct, short-term, adverse, negl Potential increased acreages succ long-term, localized impacts by intensity ground fires over time a mid-story brush).
Human Health and Safety	Direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires. Direct, short-term, negligible to minor, adverse, localized due to fire management actions (i.e., prescribed fire, mechanical and manual thinning, fire suppression tactics).	Increased acreages successfully impacts by minimizing the poten of area restored increases and fu
Visitor Use and Experience	Direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up, the increased risk for severe wildfires, and potential restricted access to areas in the Preserve with thick underbrush growth.	Direct short-term, adverse, site-s Indirect, localized, short-term, m opportunity of natural values and odor, and blackened vegetation a

Resource Topic	Alternative I No Action	
	Indirect, localized, short-term, minor, and adverse or beneficial due to the potential education and interpretation opportunity of natural values and processes and the temporary displacement/closures of areas to visitors and the smoke, odor, and blackened vegetation associated with prescribed burns.	Expected to have direct, minor to future severe wildfires and increa increases and fuel hazard reducti

3.0 ENVIRONMENTAL CONSEQUENCES

3.1 Methodology

The effects of each alternative are assessed for direct, indirect, and cumulative effects for each resource topic selected. Actions are first analyzed for their direct and indirect effects. Direct effects are impacts that are caused by the alternatives at the same time and in the same place as the action. Indirect effects are impacts caused by the alternatives that occur later in time or are farther in distance than the action. Potential impacts are described in terms of type, context, duration, and intensity. Specific impact thresholds are given for each resource at the beginning of each resource section. General definitions for potential impacts are described as follows:

Type: Describes the impact as either beneficial or adverse, direct or indirect:

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that moves the resource away from a desired condition or detracts from its appearance or condition.

Direct: An effect that is caused by an action and occurs in the same time and place.
Indirect: An effect that is caused by an action but is later in time or farther removed in distance, but is still reasonably foreseeable.

Context: Describes the location or area where the impacts will occur.
1) site-specific - impacts would occur within the location of the proposed action
2) local – impacts would affect areas within the location of the proposed action and land adjacent to the proposed action
3) regional – impacts would affect areas within the location of the proposed action, land adjacent to the proposed action, and land in surrounding communities.

Duration: Describes the length of time an impact would occur, as either short-term or long-term.

Short-term: impacts that generally last for the duration of the project. Some impact topics will have different short-term duration measures and these will be listed with the resource.

Long-term: impacts that generally last beyond the duration of the project. Some impact topics will have different long-term duration measures and these will be listed with the resource.

Intensity: Describes the degree, level, or strength of an impact. The impacts can be *negligible, minor, moderate*, or *major*. Definitions of intensity can vary by resource topic and are provided separately for each impact topic analyzed.

3.2 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations, which guide the implementation the National Environmental Policy Act of 1969 (42 USC 4321 et seq.), require assessment of cumulative impacts in the decision-making process for federal projects. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact 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" (40 CFR 1508.7). Cumulative impacts are considered for all Alternatives.

Cumulative impacts were determined by combining the impacts of the alternative with other past, present, and reasonably foreseeable future actions. Therefore, it was necessary to identify other ongoing or reasonably foreseeable future projects at BITH and, if applicable, in the surrounding region. The geographic scope for this analysis includes elements within the BITH boundaries. NPS analyzed impacts from past actions dating back to 1996, when the Resources Management Plan was completed and provided goals for managing BITH. Cumulative impacts of future planned projects were also analyzed; however the number and timeline of reasonably foreseeable future actions is limited until the NPS completes the General Management Plan for BITH in 2012 which contains a planning horizon of 15 to 20 years.

The following projects, plans, or actions were identified as related to the purpose of conducting the cumulative effects analysis:

Resource Management Plan (1996). The Resources Management Plan provides goals for BITH that address preserving park resources, providing for the public enjoyment and visitor experience, perpetuating cultural resources and enhancing recreational opportunities managed by partners, and ensuring organizational effectiveness.

Fire Management Plan (2004). Wildland fire has historically played an important part of the area's ecosystem. Its effects on vegetation and wildlife have always weighed heavily on the recreation area's natural processes. The Wildland Fire Management Plan for Big Thicket National Preserve is a detailed program of action to implement a prescribed fire program and manage wildland fire. This plan is the primary reference for conducting all fire management activities and is intended to help achieve the resource management objectives as presented in the resource management plan and follow NPS Management Policies. Protection of life (employee and public), property, cultural resources, the perpetuation of natural resources and their associated processes, and protection of cultural and historic scenes are the highest priorities for the plan. This plan is based on a strategy to use prescribed burns and mechanical methods to remove excess fuel from the system, which would reduce the likelihood of major wildfires and would also provide benefits to fire dependent native vegetation and wildlife in the area.

Oil and Gas Management Plan (2006). The 2006 Oil and Gas Management Plan for BITH was prepared for the purpose of guiding the management of activities associated with the exploration and development of nonfederal oil and gas within the park and existing transpark oil and gas pipelines and activities in their associated rights-of-way over the next 15 to 20 years. The Oil and Gas Management Plan identifies those park resources and values most sensitive to oil and gas

exploration and development disturbance, and defines impact mitigation requirements to protect such resources and values. In order to protect park resources and values, the plan establishes performance standards for oil and gas exploration and development, and it provides pertinent information to oil and gas owners and operators to facilitate compliance with applicable regulations (NPS 2006). As of 2006, BITH assumed up to 40 new wells could be developed over the next 15 to 20 years.

General Management Plan (in development). The NPS has started an interactive planning process to develop a vision for the future of BITH. This process would result in a General Management Plan that would articulate the long-term vision that would guide management of the preserve for the next 15 to 20 years. A general management plan is the broadest level of planning in the NPS. The general management plan lays the groundwork for the more detailed planning and day-to-day decision-making that will follow. The BITH General Management Plan would prescribe the resource conditions and visitor experiences that are to be achieved and maintained over the next 15 to 20 years (Federal Register 2009). Actions arising from this plan have the potential to increase resource protection and improve visitor use/experience.

The following past, present, and current actions were also considered in the analysis of cumulative impacts:

- Industry discharges from paper mills and refineries which may include metals, organic materials, hydrocarbons and variations in pH and temperature into tributaries that flow directly into the Neches River.
- Improper design, maintenance, or operation of private septic tanks resulting in discharges of pollutants in the bayou connected to the Neches River.
- Logging within the Preserve boundary is a past use that largely eliminated old growth forests and created canals which affect natural sheet flow of water.
- In general, the state of Texas provides counties with limited powers to control land use beyond protecting public safety and environment (i.e. protecting drinking water supplies). This scenario, along with population shifts from rural areas to urban regions, contributes to the on-going conversion of agricultural and forest lands in this region to housing and other development.
- Past loss or modifications of historic structures and cultural landscapes (e.g., encroaching vegetation that obscures historic roads and homestead sites).
- The Texas Commission on Environmental Quality is implementing an Environmental Flows Law, which will be required for every dam, to allow flows to maintain natural hydrologic regimes important for wildlife, riparian vegetation, and water quality.
- The U.S. Army Corps of Engineers Sabine-Neches Waterway Improvement Project is intended to improve navigation and provide for larger vessels to use the channel. Among other actions, the project includes deepening the channel and extending the channel by over 13 miles.
- Expanded refineries and chemical processing plant are planned to come online in the near future.

3.4 Natural Resources

3.4.1 Air Quality

The Clean Air Act of 1963 (42 U.S.C. 7401 *et seq.*) established federal programs that provide special protection for air resources and air quality related values associated with NPS units. Specifically, Section 118 of the Clean Air Act requires a park unit to meet all federal, state, and local air pollution standards. BTNP (hereafter preserve) is designated as a Class II air quality area under the Clean Air Act, which means emissions of particulate matter and sulfur dioxide are allowed up to the maximum increase in concentrations of pollutants over baseline concentrations as specified in Section 163 of the Clean Air Act. In addition, the Clean Air Act gives the federal land manager the responsibility to protect air quality related values (i.e., visibility, plants, animals, soils, water quality, cultural resources, and visitor health) from adverse pollution impacts.

3.4.2 Affected Environment

National Ambient Air Quality Standards (NAAQS) for criteria pollutants are intended to protect human health and welfare. Criterion pollutants are sulfur dioxide (SO_2), nitrogen oxide (NOx), ozone (O3), particulate matter (PM_{10} and $PM_{2.5}$), lead (Pb), and carbon monoxide (CO).
The Project Area is classified as a Class II area under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act of 1963 and amendments. As such, the area's air quality is protected by allowing only limited increases (i.e., allowable increments) over baseline concentrations of pollution for SO_2, nitrogen oxides (NO_x), and PM. The PSD permitting process is administered by the Texas Commission on Environmental Quality (TCEQ) and applies to defined categories of new or modified sources of air pollution with emissions greater than 100 tons per year and all other sources greater than 250 tons per year.

Ambient monitoring for SO_2, NO_x, O_3, and PM has not been routinely monitored for the Project Area, but is assumed to be in compliance with the NAAQS. The nearest ambient monitoring station is in Beaumont, Texas for SO_2, $PM_{2.5}$, and hydrogen sulfide. All monitored values were in compliance with the PM_{10} NAAQS (i.e., 150 ug/m^3 standard). BITH is located north of the Beaumont-Port Arthur airshed and northeast of the Houston airshed.

Prescribed fire activity is subject to regulations of the TCEQ, but burning permits are not required prior to ignition in the panhandle of Texas. Each year, TCEQ is provided a letter identifying the location and number of burns predicted for the area. Twenty-four hour notice is given to TCEQ, local sheriffs and fire departments prior to all prescribed burn ignitions.

3.4.1.2 Methodology and Intensity Threshold

Air quality impacts were qualitatively assessed using literature reviews and professional judgment based on consideration of fuel levels and types, size of area that could burn, and knowledge of air chemistry. The thresholds of change for the intensity and duration of an impact are defined as follows:

Negligible: Operations would cause no changes or changes in air quality would be below or at the level of detection, and if detected would have effects that would be considered slight and short-term.

Minor: Operations would cause measurable small, short-term, localized changes in air quality. Alteration to air quality would be temporary and limited smoke exposure to sensitive resources. No mitigation measures would be necessary.

Moderate: Operations would cause measurable, localized changes in air quality that would have consequences, but air quality standards would still be met. . Alteration to air quality resources would be short-term smoke exposure to sensitive resources. Mitigation measures would be necessary and would likely be successful.

Major: Operations would cause measurable, regional changes in air quality that would have substantial consequences, and would violate state and federal air quality standards and Class II air quality standards. Alteration to air quality resources would be long-term smoke exposure to sensitive resources. Extensive mitigation measures would be needed to offset any adverse effects and their success could not be guaranteed.

Duration:
Short-term: Recovers in 7 days or less.
Long-term: Takes more than 7 days to recover.

3.4.1.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Design and conduct operations in a manner that minimizes air pollution emissions and impacts. Perpetuate best air quality to sustain human health, scenic vistas, visibility, and visitor enjoyment; and to conserve natural resources and systems and cultural resources.	NPS Organic Act of 1916, as amended; Clean Air Act, as amended; NPS Wildfire Management Reference Manual 18; NPS-77 Natural Resources Management Guidelines; NPS Management Policies; Texas Admin Code, title 30, Chapter 111; National Environmental Policy Act

3.4.1.4 Analysis of Alternatives and Impacts on Air Quality

Impacts of Alternative I: No Action Alternative

Direct, minor, adverse, short-term, localized impacts to air quality would occur from particulate matter and smoke produced from prescribed burns. Fugitive dust generated from suppression activities and increased vehicle traffic associated with fire crews would also temporarily affect air quality. Smoke, particulate matter, and dust emissions impact visibility in the preserve and surrounding area. There may be an intermittent and short-term exceedance of air quality standards (especially particulates) resulting in short-term, localized, and negligible to minor

adverse impacts to air quality and visibility. Mitigation measures would include rapid mop-up and extinguishing of the remaining burning, thus reducing smoke from heavy fuels. Another mitigation measure is to burn during appropriate weather and fuel moisture conditions where fuels available to burn will burn out quickly, rather than smoldering for several days.

Indirect adverse effects from these air emissions would include reduced visibility along roadways, reductions in recreation values due to visibility limitations, smoke and odors, and possible health effects to sensitive receptors, such as residents and visitors. These adverse indirect effects would be short-term, localized, and minor. The amount and duration of these smoke impacts should be limited by limiting the acres burned at one time and timing ignitions early in the day to allow for more complete combustion during daytime conditions.

Indirect long-term, beneficial effects would result from a decrease in fuel loading following implementation of prescribed burning. Therefore, there would be a decrease in particulate matter emissions and the impairment of visibility from wildfires when they occur. These beneficial indirect effects would be long-term, regional, and moderate.

Prior to any prescribed fire, the park would notify the TCEQ. The notification would identify the location and size of the proposed prescribed fire, as well as the fuel types to be burned.

Each prescribed fire plan will include expected smoke trajectory maps and identify smoke-sensitive areas. Fire weather forecasts will be used to correlate ignitions with periods of optimal combustion and smoke dispersal. Mitigation measures would be defined in the plan and arrangements made prior to ignition to ensure that designated resources are available if needed to implement the mitigation measures. Prescribed fire will not be implemented when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health (federal and state air quality standards will be the basis for this decision). Significant smoke situation that arises and threatens smoke-sensitive areas may trigger suppression and/or mitigation measures that terminate the prescribed burn.

Air pollutants would be generated by use of gasoline-powered equipment in mechanical and manual fuel reduction projects. The direct adverse effect of these pollutants on air quality, given the small size of the projects and infrequency of activity, would be localized, short-term, and negligible to minor. The indirect and longer-term adverse impacts would be negligible.

The lack of herbicide use would reduce the number of acres restored successfully, continuing the retention and buildup of hazardous fuels in some critical areas immediately adjacent to communities or infrastructure and invasive mid-story brush. This would increase the potential for uncharacteristic wildfires that would be more difficult to control.

Cumulative Impacts

Within the preserve, existing oil and gas wells and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, routine maintenance of park roads, and prescribed burns could contribute to air quality impacts.

Activities that could contribute to air quality impacts outside the preserve boundaries include non-federal oil and gas operations, petrochemical manufacturing plants, public utilities, private land prescribed burns, pulp mills, and oil refineries, and urbanization could result in minor to moderate, adverse impacts on the regional airshed.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in minor to moderate, short-term, adverse, localized cumulative impacts to air quality. Contribution to cumulative air quality impacts resulting from the No Action alternative would be negligible, as most air quality impacts are from other sources.

Conclusion

The No Action alternative would result in direct, short-term, localized, and negligible to minor adverse impacts from prescribed burns to air quality. Cumulative effects under this alternative would be minor to moderate, short-term, adverse, and localized.

Impacts to Alternative II: Preferred Alternative

Air quality impacts under this alternative would be the same as the No Action alternative. Although, both alternatives have similar effects on air quality, the Preferred Alternative could potentially produce slightly lower emissions from reduced use of gasoline-powered equipment in mechanical fuel reduction projects where targeted herbicide application is used. Overall, alternative 2 would likely lead to lower and less intense wildfire emissions, which would have a beneficial regional effect.

Targeted herbicide application, such as hand application, could result in herbicide temporarily in the air due to spray drift and volatilization (evaporation of liquid to gas). However, mitigation measures (Section 2.4) and only using when successful restoration is low by application of prescribed fire, manual, and/or mechanical methods would reduce the potential for drift into non-target areas and the amount of herbicide released into the air through volatilization. Airborne herbicide risks have been shown to be insignificant, even when prescribed fires are applied immediately after herbicide application (McMahon and Bush 1991). The indirect and longer-term adverse impacts would be negligible.

Cumulative Impacts

Within the preserve, existing oil and gas wells and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, routine maintenance of park roads, and prescribed burns could contribute to air quality impacts.

Activities that could contribute to air quality impacts outside the preserve boundaries include non-federal oil and gas operations, petrochemical manufacturing plants, public utilities, private land prescribed burns, pulp mills, and oil refineries, and urbanization could result in minor to moderate, adverse impacts on the regional airshed.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in minor to moderate, short-term, adverse, localized cumulative impacts to air quality. Contribution to cumulative air quality impacts resulting from the Preferred Alternative would be negligible, as most air quality impacts are from other sources.

Conclusion

The Preferred Alternative would result in direct, short-term, localized, and negligible to minor adverse impacts from prescribed burns to air quality. Cumulative effects under this alternative would be minor to moderate, short-term, adverse, and localized.

3.4.2. Geology and Soil Resources

3.4.2.1 Affected Environment

The Preserve is located in the Flatwoods and Lower Coastal Plain geographic areas of southeast Texas. The topography is nearly level in the southern part to gently rolling in the northern part of the Preserve. Slopes in the Flatwoods Area (Beaumont and Lance Rosier Units) are generally less than 1%. Slopes in the Lower Coastal Plain Area (Neches Bottom and Jack Gore Baygall, Turkey Creek, Big Sandy Creek and Beech Creek units) are generally 1-3%, and range from 0.5-12% (NPS 2005).

Subsurface Geology
The Preserve consists of four geologic formations and from youngest to oldest includes Beaumont, Montgomery, Bentley, and Willis Formations. The age of these surface deposits ranges from 250 million years old to125,000 years old Pleistocene fine–grained deposits (Boylan 1986) .

Fine–grained deposits consisting of approximately 60 percent clay and silts and sands from the Beaumont Formation (Boylan 1986). Due to the high percentage of clay, the Beaumont Formation acts as an aquitard, or geologic unit that inhibits the flow of water. However, sand lenses within the clay beds are likely to act as local aquifers (Enprotec Inc. 1998).

Pleistocene–aged clay, silt, and sand with minor amounts of gravel deposits from the Montgomery and Bentley Formations can be found in the southern portion of the Preserve. The thickness of each formation ranges from 75 to 125 feet.

The Willis Formation is composed of coarser sands and gravels, but its lithology is similar to the Bentley and Montgomery. This formation reaches a maximum thickness of 75 feet (Barnes 1968) and is found under the Big Sandy Creek and Beach Creek units.

Soils
Deshotels (1978) described 46 soil-mapping units within the Preserve. The soils reflect the different geologic and drainage conditions across the Preserve. Soils formed in floodplains range from loamy to clayey, and occur on old oxbows to moderately well drained natural levees adjacent to stream channels. Upland soils are generally loamy to sandy in texture and are found

on a wide variety of landscapes. Immediately above the floodplains are sandy point bar deposits and low, mounded terraces. The northern areas of the Preserve are undulating and well drained compared to the low, flat, poorly drained areas of the southern portion.

In general, upland soils are thick to moderately thick, well to excessively drained, and moderately coarse textured (i.e., sands, loamy sands, and sandy loams) to moderately fine textured (i.e., silt loams and loams). These soils are low to moderately susceptible to erosion. Floodplain and wetland soils are high clay content, water retardant layer, and moderately fine to fine textured (i.e., sandy clay loams). Some fine textured soils consist of thin clayey with claypan or clay layer near surface. These soils are moderately to highly susceptible to erosion.

3.4.2.2 Methodology and Intensity Threshold

To analyze the impacts on geologic and soil resources, all available information on geological and soil resources in the Preserve was compiled, and was developed in consultation with NPS staff and other sources. The thresholds of change for the intensity and duration of an impact are defined as follows:

Negligible: Operations would not cause discernible alteration to geologic layers, surficial, and shallow geology. Alteration to geologic and soil resources would be so slight that their ability to sustain biota, water quality, and hydrology would not be affected, and reclamation would not be necessary.

Minor: Operations would cause localized or limited alteration to geologic layers, surficial, and shallow geology. Alteration to geology and soils would affect their ability to sustain biota, water quality, and hydrology, such that reclamation would be achievable within 2 years. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Operations would cause alteration to geologic layers, surficial, and shallow geology. Alteration to geologic and soil resources would affect their ability to sustain biota, water quality, and hydrology, such that reclamation would be achievable within 3 to 5 years. Mitigation measures, if needed to offset adverse effects, could be extensive but would likely be successful.
Major: Operations would cause substantial alteration to geologic layers, surficial, and shallow geology. Alteration to geologic and soil resources would have a lasting effect on the ability of the geology and soil to sustain biota, water quality, and hydrology, such that reclamation could not successfully be achieved. Extensive mitigation measures would be needed to offset any adverse effects and their success could not be guaranteed.

Duration:
Short-term: Recovers in less than 3 years.
Long-term: Recovers in more than 3 years.

3.4.2.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Avoid or minimize soil compaction, soil loss or removal, and soil erosion. Prevent soil contamination Re-establish contours and soil chemistry to support and sustain native vegetation communities that existed prior to initiation of actions.	NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; NPS Management Policies

3.4.2.4 Analysis of Alternatives and Impacts on Geologic and Soils Resources

Impacts of Alternative I: No Action Alternative

Prescribed fire would be beneficial by releasing nutrients into the soil and the fertilization effects of ash would provide an important source of nutrients for vegetation in the area. In addition to recycling nutrients back into the soils, raising pH, and increasing minerals and salt concentrations in the soil, the ash and charcoal residue resulting from incomplete combustion aids in soil buildup and soil enrichment by being added as organic matter to the soil profile. The added material works in combination with 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 1980).

The loss of some vegetative cover from prescribed fire could lead to a potential increase of wind soil erosion. However, problems with wind erosion would only result in minor, adverse, localized, and short-term impacts. In addition, impacts following a prescribed fire would be reduced and/or eliminated during the "green-up" as new herbaceous cover developed.

If a prescribed fire exceeded a burn prescription and burned "hot", resulting in areas of high-burn severity, the organic layer of the soil could be consumed and soil layers could become water repellant. Fire management personnel would contain and/or suppress out-of-prescription fires, minimizing the potential for, and effects of, any high-burn severity prescribed fires.

Wildland fire suppression tactics have the potential to cause increased soil erosion. Lack of action or ineffective suppression tactics can lead to larger wildfires with more high intensity and soil affecting results. However, on most wildfires minimum impact suppression tactics (e.g., select procedures, tools, and equipment that least impacts the environment, use waterbars on firelines to reduce erosion risk, re-contour area) would be used to reduce the impacts. Thus, wildland fire suppression tactics would result in direct, negligible to minor, adverse, localized impacts to the soil.

Mechanical and manual equipment used during hazardous fuel reduction treatments could impact soils due to increased erosion by removing vegetation, compaction of soils, or disrupting soil biotic crusts. However, implementing appropriate mitigation measures, minimizing use of mechanical to only when necessary, would minimize soil disturbance and prohibit potentially erosive actions in areas identified by field office resource specialists as containing highly erodible soils.

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could increase the use of mechanical equipment to cut and limit brush competition, which could lead to increased erosion by compaction of soils. Direct affects would be adverse, minor to moderate, localized, short- to long-term due to increased potential for mechanical equipment impacts on soil. Additionally, the inability to utilize herbicides as a management tool would reduce the number of acres restored successfully and treated in some critical areas immediately adjacent to communities or infrastructure. This could lead to a buildup of fuels, which could lead to more intense wildfires that are difficult to suppress/manage. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects on soil, including physical alteration of soil structure and development of hydrophobic layers.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; urban and residential development; road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), within and outside of the Preserve could contribute cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized cumulative disturbance to soils. Contribution to cumulative geologic and soil resource impacts resulting from the No Action alternative would be minor, as geologic and soil impacts from the No Action alternative would be distributed throughout the park, rather than being concentrated in one area or at one time, thus minimizing the adverse cumulative effects. There would also be minor, long-term, cumulative beneficial impacts to soils due to continued prescribed burns releasing nutrients into the soil and the soil enrichment and buildup from ash deposits.

Conclusion

The No Action alternative would result in short-term, localized, minor, and adverse impacts from prescribed burns and associated fire management activities to soils. Cumulative effects under this alternative would be minor, short-term, adverse, and localized. Use of prescribed burns would also have long-term, localized, beneficial cumulative impacts to soils from increased nutrients.

Impacts to Alternative II: Preferred Alternative

Geologic and soil impacts under this alternative would be the same as the No Action alternative; however targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide application to help reduce mid-story brush could reduce future repeated manipulation of brush and vegetation in specific landscape units, thus reducing potential erosion impacts. In addition, reducing mid-story brush would open the mid-story vegetation layer allowing an increase growth and germination of ground cover (i.e., grasses, forbs, wildflowers, and longleaf pine seedlings), resulting in a higher rate of success during ecological restoration activities and long-term, moderate benefits to geologic and soil resources. Being able to more successfully reduce mid-story brush also removes a significant fuel hazard within the Preserve and in critical areas adjacent to communities, thus reducing the potential for an uncharacteristic wildfire.

Targeted herbicide application, such as hand application, could result in herbicide migration into the soil. However, mitigation measures (Section 2.4), limited use, and hand application of herbicide to specific basal or foliar plant areas, would minimize chances for overspray and migration into the soil. The indirect and longer-term adverse impacts would be negligible.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; urban and residential development; road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), within and outside of the Preserve could contribute cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized cumulative disturbance to soils. Contribution to cumulative geologic and soil resource impacts resulting from the Preferred Alternative would be minor, as geologic and soil impacts are from the Preferred Alternative would be distributed throughout the Preserve, rather than being concentrated in one area or at one time, thus minimizing the adverse cumulative effects. There would also be minor, long-term, cumulative beneficial impacts to soils.

Conclusion

The Preferred Alternative would result in short-term, localized, minor, and adverse impacts from prescribed burns and associated activities to soils. Beneficial long-term impacts to soils would result from the increased nutrients from prescribed burns, increased stability of the soil strata, given increased ground cover, and the reduced threat of uncharacteristic wildfire. Cumulative effects under this alternative would be minor, short-term, adverse, and localized.

3.4.3 Vegetation

3.4.3.1 Affected Environment

The Preserve is often referred to as a "biological crossroads", one of the richest plant growing environments in the continental United States with approximately 1,400 species of trees, shrubs, forbs, and grasses. Diverse vegetation thrives in the long, warm growing season with abundant moisture. BTNP is an ecotone between the moist eastern hardwood forest and the prairies to the west.

The three major vegetation communities that occur within BTNP include Upland, Slope, and Floodplain. Pinelands, cypress swamps, prairies, and wetlands are the prevalent vegetation types in BTNP with temperate species as the dominant. Tropical plant species are found in the pinelands, mixed–hardwood, and cypress swamps.

Upland Vegetation Community
The three upland vegetation types (Sandhill Pine Forest, Wetland Pine Savanna, and Upland Pine Forest,) are all strongly influenced by fire and edaphic (soil) conditions. Historically the dominant pine species in the Upland Pine Forest was longleaf pine. In many of these communities, longleaf pine is no longer dominant, however, due to factors such as aggressive fire suppression and logging, and subsequent replanting with faster growing species such as shortleaf pine and loblolly pine. Many Upland Pine stands have converted from longleaf pine to a mixed pine-oak type (Upper Slope Pine Oak) due to the impact of reduced fire frequency.

The Sandhill Pine Forest differs from the Upland Pine Forest in that it is found on very well drained, sandy soils. The term "Sandhill" is topographically misleading because these communities are actually located on sandy, riverine bluffs and terraces, not hills. In spite of high precipitation, rapid infiltration limits soil moisture, and these areas support a wide variety of plants such as yucca and cacti that are adapted to xeric (dry) conditions and frequent fire. Dominant tree species include post oak (*Quercus stellata*) and bluejack oak (*Quercus incana*). Three types of native pines are also found widely scattered and include longleaf pine, shortleaf pine (*Pinus echinata*), and loblolly pine (*Pinus taeda*). The past impacts of logging and subsequent fire suppression in these areas may explain why longleaf pine is not the dominant pine species in these communities. The shrub layer, while present, is indistinct in these communities.

Sandhill Pine Forest is the rarest plant community in the Preserve and the surrounding Big Thicket region. This community best exemplifies the "Desert Southwest" component of the "Biological Crossroads" paradigm that is often used to describe the ecological setting of Big Thicket. Approximately 230 acres exist in the Preserve on the Sandhill Loop (trail) in the Turkey Creek Unit and Big Sandy Creek Unit. Historically, the federally endangered Texas Trailing Phlox was documented in this vegetation community and was recently reintroduced in an attempt to restore this endangered endemic plant species..

In contrast to the well-drained, sandy soils of the Sandhill Pine Forest type, Wetland Pine Savannas are found on poorly drained soils, with seasonal ponding. The interplay of wetland conditions and frequent fires in these systems is believed to inhibit the invasion of trees.

Wetland Pine Savannas are among the rarest plant communities in the southeast and in the Preserve. Over the past two centuries, these communities have been significantly degraded due to human settlement and fire suppression; less than 3 percent of the communities remain. Compared with all other plant communities in the Preserve, wetland pine savannas contain the richest botanical diversity; approximately 100 species of forbs per acre can be found.

Fire plays a critical role in preventing fire intolerant trees and plants. Unfortunately, the effects of 75 years of aggressive fire suppression in the Big Thicket region has made these plant communities among the rarest in the Preserve, due to invasion by shrubs and trees. Currently, the Preserve is using prescribed fire and mechanical thinning as a tool to restore and to maintain these botanically rich communities under the existing FMP.

The Upland Pine Forest is pyric (fire–dependent) and found on dry uplands and interdistributary ridges. Soil type and past disturbances such as logging and fire are important factors in determining the age and abundance of tree species in these forests. Historically, Upland Pine Forest was dominated by longleaf pine and to a lesser extent by loblolly pine and shortleaf pine. Several species of oaks are commonly associated with this community including post oak, bluejack oak, and blackjack oak (*Quercus marilandica*). In stands where fire has burned at frequent intervals, the woody understory is largely absent, and the forest is open and parklike with a rich herbaceous layer of grasses and forbs. Where frequent fire intervals are absent, the woody understory quickly encroaches and is dominated by species such as flowering dogwood (*Cornus florida*), flame-leaf sumac (*Rhus copallina*), American beautyberry (*Callicarpa americana*), wax-myrtle (*Myrica cerifera*), and yaupon (*Ilex vomitoria*).

Slope Vegetation Community

The three vegetation types, Upper Slope Pine Oak Forest, Middle Slope Oak-Pine Forest, and Lower Slope Hardwood Pine Forest, transition from dry to mesic soil conditions, which generally results in a shift from upland forest communities to slope communities. This increase in soil moisture is reflected in the shift from longleaf pine to loblolly pine and shortleaf pine. The species composition of oaks also shifts, with Southern red oak dominating on the upper slopes and white oak (*Quercus alba*) dominating on the wetter, lower slopes. Other significant hardwood species include Southern magnolia (*Magnolia grandiflora*) and American Beech (*Fagus grandiflora*). The slope forests are also called the Beech-Magnolia-Loblolly (American Beech–Southern Magnolia Series) forests due to the abundance of the three tree species.

Floodplain Vegetation Communities

Four vegetation types, Floodplain Hardwood Pine Forest, Floodplain Hardwood Forest, Wetland Baygall Shrub Thicket, and Swamp Cypress Tupelo Forest, generally occur along river and creek floodplains throughout the Preserve. The Floodplain Hardwood Pine Forest type generally grows along smaller floodplains, where the transition from terrestrial to aquatic environments occurs over a relatively short distance. Dominant pine and hardwood species in this vegetation type are loblolly pine and American beech. American hornbeam (*Carpinus caroliniana*) is an abundant understory species.

Moving from lower order to higher order streams, the floodplains increase in size and Floodplain Hardwood Pine Forest is replaced by Floodplain Hardwood Forest community. This vegetation type is often generally referred to as bottomland hardwood forest. Examples of these forests are found along the Neches River floodplain, especially in the Jack Gore Baygall and Neches Bottom Unit. Dominant tree species in this type include sweetgum (*Liquidambar styraciflua*) and water oak (*Quercus nigra*).

Swamp Cypress Tupelo Forest is found in secondary river and creek channels and along the fringe of oxbow lakes and sloughs throughout the floodplain forests of the Preserve. As the name implies, the dominant tree species are baldcypress (*Taxodium distichum*) and tupelo (*Nyssa aquatica*).

Rare Plant Communities in Texas.

The Texas Natural Heritage Program maintains a list of plant communities in the state. The protection of plant communities, especially rare or imperiled plant communities, is important because they provide food and shelter for migrating and resident wildlife, biological diversity, aesthetics, nutrient cycling, and gene-banks. These plant communities are also important to future science and technological discoveries. Eight rare plant communities are known to occur within the Preserve (TPWD 2012). These include the following: Texas Upper West Gulf Coastal Plain Southern Magnolia Forest; West Gulf Coastal Plain Beech - Magnolia Forest; West Gulf Coastal Plain Catahoula Sandstone Glade; West Gulf Coastal Plain Beech–Magnolia Forest; West Gulf Coastal Plain Catahoula Sandstone Glade; West Gulf Coastal Plain Forested Seep (Southern Type); West Gulf Coastal Plain High Terrace Wooded Flatwoods Pond; West Gulf Coastal Plain Shallow Flatwoods Pond; Western Upland Longleaf Pine Forest (Stream Terrace Sandy Woodland Type); and Western Wet Longleaf Pine Savanna (Prairie Terraces Acidic Silt Loam Type).

Invasive, Non-native Species

Currently, there are four most problematic invasive plant species found in the Preserve—Chinese tallow (*Triadica sebifera*), water hyacinth (*Eichomia crassipes*) and hydrilla (*Hydrilla verticillata*), and giant salvinia (*Salvinia molesta*). Less prominent invasive plant species in the Preserve include, but are not limited to the Japanese honeysuckle (*Lonicera japonica*), Chinese wisteria (*Wisteria sinensis*), Japanese climbing fern (*Lygodium japonicum*), Chinaberry (*Melia azedarach*), and Coral ardisia (*Ardisia crenata*).

Chinese tallow is native to China and spreads by birds and moving water, grows rapidly, and can cause large-scale ecosystem modification, creating forests without native plant or animal species. Chinese tallows can grow under a variety of environmental conditions (e.g., flooding, drought, shade), but are susceptible to herbicide and somewhat susceptible to fire. The sap and berries of the tree contain a toxin that is potentially harmful to humans and wildlife, and its leaves may also contain a toxin that has the ability to modify soil chemistry (USGS 2000).

Water hyacinth and hydrilla are known to occur within several of the Preserve's waterways, where they may form dense mats. The plants appear to be restricted to permanent waterways and cannot invade seasonally wet wetlands.

Giant salvinia is native to South America and is a floating, rootless, aquatic fern. This species is typically found in calm waters of lakes, ponds, oxbows, ditches, or slow flowing streams or rivers, marshes, backwater swamps, and rice fields. Giant salvinia is spread by human transport, which includes boats, trailers, fishing and recreational equipment, wheels, and boots; as well as through natural drainage and flow of river and stream systems (Howard 2012). This species forms dense mats up to three feet deep that clog the waterways, permits light from entering the waterway, reduces oxygen levels, degrades water quality for aquatic species and recreational values, and outcompetes native plants that provide food and habitat to native wildlife and waterfowl (TPWD 2010). Eradication requires herbicide and biological control organisms.

3.4.3.2 Methodology and Intensity Threshold

The methodology used for assessing vegetation impacts included using available spatial data and literature to identify the plant communities present and identifying the potential effects to plant populations (e.g., composition, diversity, abundance) by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Operations would not affect native vegetation or some individual native plants would be affected, but there would be no effect on native plant species' populations (e.g., composition, diversity, abundance). The effects would be on a small scale.

Minor: Operations would affect some individual plants and a relatively limited portion of that species' population would also be affected. Mitigation measures, if needed to offset adverse effects, would be simple and successful. Reclamation is readily achievable through natural successional processes.

Moderate: Operations would affect some individual native plants and a sizeable segment of the species' population would also be affected over a relatively wide area. Mitigation measures, if needed to offset adverse effects, could be extensive, but would likely be successful. Reclamation is achievable but likely requires additional resources to accomplish goals.

Major: Operations would cause substantial alteration to individual native plants and affect a sizeable segment of the species' populations over a relatively wide area. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed. Reclamation may not be attainable even with substantial efforts.

Duration:
Short: Recovers in 3 years or less.
Long: Recovers in more than 3 years.

3.4.3.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Avoid or minimize damage to or removal of vegetation communities, particularly rare or imperiled plant communities identified by the State of Texas Parks and Wildlife Department. Reclaim all treated areas to a condition that is approximately equivalent to pre-treatment conditions in terms of sustained support of functional physical processes, biological productivity, biological organisms, and land uses. Prevent establishment of non-native vegetation in all disturbed areas.	NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; Executive Order 13112, Invasive Species; NPS Management Policies

3.4.3.4 Analysis of Alternatives and Impacts on Vegetation

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the success of ecological restoration efforts, thus reducing the number of acres successfully restored to longleaf pine, and hindering restoration and maintenance of other unique vegetation areas that are being taken over by brush species. This would result in reduced resilience of Preserve ecosystems to continued stress from hurricanes, drought, pest outbreaks, and wildfire. The use of mechanical methods to cut and limit brush competition may increase, thus increasing the potential for loss of individual plants, erosion, and increased potential for noxious weeds. Direct effects would be adverse, minor to moderate, localized, long-term due to decreased acres of successful ecological restoration, reduced resilience, and increased potential for noxious weeds.

Potential spread of noxious weeds could occur from equipment used by fire crews both on prescribed fire and wildfire work (i.e., carried in on equipment from outside the area, mechanical fuel reduction treatment equipment, fireline construction equipment). Following fire management activities (e.g., prescribed burns, hazardous fuels reduction), areas that were treated would be monitored and invasive vegetation may be prevented or removed by manual or mechanical treatments. Impacts from the spread of invasive weed species would be long-term and adverse if viable seeds are transported and become established. However, due to mitigation measures that would be used (i.e., cleaning of equipment before and after use, avoid burning when possible in areas at high risk for weed establishment or spread), impacts would be negligible.

The lack of herbicide use would also allow reduce the number of acres restored successfully, continuing the retention and buildup of hazardous fuels in some critical areas immediately adjacent to communities or infrastructure and invasive mid-story brush. This would increase the potential for uncharacteristic wildfires that would be more difficult to control. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects on vegetation, including physical alteration of vegetation structure, composition, and function and increased susceptibility to spread of noxious weeds.

Prescribed fire would benefit the native plants communities by rejuvenating the soils with nutrients, reducing dense undergrowth and matting of grasses, reducing competition for limited resources with noxious weeds, increasing flower production and/or seed germination of fire-adapted plant species, and restoring the native vegetation structure, composition, and function of historically fire-maintained vegetation associations. Grassland and wetland plant communities have evolved with the periodic fire regime and require it to maintain the open vegetation communities with sparse overstories and abundant herbaceous cover. Wetland plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to the rapid recovery of many wetland vegetation communities.

The use of prescribed fire could result in the loss of individuals and communities of plants. However, prescribed fire would have direct, minor to moderate, beneficial, long-term, localized impacts by restoring the native vegetation structure, composition, and function of historically fire-maintained vegetation associations.

Soil sterilizing, high intensity wildfires and wildfire suppression activities pose the greatest risk to soil degradation. However, minimum impact suppression tactics (MIST) would be used to further minimize the impacts to soils, thus reducing potential erosion impacts to vegetation. Fuel treatments help lower the risk of high intensity wildfires, thus reducing soil sterilizing events.

Climate Change

Recent analysis on fire extent and climate during the past 35 years revealed an increase in frequency of large, high severe fires since the mid-1980's with longer wildfire duration and longer wildfire seasons (Westerling et al. 2006). It is likely that vegetation types that have experienced fuel accumulations and increased vegetation density are more sensitive to climatic variability (i.e., less resilient to fires during drought and warmer years). In the face of climate change, it is unknown whether the same or different vegetation would grow back following a large, severe fire.

In addition, 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). Many future scenarios have been developed and modeled in an attempt to quantify future climate change (Solomon et al. 2007). Annual average temperature is predicted to increase in Texas by 1–4 degrees Fahrenheit over the next 60 years compared to the 1989–1990 mean; precipitation is not able to be predicted (Nielsen-Gammon 2011). However, at this time, the models are not sufficiently precise to address increases in

temperature and water stress over the short duration of the planning period and the small scale of the project area.

Considered over a broad scale, areas treated with prescribed fire can remove additional environmental stressors on species and allow them to better adapt to climate change. Burn plan prescriptions and real-time fire modeling rely on current meteorological conditions and fuel characteristics, which reflect the uneven progression of longer-term changes. These planning and decision-making processes are an example of short-term adaptive management followed by the fire program under guidance in RM-18, Wildland Fire Management. As additional scientific information becomes available at a useful temporal, spatial, and/or ecological scale, it would also contribute to the longer-term adaptive management process through annual program reviews and revisions to the Fire Management Plan. Indirect effects would be beneficial, long-term, and localized due to reduced fuels and fire behavior potential in treated areas.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would have moderate, long-term, beneficial, localized cumulative impacts to vegetation through the return of a natural fire regime and an increased trend of resilience to future stress from hurricanes, drought, pest outbreaks, wildfire, and climate warming. However, these positive changes would be limited in scope and size due to the NPS inability to use herbicide as a fire management tool. There is the potential for minor to moderate, long-term, adverse, localized impacts to vegetation through future severe wildfires from potential fuel buildup in some critical areas immediately adjacent to communities or infrastructure and invasive mid-story brush.

Conclusion

The No Action alternative would result in minor, adverse, short-term, and localized impacts from prescribed burns and associated activities. Limiting the fire management program to presently approved and occurring fire management activities could also have minor to moderate, long-term, adverse, localized impacts to vegetation through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be moderate, long-term, beneficial, and localized.

Impacts to Alternative II: Preferred Alternative

Vegetation impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or

mechanical methods. The use of herbicide would help to control invasive brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would also increase the resilience of the Preserve ecosystem to future insect disease, wildfires, droughts, and hurricanes by improving the health and vigor of the ecosystems. Targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities.

Targeted herbicide application may reduce repeated mechanical manipulations over the long-term in some landscape units, which could reduce the potential spread of noxious weeds from equipment.

Following fire management activities (e.g., prescribed burns, hazardous fuels reduction), areas that were treated would be monitored and invasive vegetation may be prevented or removed by chemical treatments (i.e., targeted herbicide application). Chemical treatment of invasive weed species to burn units after prescribed fires would be beneficial to re-establishment of native plant species. Controlling invasive weed species would eliminate competition for space, nutrients, and water resources to favor native plants. Chemical treatments may consist of spot treatments of invasive species discovered during the pre-burn or post-burn monitoring period, thus impacts would be negligible.

Targeted herbicide application, such as hand application to specific basal or foliar plant areas, would minimize chances for overspray and applying to non-target plants. Thus, mitigation measures (Section 2.4), limited use, and hand application of herbicide to specific basal or foliar plant areas, would minimize chances for overspray and impacting non-target plants. The indirect and longer-term adverse impacts would be negligible.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, moderate, long-term, beneficial, localized cumulative impacts to vegetation. This would be due to the increased the amount of invasive mid-story brush removed with herbicide application, thus increasing ecological restoration and the return of a natural fire regime and an increased trend of resilience to future climate warming or droughts.

Conclusion

The Preferred Alternative would result in direct, minor, adverse, short-term, and localized impacts from prescribed burns and associated activities. Cumulative effects under this alternative would be direct, moderate, long-term, beneficial, and localized.

3.4.4 Wildlife

3.4.4.1 Affected Environment

The abundant and diverse vegetation in BTNP supports aquatic and terrestrial habitat for a variety of fish and wildlife species. BTNP provides habitat for plant and animal species of the southeast swamps, pineywood forest, post-oak belt, Great Plains, southwest deserts, and the coastal prairie.

The Preserve consists of eight discrete land units connected by four narrow water corridor units. The water corridor units, varying in width from 1,000 to 1,500 feet, were established in part to offset the effects of fragmentation by providing ecological connectivity between otherwise isolated units. However, the degree to which these habitat corridors serve as migration routes or enhance the persistence of fish and wildlife species has not been adequately tested (NPS 2006a). With few exceptions, the Preserve's land and corridor units are crossed by roads, trails, pipeline and power line corridors, oil and gas operations, and one railway. Therefore, the geographic configuration of the units, along with the further contributions of human-induced developments, generally results in fragmentation of wildlife habitat (NPS 2011).

There are approximately 60 species of mammals, 176 bird species, 85 species of reptiles and amphibians, 92 fish species, and 1,800 invertebrate species (NPS 2005). Many studies of specific types of wildlife, such as inventories of mammals, have been performed in the Big Thicket region over the past century. Some of the most thorough inventories were conducted shortly after the Preserve's establishment in 1974.

Mammals
Several large species are now extirpated from BTNP due to a variety of factors including habitat destruction and overhunting. These include the jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), and red wolf (*Canis rufus*). Although occasional sightings of the Louisiana subspecies of the American black bear (*Ursus americanus luteolus)* have been reported near the Preserve, no populations are believed to be reproducing in east Texas (NPS 2011).

Birds
Birds are the most visible and diverse vertebrate fauna found in BTNP. Currently, there are 176 documented bird species. This number may be low because there has not been a comprehensive inventory completed. The Preserve lies on a major migratory flyway, and many species of birds are transient during spring and fall migrations. Birds found in the Preserve predominantly consist of three categories: passerines (including many neotropical songbirds), raptors, and waterfowl. The abundance and variety of birds in the Preserve contribute to one of the favorite visitor activities, bird watching (NPS 2011).

Reptiles and Amphibians
Approximately 85 species of reptiles and amphibians are thought to inhabit the Preserve (Harcombe et al. 1996). This figure represents approximately 33% of the 235 species recorded in Texas. The most diverse group of reptiles in the Preserve is snakes. Texas has 68 speceis of snakes and half of these inhabit the Preserve. Other reptiles known to occur in BTNP include skinks, lizards, turtles, and the American alligator. Amphibians include frogs, toads, and salamanders.

Fish
Approximately 92 species are thought to inhabit the Preserve (NPS 2005). Smaller water bodies are generally dominated by minnows, darters, bass, and bullhead catfish (*Ameiurus* spp.). Larger water bodies are typically dominated by channel (*Ictalurus punctatus*), blue (*I. furcatus*), and flathead catfish (*Pylodictis olivaris*); sunfish; largemouth (*Micropterus salmoides*) and spotted bass (*M. punctulatus*); and crappie (*Pomoxis* spp.). Fishing is a popular recreational activity in the Preserve.

Invertebrates
A lepidoptera (butterflies, moths, skippers) inventory documented over 1,800 species (Bordelon and Knudson 1999). In aquatic environments, insects and mussels are the most documented species. Comprehensive inventories in the Village Creek drainage have documented 249 species of common macroinvertebrates including dragonflies, caddisflies, mayflies and stoneflies. Three species of aquatic insects are endemic to the Big Thicket region—A mayfly (*Plauditus gloveri*), bay skipper (*Euphyes bayensis*), and Gulf Coast chubtail (*Gomphus modestus*; Abbott and Stewart 1997). Thirty-four species of mussels, including the Texas heelsplitter (*Potamilus amphichaenus*), wartyback (*Quadrula nodulata)*, and sandbank pocketbook(*Lampsilis satura*), live in the Lower Neches River watershed, which includes most of the units of the Preserve (Howells 1996).

3.4.4.2 Methodology and Intensity Threshold

The methodology used for assessing wildlife impacts included using available literature to identify the wildlife species and habitat communities present and identifying the potential effects to wildlife populations (e.g., composition, diversity, abundance) by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: No wildlife species would be affected or some individuals could be affected as a result of the alternative, but there would be no effect on wildlife species' populations. Impacts would be well within natural fluctuations.

Minor: Some wildlife species would be affected and a limited part of the species' population would be affected as a result of the alternative. Mitigation measures, if needed, would be simple and successful.

Moderate: Some wildlife species would be affected and a sizeable part of the species' population would be affected as a result of the alternative over a relatively large area within BTNP. Mitigation measures, if needed, would be extensive and successful.

Major: A considerable effect on wildlife individuals and on a sizeable segment of the species' population as a result of the alternative over a relatively large area in and outside BTNP. Extensive mitigation measures would be needed to offset any adverse effects and may not be successful.
Duration:
Short: If individual species or habitat recovers in ≤ 3 years.
Long: If individual species or habitat recovers in >3 years.

3.4.4.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Avoid or minimize disturbances to native wildlife habitat. Prevent wildlife exposure to contaminants. Avoid or minimize death to wildlife. Reclaim disturbed wildlife habitat to provide for their survival.	NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; Migratory Bird Treaty Act, as amended; Executive Order 13186, Migratory Birds; Lacey Act, as amended; NPS Management Policies

3.4.4.4 Analysis of Alternatives and Impacts on Wildlife

Impacts of Alternative I: No Action Alternative

Under this alternative fire management program would be restricted to presently approved and occurring fire management activities. The inability to use herbicides could reduce the success of ecological restoration efforts, thus reducing the number of acres successfully restored to longleaf pine, and hindering restoration and maintenance of other unique vegetation areas that are being taken over by mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, potentially outcompeting native vegetation and leading to a more homogenous habitat state, thus reducing wildlife habitat quality and increasing the potential for an uncharacteristic wildfire. In addition, without successful ecological restoration (i.e., prescribed fire mimicking natural fire cycles), fire dependent vegetation may decrease in prevalence and vigor, with negative effects on wildlife species adapted to those vegetation types. This could also lead to a buildup of fuels in some areas adjacent to communities and invasive mid-story brush, which could lead to more intense wildfires that are difficult to suppress/ manage. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased potential for locally severe fire effects on wildlife habitat and individuals.

Use of prescribed fire would temporarily disturb wildlife species within the burn units. During prescribed fire activities, wildlife in the area would experience an increase in noise disturbance from equipment, human presence, smoke, fire, and soil disturbance. In addition, reproduction

and survival for individuals may be affected due to increased stress and loss of foraging opportunities. Temporary displacement and habitat loss may occur for some individuals within the burn units. Mortality to wildlife species that are smaller and less mobile such as, small mammals, lizards, and snakes, may also occur from prescribed burns. However, these species are relatively common and/or widespread, and occasional impacts to individual animals generally do not affect wildlife populations, wildlife communities, or ecological processes.

Prescribed fire would benefit individual wildlife species and their habitat by emulating the natural fire regime and creating a more natural vegetation pattern across the Preserve, enhancing the variety and diversity of vegetation communities and wildlife habitat present. Prescribed fire would also provide more nutrients to the soils in the short-term, which would increase plant growth and improve the amount available and nutritional quality of forage for wildlife species. The burned areas generally green up earlier than non-burned areas, thus providing earlier grazing (Redmon and Bidwell 2003).

Prescribed fires could directly impact nesting migratory birds if conducted during breeding season (generally between March–August) through mortality of fledglings that are unable to flee or avoid the burn units. Performing prescribed burns when possible outside the breeding season should mitigate these potential impacts.

Aquatic species in the Preserve would not be affected by fireline construction or fire retardant use since mitigation measures state that no chemical retardant, foam, or gasoline would be utilized within 200 feet of standing streams or surface.

Mechanical and manual treatments used for hazardous fuel reduction would have short-term, adverse, localized impacts on wildlife species that are less mobile due to stress and disturbance. Mitigations would include avoiding seasons when ground nesting birds are actively nesting. Short-term impacts on more mobile wildlife species would be temporary displacement from the treatment areas.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized impacts due to displacement and habitat fragmentation from prescribed fires. In addition, moderate, long-term, beneficial, localized cumulative impacts to wildlife species and their habitats through improved habitat from the return of a natural fire regime. However, there is the potential for minor to moderate, long-term, adverse, localized impacts to wildlife habitat through future severe wildfires from potential fuel

buildup in areas and from reduced acreage of sufficient ecological restoration, leading to continued invasive brush species increasing in density and abundance.

Conclusion
The No Action alternative would result in direct, minor, adverse, short-term, and localized impacts as well as indirect, moderate, long-term, beneficial, localized cumulative impacts. Limiting the fire program to presently approved and occurring fire management activities could also have minor to moderate, long-term, adverse, localized impacts to wildlife habitat through future severe wildfires from potential fuel buildup in areas and reduced habitat quality. Cumulative effects under this alternative would be minor, short-term, adverse, localized and minor, long-term, beneficial, and localized impacts to wildlife resources.

Impacts to Alternative II: Preferred Alternative

Wildlife impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application (i.e., hand applications) would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would increase the success rate of ecological restoration, thus increasing fire dependent vegetation in prevalence and vigor and have a positive impact on wildlife species adapted to those vegetation types. In addition, the ability to reduce more mid-story invasive brush species would potentially increase wildlife habitat quality and forage available by opening the mid-story vegetation layer and promoting herbaceous ground cover (e.g., forbs, wildflowers) and increase the potential for lower intensity ground fires, which are easier to manage/suppress. Thus, the Preferred Alternative would have minor to moderate, beneficial, long-term, localized impacts by restoring the variety and diversity of vegetation communities and wildlife habitat present and minimizing the potential for future severe wildfires.

Targeted herbicide application, such as hand application to specific basal or foliar plant areas, would minimize chances for overspray and applying to non-target plants. Thus, mitigation measures (Section 2.4), limited use, hand 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/Elelment 4), glyphosate, imazapyr, sulfometuron, metsulfuron methyl, hexazinone) have been designed to target biochemical processes unique to plants, thus have low levels of direct toxicity to animals and when used in accordance with the label specifications pose little risk to wildlife (Tatum 2004). Herbicides commonly used for vegetation management also degrade quickly upon entering the environment and thus are neither persistent nor bioaccumulative (Tatum 2004).

Habitat for aquatic species would have 50 feet buffers placed on either side to assure that there would be essentially no opportunity for spray, directly or in drift, to enter those waters (Texas Forest Service 2010). Federal FIFRA regulations and federal agency water quality monitoring have indicated that use of herbicides in forestry vegetation management constitute low risk to humans and wildlife (Shepard et al. 2004). Overall, limited herbicide applications applied by

hand would have a negligible effect on wildlife because of the low concentrations applied. The indirect and longer-term adverse impacts would be negligible.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in minor, short-term, adverse, localized and minor, long-term, beneficial, and localized impacts to wildlife resources.

Conclusion

The Preferred Alternative would result in minor to moderate, beneficial, long-term, localized impacts restoring the variety and diversity of vegetation communities and wildlife habitat present and minimizing the potential for future severe wildfires. Cumulative effects under this alternative would be minor, long-term, beneficial, and localized.

3.4.5 Special Status Species

3.4.5.1 Affected Environment

Under the Endangered Species Act of 1973 (ESA), NPS has the responsibility to address impacts to federally listed, candidate, and proposed species. The terms “threatened” and “endangered” describe the official federal status and certain species in the Preserve as defined by the Endangered Species Act. The term “candidate” is used officially by the U.S. Fish and Wildlife Service (USFWS) to describe species, which sufficient information exists on biological vulnerability and threats to support a “proposed rule to list,” but issuance of the proposed rule is precluded. Texas has enacted regulations similar to the ESA that confer threatened and endangered to certain species that inhabit areas within the state. NPS policies dictate that federal candidate species, proposed species, and state species of concern are to be managed to the greatest extent possible as federal–listed endangered and threatened species (NPS 2006).

All federal-listed and state-listed species believed to occur permanently or transiently in the Preserve based on past inventories, existing and potential habitat, documented sightings, and professional judgment are listed in Table 4. Currently, there is no designated critical habitat within or near the Preserve.

The federal-listed or candidate species considered within the Preserve are the Red-cockaded Woodpecker, Louisiana black bear, Louisiana pine snake, Navasota Ladies’ Tresses, and the Texas trailing phlox.

Table 4. State and Federally listed Threatened, Endangered, Proposed, or Candidate Species Known to Occur or Likely Occur within the Preserve.

Species	Federal Status	State Status	County
Birds			
Bachman's Sparrow *Aimophila aestivalis*	—	Threatened	Hardin, Jasper, Liberty, Polk, Tyler
Bald Eagle *Haliaeetus leucocephalus*	—	Threatened	All
Brown Pelican *Pelecanus occidentalis*	—	Endangered	Jefferson, Orange
American Peregrine Falcon *Falco peregrinus anatum*	—	Threatened	All
Red–cockaded Woodpecker *Picoides borealis*	Endangered	Endangered	Hardin, Jasper, Liberty, Polk, Tyler
Reddish Egret *Egretta rufescens*	—	Threatened	Jefferson
Swallow–tailed Kite *Elanoides forficatus*	—	Threatened	All
White–faced Ibis *Plegadis chihi*	—	Threatened	Hardin, Jasper, Jefferson, Liberty, Orange
Wood Stork *Mycteria americana*	—	Threatened	All
Fish			
Blue Sucker *Cycleptus elongatus*	—	Threatened	Hardin, Jasper, Tyler
Creek chubsucker *Erimyzon oblongus*	—	Threatened	Hardin, Jasper, Tyler
Paddlefish *Polyodon spathula*	—	Threatened	Hardin, Jasper, Liberty, Polk, Tyler
Mammals			
Black bear *Ursus americanus*	—	Threatened	All
Louisiana black bear *Ursus americanus luteolus*	Threatened	Threatened	All
Rafinesque's big–eared bat *Corynorhinus rafinesquii*	—	Threatened	All
Reptiles			
Alligator snapping turtle *Macrochelys temminckii*	—	Threatened	All
Louisiana pine snake *Pituophis ruthveni*	Candidate	Threatened	Hardin, Jasper, Liberty, Polk, Tyler
Northern scarlet snake *Cemophora coccinea copei*	—	Threatened	Hardin, Jasper, Jefferson, Liberty, Orange, Tyler
Texas horned lizard *Phrynosoma cornutum*	—	Threatened	Jefferson, Liberty, Orange

Species	Federal Status	State Status	County
Timber/Canebrake rattlesnake *Crotalus horridus*	—	Threatened	All
Amphibians			
Houston Toad *Anaxyrus houstonensis*	—	Endangered	Liberty
Mollusks			
Louisiana pigtoe *Pleurobema riddellii*	—	Threatened	All
Sandbank pocketbook *Lampsillis satura*	—	Threatened	All
Southern hickorynut *Obovaria jacksoniana*	—	Threatened	Hardin, Jasper, Jefferson, Orange, Polk, Tyler
Texas heelsplitter *Potamilus amphichaenus*	—	Threatened	All
Texas pigtoe *Fusconaia askewi*	—	Threatened	All
Triangle pigtoe *Fusconaia lananensis*	—	Threatened	Hardin, Tyler
Plants			
Navasota ladies' tresses *Spiranthes parksii*	Endangered	Endangered	Jasper
Texas trailing phlox *Phlox nivalis var.texensis*	Endangered	Endangered	Hardin, Polk, Tyler

Sources: USFWS, last updated May 14, 2012; and TPWD, last updated February 28, 2011.

Birds

The Red–cockaded Woodpecker, federal and state endangered, is a year-round resident of the Pineywoods of east Texas. Red-cockaded Woodpeckers prefer open, park-like stands of mature pine maintained by frequent fire. Little of this habitat remains in the Preserve due to past logging and fire suppression activities. The Preserve is currently restoring Red-cockaded Woodpecker habitat through longleaf pine forest regeneration and periodic prescribed fire activities. Until the mid-1990s, active colonies were documented in the upland pine forests in the Big Sandy Unit. Currently, these colonies are inactive, but the cavity trees and associated habitat remain and could be colonized in the future.

Mammals

The Louisiana black bear, federal and state threatened, inhabit forested areas with food, water, cover, and denning resources spatially arranged across large, relatively remote blocks of land. Historically, Louisiana black bears inhabited the swamps and thickets in the Big Thicket Region in southeast Texas. Currently, Louisiana black bears occur primarily in Louisiana and solitary juvenile males are thought to occasionally move through eastern Texas. The Neches Bottom and Jack Baygall Unit has potential habitat for black bear reintroductions (Garner 1996, Epps 1997). This area could serve as core habitat for bears in the future, through reintroduction efforts or expansion of existing populations in Louisiana. However, any reintroduction effort would require the active participation and support of a number of public and private land management

agencies and the public to ensure the provision of sufficient habitat and to prevent poaching and other bear-human conflicts. Continued fragmentation of habitat in the Preserve and surrounding region could preclude the possibility of black bear reintroduction.

Reptiles

The Louisiana pine snake, federal candidate and state threatened, inhabits small mammal burrows (especially pocket gopher), which is also their primary food source (NPS 2006). The snake is limited to sandy soils in hardwood coniferous forests of western Louisiana and eastern Texas. Within this broad ecoregion, upland longleaf pine savanna habitat appears to be preferred (Conant 1975). Louisiana pine snakes prefer an overstory dominated by longleaf-pine, with minimal midstory cover and a well-developed understory of native bunch-grasses and herbaceous plants, which is maintained by frequent, but low-intensity ground fire (USFWS 2012). To date only one Louisiana pine snake has been found in the Lance Rosier Unit of the Preserve, although favorable habitat exists as well in both the Big Sandy and Turkey Creek Units.

Plants

Navasota ladies' tresses, federal and state endangered, is an orchid species that is endemic to southeast Texas. This plant grows in moist, sandy soils in small openings on gentle slopes and along intermittent tributaries of the Brazos, Navasota, and Neches Rivers. This species has a limited range and low population numbers. Reasons for endangerment include habitat loss and degradation due to development and road construction (USFWS 1992). This plant has not been documented in the Preserve, but a known population exists in northwestern Jasper County just east of the Upper Neches River Corridor Unit. Although this plant has not been documented in the Preserve, there is suitable habitat along the upper Neches River.

Texas Trailing Phlox, federal and state endangered, is endemic to southeast Texas. Currently, populations are only found in three counties—Hardin, Polk, and Tyler. Texas trailing phlox is a fire adapted species that grows in fire-maintained openings in upland longleaf pine savannas or post oak-bluejack oak woodlands on deep sandy soils. Considered very rare and imperiled less than a decade ago, its numbers have increased at some sites during the last few years after prescribed burning. This trend may indicate that prescribed burning of its habitat, which allows more light to reach the ground and possibly influences nutrient availability, is essential to its continued survival and recovery (Texas Parks and Wildlife 1997, Ajilvsgi 1979). Phlox currently grows in two locations in the Big Sandy Unit and in two locations in the Turkey Creek Unit. The population in the Turkey Creek Unit was established after prescribed burning from cuttings taken from plants in Roy E. Larsen Sandylands sanctuary, owned and managed by the Nature Conservancy of Texas.

3.4.5.2 Methodology and Intensity Threshold

The methodology used for assessing special status impacts included using available GIS data and literature to identify the special status species and habitat communities present and identifying the potential effects to special status populations (e.g., composition, diversity, abundance) by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: No individuals of a special-status species would be affected but a very localized area of their habitats could be affected as a result of the alternative.

Minor: A few individuals of special status species or localized areas of their respective habitats would be affected, but the species' population would not be affected as a result of the alternative. Mitigation measures, if needed, would be simple and successful.

Moderate: A number of individuals of special status species populations or a limited portion of their respective habitats would be affected as a result of the alternative. The impacts would be difficult to detect using typical population monitoring techniques. Mitigation measures, if needed, would be extensive and successful.

Major: A measureable portion of a special-status population or their large portion of their respective habitats would be affected as a result of the alternative over a relatively large area within the park. The impacts would be readily detectable using typical population monitoring techniques. Extensive mitigation measures would be needed to offset any adverse effects and may not be successful.

Duration:
Short-term: If individual species or habitat recovers in ≤ 1 year; population recovers in ≤ 5 years.
Long-term: If individual species or habitat recovers in ≥ 1 year; population recovers in >5 years.

3.4.5.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Avoid adverse impacts on state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats. Ensure the continued existence of state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats. Ensure that permitted treatments aid in the recovery of state and federally listed threatened, endangered, sensitive, and candidate plant and animal species and their habitats.	Endangered Species Act; NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; Migratory Bird Treaty Act, as amended; Executive Order 13186, Migratory Birds; Lacey Act, as amended; Texas Admin Code Title 31, Part 2, Chapter 65; NPS Management Policies; National Environmental Policy Act

3.4.5.4 Analysis of Alternatives and Impacts on Special Status Species

Impacts of Alternative I: No Action Alternative

Red-cockaded Woodpecker:

No active Red-cockaded Woodpecker colonies are known to occur within the Preserve since the mid-1990's. The inability to use herbicides could reduce the success of ecological restoration efforts, thus reducing the number of acres successfully restored to longleaf pine that are being taken over by mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, potentially reducing suitable nesting and foraging habitat (i.e., open grassy groundcover), thus reducing Red-cockaded habitat quality and increasing the potential for an uncharacteristic wildfire. Past studies have shown hardwood and woody shrub encroachment reduce foraging habitat quality (James et al. 1997, Walters et al. 2000). An uncharacteristic wildfire could kill a substantial portion of canopy trees, further hindering the long-term objective of creating habitat for the Red-cockaded Woodpecker. This would result in minor to moderate, long-term, adverse, localized impacts on Red-cockaded Woodpecker habitat due to potential destruction of nesting trees and reduced suitable foraging habitat.

Prescribed fire would continue to be used to restore and maintain open park-like stands of mature longleaf pine preferred by this species. Prescribed burns have the ability to control hardwoods and shrubs without damaging the herbaceous layer and soils (USFWS 2003). In addition, prescribed burns as a restoration tool emulate historic fire regimes and aids in the reproduction, growth, and maintenance of longleaf, and other native, appropriate pine species, and aids in reestablishing highly diverse native groundcovers, all important factors of healthy and suitable Red-cockaded Woodpecker habitat (USFWS 2003). Prescribed burn plans would include mitigation measures to minimize any potential impacts to this species and its habitat.

Thus, the No Action alternative would result in no effect to the Red-cockaded Woodpecker because no active woodpecker colonies or designated critical habitat occurs within the Preserve.

Louisiana Black Bear:

No Louisiana black bears are known to inhabit the Preserve; only transient juvenile males are thought to occasionally move through eastern Texas. However, the Neches Bottom and Jack Baygall Unit has potential habitat for black bear reintroductions (Garner 1996, Epps 1997) and restoration efforts could be started in the future. The inability to use herbicides could reduce the success of ecological restoration efforts, thus hindering restoration and maintenance of unique vegetation areas that are being overtaken by invasive mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, potentially reducing suitable foraging habitat (i.e., low brush density and soft mass producing trees), thus reducing suitable Louisiana black bear habitat quality and increasing the potential for an uncharacteristic wildfire. An uncharacteristic wildfire could kill a substantial portion of canopy trees, further hindering the long-term objective of creating habitat for the Louisiana black bear. This would result in minor to moderate, long-term, adverse, localized

impacts on Louisiana black bear habitat due to potential destruction of den trees and reduced suitable foraging habitat.

Prescribed fire could aid in the regeneration of desired hard mast producing oak trees and soft mass producing species (blackberries, pokeberry). Prescribed burns could emulate the historic fire regimes that helped to maintain oak dominated sites (Weaver 2000). In addition, prescribed burns could open the mid-story vegetation layer in areas to promote growth and germination of forbs that are used as seasonal forage by black bears. Prescribed burn plans would include mitigation measures to minimize any potential impacts to this species and its habitat. Prescribed fire could have minor to moderate, long-term, beneficial, localized impacts by restoring black bear habitat quality.

Thus, the No Action alternative would result in no effect to the Louisiana black bear because no Louisiana black bear populations or designated critical habitat occurs within the Preserve.

Louisiana Pine Snake:

Only one Louisiana pine snake has been observed within the Lance Rossier Unit; although favorable habitat exists as well in both the Big Sandy and Turkey Creek Units. This pine snake prefers an overstory dominated by longleaf-pine, with minimal mid-story cover and a well-developed understory of native bunch-grasses and herbaceous plants, which is maintained by frequent, but low-intensity ground fire (USFWS 2012). The inability to use herbicides could reduce the success of ecological restoration efforts, thus hindering restoration and maintenance of unique vegetation areas that are being overtaken by invasive mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, reducing suitable habitat for pocket gophers, the main food source for Louisiana pine snakes (Rudolph et al. 2002), and subsequently pine snakes, and increasing the potential for an uncharacteristic wildfire. Dense brush mid-story could also suppress or eliminate an herbaceous layer, which is important to pocket gophers. An uncharacteristic wildfire could kill a substantial portion of canopy trees and herbaceous cover, further hindering the long-term objective of creating habitat for the Louisiana pine snake. This would result in minor to moderate, long-term, adverse, localized impacts on Louisiana pine snake habitat due to potential destruction of herbaceous cover and suitable habitat.

Prescribed fire would continue to be used to restore and maintain open stands of mature longleaf pine with minimal mid-story and well developed herbaceous cover preferred by this species. Prescribed burns as a restoration tool emulate historic fire regimes and aids in the reproduction, growth, and maintenance of longleaf and establishing an herbaceous layer. A well-developed herbaceous layer is important foraging habitat for pocket gophers, which seems to have a direct correlation to Louisiana pine snake populations (Himes 1998). It has been shown that Louisiana pine snakes are well adapted to fire and will seek refuge in pocket gopher burrows (USFWS 2012). Prescribed burn plans would include mitigation measures to minimize any potential impacts to this species and its habitat. Prescribed fire could have minor to moderate, long-term, beneficial, localized impacts by restoring Louisiana pine snake habitat quantity and quality.

Thus, the No Action alternative would result in no effect to the Louisiana pine snake because no pine snake populations or designated critical habitat occurs within the Preserve.

Navasota ladies' tresses:

This plant has not been documented in the Preserve, but a known population exists in northwestern Jasper County just east of the Upper Neches River Corridor Unit; there is suitable habitat along the upper Neches River within the preserve. The Navasota ladies' tresses prefer sparsely vegetated areas along ephemeral or intermittent drainages and have also been found along game/livestock trails (Hammons et al. 2010). This species has been associated with functioning longleaf pine systems where fire is a key element to maintaining (Clark and Saunders 2009). The inability to use herbicides could reduce the success of ecological restoration efforts, thus hindering restoration and maintenance of longleaf pine and other unique vegetation areas that are being overtaken by invasive mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, reducing suitable habitat for Navasota ladies' tresses, and increasing the potential for an uncharacteristic wildfire. An uncharacteristic wildfire could kill a substantial portion of herbaceous cover and sterilize the soil, further hindering the long-term objective of maintaining suitable habitat for Navasota ladies' tresses along the Neches River. This would result in minor to moderate, long-term, adverse, localized impacts on Navasota ladies' tresses habitat due to potential destruction of suitable habitat.

Prescribed fire would aid in maintaining these sparsely vegetated openings in moist, sandy soils within the Preserve. In addition, prescribed burns could open the mid-story vegetation layer in areas to promote growth and germination of sparse herbaceous patches. Prescribed burn plans would include mitigation measures to minimize any potential impacts to this species and its habitat. Prescribed fire could have minor to moderate, long-term, beneficial, localized impacts by maintaining/restoring Navasota ladies' tresses habitat quality.

Thus, the No Action alternative would result in no effect to the Navasota ladies' tresses because no Navasota ladies' tresses populations or designated critical habitat occurs within the Preserve.

Texas Trailing Phlox:

This plant is known to occur in two locations in the Big Sandy Unit and in two locations in the Turkey Creek Unit. The population in the Turkey Creek Unit was established after prescribed burning from cuttings taken from plants in Roy E. Larsen Sandylands sanctuary. This species is fire adapted that grows in fire-maintained openings in upland longleaf pine savannas or post oak-bluejack oak woodlands on deep sandy soils with some groundcover (USFWS 1995). A pine savanna consists of relatively open stands of Longleaf Pine with a well-developed groundcover layer and sparse or absent understory (Diamond et al. 1987). The inability to use herbicides could reduce the success of ecological restoration efforts, thus hindering restoration and maintenance of longleaf pine savannas and/or post oak-bluejack oak woodlands that are being overtaken by invasive mid-story brush species. Without sufficient ecological restoration in these areas, invasive brush species would continue to increase in density and abundance, reducing open, herbaceous areas suitable for Texas trailing phlox, and increasing the potential for an

uncharacteristic wildfire. An uncharacteristic wildfire could kill a substantial portion of the canopy cover, herbaceous cover, sterilize the soil, and destroy individual plants or populations, further hindering the long-term objective of maintaining/restoring suitable habitat for this species. This would result in minor to moderate, long-term, adverse, localized impacts on Texas trailing phlox habitat due to potential destruction of suitable habitat.

Prescribed fire would aid in restoring the longleaf pine savannas and post oak-blackjack oak woodlands by rejuvenating the soils with nutrients, reducing invasive mid-story brush, increasing flower production and/or seed germination of fire-adapted plant species and the herbaceous layer, and restoring the native vegetation structure, composition, and function. Prescribed fire would help to maintain existing and suitable habitat of openings with some herbaceous cover. Texas trailing phlox are adapted to fire with aboveground parts being destroyed by fire and underground parts remaining undamaged (USFWS 1995b). In addition, new growth has appeared two weeks after spring burns and resprouting and flowering again after a prescribed burn during the growing season (USFWS 1995b). Prescribed fire could have minor to moderate, long-term, beneficial, localized impacts by maintaining/restoring Texas trailing phlox habitat quality.

Thus, the No Action alternative would result in may affect, but not likely to adversely affect the Texas trailing phlox due to the beneficial impacts with continuing prescribed burning to foster restoration of longleaf pine and oak woodland communities favored by this species.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in moderate, long-term, beneficial, localized cumulative impacts to special status species and their habitats through improved habitat from the return of a natural fire regime. However, there is the potential for minor to moderate, long-term, adverse, localized impacts to special status habitat through future severe wildfires from potential fuel buildup in areas adjacent to communities and invasive mid-story brush.

Conclusion

Continuing with prescribed burning to foster restoration of longleaf pine and other vegetation communities favored by the four federally-listed species—Red-cockaded Woodpecker, Louisiana black bear, Louisiana pine snake, Navasota ladies' tresses, and Texas trailing phlox—would be a long-term, minor to moderate beneficial effect for these species or their habitat. There is potential for uncharacteristic wildfires to have minor to moderate, long-term, adverse, localized

impacts on habitat and Texas trailing phlox individuals or populations due to potential destruction of suitable habitat.

Impacts to Alternative II: Preferred Alternative

Special status species impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application (i.e., hand applications) would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would increase the success rate of ecological restoration, thus increasing fire dependent vegetation in prevalence and vigor and have a positive impact on special status species adapted to those vegetation types. For example, a study conducted over 10 years showed herbicide and mechanical treatments in longleaf pine stands to result in higher survival rates, greater productivity, less woody understory cover, and larger trees (Haywood 2010). In addition, the ability to reduce more mid-story invasive brush species would potentially increase habitat quality for special status species by opening the mid-story vegetation layer and promoting herbaceous ground cover (e.g., forbs, wildflowers), and increase the potential for lower intensity ground fires, which are easier to manage/suppress.

Targeted herbicide application—hand application—to specific basal or foliar plant areas, would minimize chances for overspray and applying to non-target plants. Thus, mitigation measures (Section 2.4), limited use, hand 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, known areas with Texas trailing phlox would not be treated and if targeted herbicide treatment were conducted within the Big Sandy or Turkey Creek units, a minimum 50-feet buffer would be placed around the population to assure that there would be essentially no opportunity for spray, directly or in drift. Thus, the Preferred Alternative would result in may affect, but not likely to adversely affect the Texas trailing phlox due to the beneficial impacts with continuing prescribed burning to foster restoration of longleaf pine and oak woodland communities favored by this species.

There should be no potential for direct impacts to a transient black bear or Louisiana pine snake traveling through the preserve because low concentrations would be applied by hand applications. Plus, herbicides commonly used for vegetation management (e.g., triclopyr (Garlon 4/Elelment 4), glyphosate, imazapyr, sulfometuron, metsulfuron methyl, hexazinone) have been designed to target biochemical processes unique to plants, thus have low levels of direct toxicity to animals and pose little risk to wildlife when used in accordance with the label specifications (Tatum 2004). The indirect and longer-term adverse impacts would be negligible.

Neither direct nor indirect short-term or long-term effects of targeted herbicide treatments would be expected to Red-cockaded Woodpeckers, Louisiana black bears, Louisiana pine snake, or Navasota ladies' tresses because the preserve does not support any known populations or contain designated critical habitat. Thus, the Preferred Alternative would have no effect to Red-cockaded Woodpeckers, Louisiana black bears, Louisiana pine snakes, or Navasota ladies' tresses because no populations or designated critical habitat occurs within the Preserve.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in moderate, long-term, beneficial, localized cumulative impacts to special status species and their habitats through improved habitat from the return of a natural fire regime and increased ecological restoration success (i.e., removal of invasive mid-story brush).

Conclusion

The Preferred Alternative would result in moderate, long-term, beneficial, localized cumulative impacts from prescribed burns and associated fireline activities. Cumulative effects under this alternative would be moderate, long-term, beneficial, and localized impacts to special status species and/or their habitat.

3.4.6 Water Resources

3.4.6.1 Affected Environment

Water is one of the most pervasive resources in the Preserve with four of the 15 management units being river or stream corridor units and most units are adjacent to or include third-order perennial streams. In addition to the major streams or river reaches, the Preserve contains a variety of minor hydrologic features—floodplains, sloughs, oxbows, baygalls, acid bogs, and low-order tributary streams. First order streams are the smallest streams or tributaries that do not have water flowing into them. Second order streams have one or more first order tributaries flowing into them. The Neches is a third order stream, as it receives water from second order tributaries. The origin and occurrence of all water resources is affected by surface and subsurface geology.

Major Drainages

All units of the Preserve are located within the watershed or basin of the Neches River, except for the Menard Creek Corridor Unit, which is in the Trinity River basin. Both of these drainage basins trend from northwest to southeast and have gentle slopes with channels that meander from their headwaters to the Gulf of Mexico. The Neches and Angelina Rivers constitute the two major rivers within the Neches River basin. The mainstem Neches River headwaters are located in northeast Texas, in Van Zandt, Smith, and Henderson Counties. The Angelina River originates in Smith and Rusk Counties.

The Neches River basin is roughly 200 miles long by 50 miles wide, and drains an area of approximately 10,000 square miles. Major tributaries to the Neches within the Preserve are Big Sandy Creek/Village Creek, Turkey Creek, Pine Island and Little Pine Island Bayous, Hickory

Creek, and Beech Creek. The Trinity River basin drains approximately 18,000 square miles, encompassing parts of 34 counties before entering the Gulf of Mexico through Trinity Bay and Galveston Bay (TNRCC 1996). Menard Creek is the only major tributary to Trinity River within the Preserve. The drainages generally follow dendritic patterns, which are indicative of horizontal or near horizontal bedrock and gentle sloping topography.

Minor Hydraulic Features

The surface water network in all management units consists of unnamed creeks, sloughs, acid bogs, and baygalls that greatly affect the hydrology and hydrochemistry of the surface and near-surface groundwater developments. Baygalls occur in depressions formed by abandoned channels on terraces. In the Preserve, baygalls frequently occur in relatively lower depressional areas, where water stands for much of the year (e.g., Lance Rosier Unit). Additionally, baygalls may form at the contact of two geologic formations with differing hydraulic properties. Baygalls accumulate a large amount of organic debris, which results in water that is high in organic acids, low in dissolved oxygen and exhibit low pH values.

Similarly, sloughs channel and capture water. Sloughs occur within active floodplains, thus are subject to a greater degree of hydrologic exchange with mainstem drainages. In addition to the periodic input of floodwaters, sloughs may receive sediments during floods. Water quality in sloughs can vary from that observed in the mainstem watercourse to that of baygalls depending on the elapsed time between flood events.

Acid bogs generally form at locations where terrace-level tributary streams enter a main drainage. The loss in gradient from terrace to active floodplain results in sediment deposition, long-term aggradation, and shifting channels. Acid bogs are subject to the same water quality controls as baygalls and consequently exhibit low pH waters with organic acid turbidity and low dissolved oxygen. Additionally, acid bogs may be subject to flooding due to their location in floodplains. Acid bogs are similar to baygalls in plant species composition.

Water Quality

The Texas Commission on Environment Quality (TCEQ) and US Environmental Protection Agency (EPA) has identified approximately 141.7 miles of streams as a 303(d) listed reaches (Turkey Creek, Big Sandy Creek, Beech Creek, Little Pine Island Bayou, Village Creek, Cypress Creek, and Booger Branch). The reasons for 303(d) listing is bacteria, low pH, and oxygen depletion. These segments were categorized as 5c, which means additional data information will be gathered before a Total Maximum Daily Load (TMDL) is scheduled. For waters identified as a 303(d) reach, a water quality improvement plan must be developed. The water quality improvement plan known as TMDL establishes allowable pollutant loads set at levels to achieve water quality standards and is the responsibility of the TECQ and Texas State Soil and Water Conservation Board. The EPA must then approve these plans.

NPS has also divided the major water resources of the Preserve into three classes based on a combination of ambient water quality and monitoring status. Category 1 waters are those streams whose water quality presently ranges from very good to excellent. Streams in the Preserve included in Category 1 are: Big Sandy Creek, Beech Creek, Turkey Creek, and Black Creek (within the Jack Gore Baygall Unit). Category 2 waters are those already exhibiting water

quality degradation for one or more parameters, often due to non-point source pollution and/or legally permitted point-source discharges. Streams in the Preserve included in Category 2 are Little Pine Island Bayou and Menard Creek. Category 3 waters are those major stream segments within the Preserve, which are included in the Texas Surface Water Quality Standards (1980) and are routinely monitored by the USGS. Category 3 stream segments that flow through the Preserve are the Neches River, from Town Bluff Dam to the tidal zone (Beaumont Unit area) and Pine Island Bayou.

3.4.6.2 Methodology and Intensity Threshold

The methodology used for assessing water resource impacts included using available GIS data and literature to identify the water resources present and identifying the potential effects to water resources (i.e., surface and ground water) by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: There would be no detectable change in the quality of natural surface water or water aquifers. There would be no risk of accidental discharge of wastewater into the surface environment.

Minor: There would be a detectable change in the quality of natural surface water or water aquifers at the immediate discharge point. The quality of affected waters would remain within permit standards under the Clean Water Act and/or Safe Drinking Water Act. For adverse impacts, any accidental wastewater discharge into the environment would remain small in volume, and be readily detected, controlled, and cleaned up. Any accidental pollutant release could be corrected by standard repairs and maintenance of the existing treatment/discharge system.

Moderate: There would be an observable or measurable change in the quality of natural surface water or water aquifer. For adverse impacts, the quality of affected waters might infrequently violate permit standards under the Clean Water Act and/or Safe Drinking Water Act. Any accidental wastewater discharge into the environment could cause limited environmental contamination and/or require substantial effort to contain, control, and clean up. Any accidental pollutant release could be addressed by upgrading or otherwise improving the existing wastewater treatment/discharge system.

Major: There would be extensive and substantial change in the quality of natural surface water or water aquifer. For adverse impacts, the quality of affected waters might chronically violate and/or impair natural surface water or groundwater under the Clean Water Act and/or Safe Drinking Water Act. There would be an unacceptable risk of a large accidental discharge into the surface environment which would cause widespread environmental contamination or otherwise be extremely difficult to contain, control, and clean up. The violations could only be addressed by entirely replacing the existing wastewater treatment/discharge system.

Duration:
Short-term: If water quality recovers in one day or less.
Long-term: If water quality recovers in more than one day.

3.4.6.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Maintain existing quality of all surface water and groundwater resources. Avoid diminishing the quantity of all surface water and groundwater resources. Avoid altering drainage characteristics, soil hydrology, and natural movement of groundwater.	Clean Water Act; NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; Executive Order 12088, Federal Compliance with Pollution Control Standards; NPS Management Policies; National Environmental Policy Act

3.4.6.4 Analysis of Alternatives and Impacts on Water Resources

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could increase the use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities, which could lead to increased erosion by compaction of soils and more intense wildfires that are difficult to suppress/manage, respectively. Potential increased erosion could result in increased turbidity, sedimentation, and debris flushes with reduced water quality, and potentially large pulses of water delivered to water bodies within the Preserve. The degree of impacts would depend on the severity and extant of the wildfire and rain events. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water.

Prescribed fire may reduce vegetation along the stream banks, thus temporarily increasing stream temperatures, soil erosion, and sediment yield. This could lead to turbidity and sedimentation of surface water resources in the preserve. Turbidity and sedimentation can alter the hydrologic regime of surface waters and adversely affect aquatic habitats, invertebrates, and fish. The potential for an increase in turbidity and sediment delivery in water bodies within the preserve as a result of soil erosion following suppression activities could occur. However, problems with soil erosion would only result in direct, minor, adverse, short-term, and localized impacts. In addition, impacts following a prescribed fire would be reduced and/or eliminated during the "green-up" as new herbaceous cover developed.

The use of fire retardants or foams could potentially cause short and long-term impacts to water resources if misapplied or mishandled. Retardants contain ammonia and phosphate or sulfate ions, which can temporarily change the chemistry of a water body, thus making it lethal to fish and other aquatic organisms. Foams contain detergents that can interfere with the ability of fish

gills to absorb oxygen. The degree of impact would depend on the volume of retardant/foam dropped into the water body, the size of the water body, and the volume of flow in the stream or river. However, since mitigation measures limit the use, type, and proximity to water bodies of fire retardants, impacts to water quality would be minimal.

In wildland fire suppression tactics, fire engines and other equipment are often driven off-road to control the fire perimeter. With an appropriate response, there would be less fireline constructed and a less off-road use of engines, as natural barriers are more likely to be used to confine wildland fires. The direct adverse effect of fire suppression efforts would be negligible unless water was drawn from rivers for firefighting. If this occurred, the direct adverse effects of reduced flow would be localized, short-term (hours), and minor. Indirect adverse effects could include destabilizing river banks or pond shores due to off-road travel with fire engines and other equipment. They would be mitigated by reduced off-road travel and rehabilitation of any damaged river banks.

Direct, adverse, localized, short-term, negligible to minor impacts could occur from mechanical and manual fuel reduction treatments due to trampling of river banks or similar disturbances by felled and/or dragged trees. These effects could be mitigated by avoidance, where possible, and immediate rehabilitation using the appropriate mitigation measures. Indirect, localized, short-term, adverse, negligible impacts could be slightly increased streamflow due to a reduction in vegetation and thus less transpiration on the treated area.

Cumulative Impacts

Existing industry outfalls from paper mills and refineries, pollutants from private septic tanks, and the U.S. Army Corps of Engineers Sabine-Neches Waterway Improvement Project outside the Preserve have affected and may continue to affect water resources within the Preserve.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short-term, adverse cumulative impacts to water quality. However, there is the potential for indirect, minor to moderate, long-term, adverse, localized impacts to water quality through future severe wildfires from potential fuel buildup due to the reduced acres of successful restoration and limited vegetative fuels treated in areas adjacent to communities.

Conclusion

The No Action alternative would result in direct, minor, adverse, short-term, and localized impacts as well as indirect, minor to moderate, short-term, beneficial, localized impacts from prescribed burns. The inability to use herbicides could also have minor to moderate, long-term, adverse, localized impacts to water quality through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be minor, short-term, adverse, localized impacts to water resources.

Impacts to Alternative II: Preferred Alternative

Water Resource impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would

be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would increase the success rate of ecological restoration, thus increasing fire dependent vegetation in prevalence and vigor and having a positive impact on vegetation by developing an understory layer and removing fuel buildup created by invasive mid-story brush species within the Preserve and immediately adjacent to some communities. The increased ecological restoration success rate would benefit water resources with lower intensity ground fires that have less impact on soil runoff when compared to more intense wildfires and are easier to manage/suppress. Thus, the Preferred Alternative would have indirect, minor to moderate, beneficial, long-term, and localized impacts by increasing the potential for lower intensity ground fires and increasing the overall health and vigor of vegetation communities.

All treatment areas would have individual treatment plans submitted for herbicide use to be approved at the state and regional levels. Approval may be given by the regional and national level staff after considering numerous factors including: the target use, location where the application will occur, potential T&E species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, type of application (example, spot spraying), etc. Furthermore, streamside management zones (SMZs) would be placed around all water bodies and herbicide labels would be followed to make potential for herbicide drift unlikely. All such features would be buffered by minimum of 50 feet on either side to assure that there would be essentially no opportunity for spray, directly or in drift, to enter those waters (Texas Forest Service 2010).

Cumulative Impacts

Existing industry outfalls from paper mills and refineries, pollutants from private septic tanks, and the U.S. Army Corps of Engineers Sabine-Neches Waterway Improvement Project outside the Preserve have affected and may continue to affect water resources within the Preserve.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short-term, adverse and beneficial cumulative impacts to water quality.

Conclusion

The Preferred Alternative would result in direct, minor, adverse, short-term, and localized impacts as well as direct, minor, long-term, beneficial, localized cumulative impacts from fire management activities. Cumulative effects under this alternative would be direct, minor, long-term, adverse and beneficial, and localized.

3.4.7 Riparian/Wetlands

3.4.7.1 Affected Environment

Approximately 40% of the Preserve is comprised of wetlands and are classified into three categories based on the Cowardin Classification System: palustrine, riverine, and lacustrine wetlands. Table 5 lists the acreage of each Cowardin classification wetland by wetland type.

Table 5. Cowardin Classification System Wetlands within the Preserve*.

Wetland Type	Acres
Palustrine	31,530
Palustrine with two classes (complex)	180
Riverine	3,125
Lacustrine	60
Total	34,895

*Data Source: USFWS National Wetland Inventory Data published in 1987.

Although not all of the existing wetlands of the Preserve are mapped, each of the Cowardin wetland types found illustrates the different habitats and wetlands that occur within the various management units of the Preserve. Wetlands are part of the mosaic of plant and animal communities and support a diverse assemblage of life in the Preserve.

The majority of wetlands within the Preserve fall within the palustrine classification, which are non-tidal wetland dominated by trees, shrubs, or persistent emergents. Non-vegetated wetlands smaller than 20 acres, less than six feet deep, lacking a waved-form or bedrock shoreline, with low salinity (i.e., <5 parts per thousand) also fall under the palustrine systems (Cowardin et al. 1979). The palustrine classes found within the Preserve are forested, scrub-shrub, emergent, open water (emergent unconsolidated bottom), or a mixture of classes (i.e., complexes). Palustrine forested and scrub–shrub wetlands are also referred to as bottomland hardwood forests, riparian wetlands, and floodplain forests. These wetland are characterized by woody-vegetation including, but not limited to bald cypress, tupelo gum, black gum (*Nyssa sylvatica*), oaks (*Quercus* spp.), river birch (*Betula nigra*), and red bay (*Persea borbonia*). These wetlands are sustained by a high water table and flood events; proper functioning of these wetlands are connected to the physical, chemical, and biological processes of the nearby streams (National Resource Council 1995).

Palustrine emergent wetlands contain non-woody vegetation such as, rushes (*Juncus* spp.), arrowheads *Sagittaria* spp.), sedges (*Carex* spp.), grasses, vines, and pale pitcher plants (*Sarracenia alata*). These wetlands are considered to have high productivity rates and serve as nutrient pumps as plants take in nutrients and release some back into the water and soil as they die (Mitsch and Gosselink 1993).

Palustrine open water wetlands have less than 30% vegetation (Cowardin et al. 1979). These wetlands are typically small, shallow ponds that provide habitat to various organisms.

The riverine systems include wetlands and deepwater habitats located in stream channels. The riverine classes found within the Preserve are unconsolidated bottom and unconsolidated shore. The majority of the riverine wetlands lie within the Neches River corridor, including the Neches Bottom and Jack Baygall unit. Riverine wetlands are also located along the Neches and Little Pine Island Bayou–Pine Island Bayou units.

Lacustrine wetlands are wetlands larger than 20 acres, located in a topographic depression or a dammed river channel with vegetation covering less than 30% (Cowardin et al. 1979). There are two locations within the Preserve classified as unconsolidated bottom or unconsolidated shore lacustrine wetlands.

3.4.7.2 Methodology and Intensity Threshold

The methodology used for assessing riparian/wetland resource impacts included using available GIS data and literature to identify the water resources present and identifying the potential effects to riparian/wetlands by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts would result in a change to wetlands values and functions, but the change would be so slight that it would not be of any measurable or perceptible consequence.

Minor: Impacts would result in a change to wetlands values and functions that would be detectable, but the change would be small and of little consequence and would be expected to be localized. Mitigation measures, if needed to address adverse effects, would be simple and successful.

Moderate: Impacts would result in a change to wetlands values and functions that would be readily detectable and could occur in several units. Mitigation measures, if needed to address adverse effects, would be extensive and likely successful.

Major: Impacts would result in a change to wetlands values and functions that would have substantial consequences on a regional scale. Extensive mitigation measures would be needed to address any adverse effects, and their success would not be guaranteed.

Duration:
Short-term: If wetland and/or riparian areas recover in one year or less.
Long-term: If wetland and/or riparian areas recover in more than one year.

3.4.7.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Maintain existing quality of all wetland and riparian resources. Prevent loss or degradation of all wetland and riparian resources. Avoid altering drainage characteristics, soil hydrology, and natural and beneficial values of wetland and riparian resources.	Clean Water Act; NPS Organic Act of 1916, as amended; NPS-77 Natural Resources Management Guidelines; Executive Order 11990, DO 77-1; Federal Compliance with Pollution Control Standards; NPS Management Policies; National Environmental Policy Act

3.4.7.4 Analysis of Alternatives and Impacts on Riparian/Wetland Resources

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could increase the use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities and of invasive mid-story brush (reduced acreage treated successfully), which could lead to increased erosion by compaction of soils and more intense wildfires that are difficult to suppress/manage, respectively. Potential increased erosion could result in increased temperature, turbidity, sedimentation, and debris flushes with reduced water quality, and potentially large surface flows of water delivered to riparian areas/wetlands within the Preserve. The degree of impacts would depend on the severity and extant of the wildfire and rain events. Indirect effects would be adverse, minor to moderate, localized, long-term impacts due to increased soil erosion, turbidity, and sedimentation, reduced water quality, and potential pulses of water.

Historically wildfires helped shape the native vegetation and ecosystems of southeast Texas. Wetland plant communities have evolved with a periodic fire regime and require it to maintain the open vegetation communities with sparse overstories and abundant herbaceous cover. Wetland plant species possess adaptations to fluvial disturbances that facilitate survival and reestablishment following fires, thus contributing to the rapid recovery of many wetland vegetation communities. In addition, prescribed fires emulate the natural fire regime and are beneficial to wetlands by providing an influx of nutrients to the soil from the plant biomass burned, stimulates seed production, and helps to perpetuate the vegetation and wildlife species associated with wetlands (Craft and Casey 2000, Battle and Golladay 2001). Temporary increases in temperatures, soil erosion, and sediment yield could result from prescribed fire due to reduced vegetation along the riparian/wetland banks. However, problems with temperature and soil erosion would only result in direct, minor, adverse, short-term, and localized impacts.

The use of fire retardants or foams could potentially cause short and long-term impacts to riparian/wetlands if misapplied or mishandled. Retardants contain ammonia and phosphate or sulfate ions, which can temporarily change the chemistry of a water body, thus making it lethal to fish and other aquatic organisms. Foams contain detergents that can interfere with the ability of fish gills to absorb oxygen. The degree of impact would depend on the volume of retardant/foam dropped into the water body, the size of the water body, and the volume of flow. However, since mitigation measures limit the use, type, and proximity to water bodies of fire retardants, impacts to water quality would be minimal.

Direct, adverse, localized, short-term, negligible to minor impacts could occur from mechanical and manual fuel reduction treatments due to trampling of riparian/wetland banks or similar disturbances by felled and/or dragged trees. These effects could be mitigated by avoidance, where possible, and immediate rehabilitation using the appropriate mitigation measures. Indirect, localized, short-term, adverse, negligible impacts could be slightly increased soil erosion and sediment yield due to a reduction in vegetation and thus less transpiration on the treated area.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short-term, adverse cumulative impacts to wetlands/riparian resources. However, there is the potential for indirect, minor to moderate, long-term, adverse, localized impacts through future severe wildfires from potential fuel buildup due to the reduced acres of successful restoration and limited vegetative fuels treated in areas adjacent to communities.

Conclusion

The No Action alternative would result in direct, minor, adverse, short-term, and localized impacts as well as indirect, minor to moderate, short-term, beneficial, localized impacts from prescribed burns. The inability to use herbicides could also have minor to moderate, long-term, adverse, localized impacts to wetlands/riparian areas through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be minor, short-term, adverse, localized impacts to water resources.

Impacts to Alternative II: Preferred Alternative

Riparian/Wetland impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would

be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would increase the success rate of ecological restoration, thus increasing fire dependent vegetation in prevalence and vigor and having a positive impact on vegetation by developing an understory layer and removing fuel buildup created by invasive mid-story brush species within the Preserve and immediately adjacent to some communities. The increased ecological restoration success rate would benefit riparian/wetlands with lower intensity ground fires that have less impact on soil runoff, loss of bank vegetation, and degradation of soils when compared to more intense wildfires and are easier to manage/suppress. Thus, the Preferred Alternative would have indirect, minor to moderate, beneficial, long-term, and localized impacts by increasing the potential for lower intensity ground fires and increasing the overall health and vigor of wetland/riparian vegetation communities.

All treatment areas would have individual treatment plans submitted for herbicide use to be approved at the state and regional levels. Approval may be given by the regional and national level staff after considering numerous factors including: the target use, location where the application will occur, potential T&E species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, type of application (example, spot spraying), etc. Furthermore, streamside management zones (SMZs) would be placed around all water bodies and herbicide labels would be followed to make potential for herbicide drift unlikely. All such features would be buffered by minimum of 50 feet on either side to assure that there would be essentially no opportunity for spray, directly or in drift, to enter those waters (Texas Forest Service 2010).

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Proposed Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short- to long-term, adverse and beneficial cumulative impacts.

Conclusion

The Preferred Alternative would result in direct, minor, adverse, short-term, and localized impacts as well as direct, minor, long-term, beneficial, localized cumulative impacts from fire management activities. Cumulative effects under this alternative would be direct, minor, long-term, adverse and beneficial, and localized.

3.5 Cultural Resources

3.5.1 Archaeological Resources Affected Environment

In addition to their natural diversity the parks preserve a rich, unique cultural record of prehistoric and historic sites. To date, not all of BTNP has been surveyed for the presence/absence of cultural resources. However, several surveys have been conducted in recent years ahead of 3-D seismic surveys in the Beaumont, Jack Gore Baygall and Neches Bottom, and Lance Rosier Units. Approximately 15 archeological sites are known to occur within BTNP and are listed in the NPS Archeological Sites Management Information System (NPS 2011).

Prehistoric sites in east Texas are divided into three temporal periods: Paleoindian sites from 8,000-6,000 BC; Archaic sites from 6,000 BC to AD 100; and Late Prehistoric sites from AD 100-1500. They include shell middens, temporal mounds, burial mounds, and surface artifacts (i.e., metal, ceramic, stone).

Historic sites are associated with the 19th century homesteading and ranching, late 19th century timber industry activities, and the boom period of oil and gas development during the early 20th century. They include remains of former homesteads; logging camps and mills; hunting camps; river craft; roads, trails, and traces; ferry crossings; steamboat landings; abandoned communities; and early oil and gas production sites. The Staley Cabin was determined eligible for listing in the NHRP, although other historic resources may be discovered in the future during BTNP projects.

A Memorandum of Understanding (MOU) between NPS and Texas SHPO was signed and became effective on ____2012 (Appendix A). This MOU was entered to establish joint understanding of the need to initiate compliance with NEPA, NHPA, and ESA on NPS lands that would be included in the proposed prescribed burns. The MOU also lays out the basic framework for communications and prescribed fire operational processes that will assist fire managers in ensuring that all parties are satisfied as work to implement burns moves forward.

3.5.1.2 Methodology and Intensity Threshold

The methodology used for assessing archaeological resource impacts included using available GIS data and literature to identify the archaeological resources present and identifying the potential effects to archaeological resources by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact is at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial. For the purposes of Section 106, the determination of effect would be no adverse effect to archaeological resources.
Minor: Disturbance of a site(s) is confined to a small area with little, if any, loss of important information potential. For purposes of Section 106, the determination of effect would be no adverse effect.

Moderate: Disturbance of the site(s) would not result in the loss of integrity. For purposes of Section 106, the determination of effect would be adverse effect.

Major: Disturbance of the site(s) is substantial and results in the loss of most or all of the site and its integrity. For purposes of Section 106, the determination of effect would be adverse effect.

Duration:
Short-term: Any disturbance to archaeological resources would be permanent, and are considered long-term.
Long-term: Any disturbance to archaeological resources would be permanent, and are considered long-term.

3.5.1.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Provide protection of all archaeological resources by preventing the destruction, alteration, or impairment to all or part of the cultural resource. Prevent isolation from or alteration to cultural resources with its surrounding environment. In those cases where disturbance or deterioration is unavoidable, the archaeological resource is professionally documented and salvaged.	National Historic Preservation Act; Executive Order 11593, Protection and Enhancement of the Cultural Environment; Archeological and Historic Preservation Act; Archeological Resources Protection Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS Management Policies; National Environmental Policy Act

3.5.1.4 Analysis of Alternatives and Impacts on Archaeological Resources

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased soil erosion and the potential for more intense wildfires that are difficult to suppress/manage, respectively. Potential for increased high intensity wildfire could result in the destruction of unknown, unrecorded archaeological sites and known archaeological sites. Severe wildfire impacts include discoloration of surface artifacts, burning perishable materials, and checking or cracking of rock and ceramic artifacts. Archeomagnetic dates and pollen counts could also be altered from a severe, uncontrollable wildfire. This effect would be direct, long-term, minor to moderate, adverse, and localized due to potential fuel build up and the increased risk for severe wildfires.

The potential increase use of mechanical equipment to cut and limit brush would result in direct, long-term, adverse, localized impacts due to displaced surface materials; exposure of materials due to ground disturbance associated with the activities; or to disturb materials immediately below the surface with vehicle use due to earth moving or compaction. Indirect adverse impacts would include exposure of artifacts to erosion. With avoidance of known archeological resources and implementation of mitigation actions, the direct and indirect adverse impacts of fire suppression tactics or fire hazard fuel reductions would be localized, short-term, and minor.

Prescribed fire would allow for advance clearance and avoidance of cultural resources. Known archaeological resources could be excluded from prescribed burn units or local site- specific related mitigation measures could be implemented. Prescribed burning would reduce the probability of severe wildfires, thus reducing the potential for damage to known and unknown archaeological resources and enhancing protection of these resources. Standard management strategies would be adopted to preclude or minimize impacts (e.g., cultural resources inventories would be completed prior to all prescribed burns, a cultural specialist or an archeologist would monitor initial ground-disturbing activities, should archaeological resources be identified during prescribed burns, all work would cease in the immediate vicinity of the discovery until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the State Historic Preservation Officer). In burn units with known Native American Graves Protection and Repatriation Act (NAGPRA) sites, local Native American tribes will be consulted prior to the prescribed burn. Any known archaeological resources would be marked with special flagging and mitigation measures would be taken to protect identified resources from prescribed burns. Based upon current information, the No Action alternative impacts would be direct, minor to moderate, long-term, beneficial, and site-specific.

Overall, however, the No Action alternative would have direct, minor, adverse, long-term, and localized effects on archaeological resources in the park. In addition, the use of prescribed fire would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain the archaeological resources.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in indirect, minor to moderate, long-term, beneficial, site-specific impacts as well as direct, minor, adverse, long-term, and localized effects due to potential future severe wildfires from potential fuel buildup in areas adjacent to communities and invasive mid-story brush.

Conclusion

The No Action alternative would result in direct, minor, adverse, long-term, and localized effects on archaeological resources in the preserve. In addition, the use of prescribed fire would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain the archaeological resources. Limiting the fire program to presently approved and occurring fire management activities could also have direct, minor to moderate, long-term, adverse, localized impacts to archaeological resources through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be direct, minor to moderate, long-term, beneficial, localized impacts to archaeological resources.

Impacts to Alternative II: Preferred Alternative

Archaeological resource impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control invasive brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Targeted herbicide application would be applied by hand and applied to specific basal or foliar plant areas, which would minimize chances for overspray and migration into the soil. Thus impacts would be negligible.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, minor to moderate, long-term, beneficial, site-specific impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Conclusion

The Preferred Alternative would result in direct, minor, adverse, long-term, and site-specific effects on unknown archaeological resources. In addition the use of prescribed fire in conjunction with targeted herbicide application would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain archaeological resources. Cumulative effects under this alternative would be direct, minor to moderate, long-term, beneficial, localized impacts to archaeological resources.

3.5.2 Historic Resources

3.5.2.1 Affected Environment

Historic resources are those human-made sites, structures, features, or objects that date from the time of the arrival of Euroamericans in approximately 1850, up until the middle of the 20th century (i.e., at least 50 years of age). Historic sites, by definition then, can be of Native American association but are most often associated with Euroamerican use and occupation.

The Staley Cabin is the only historic building determined eligible for listing in the National Register of Historic Places, although other historic resources may be discovered in the future during BTNP projects. The cabin served as the visitor center until 2001 and currently is used as the Environmental Education Center for school groups. Although perhaps the Preserve's best-preserved historic structure, modifications to the cabin (primarily to the interior) have compromised its integrity and its potential national register eligibility (NPS 2011).

3.5.2.2 Methodology and Intensity Threshold

The methodology used for assessing archaeological resource impacts included using available literature to identify the historic resources present and identifying the potential effects to historic resources by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impact is at the lowest levels of detection, barely measurable, with no perceptible consequences, either adverse or beneficial. For the purposes of Section 106, the determination of effect would be no adverse effect to historic resources.

Minor: Disturbance of a historic site(s) is confined to a small area with little, if any, loss of important information potential. For purposes of Section 106, the determination of effect would be no adverse effect.

Moderate: Disturbance of the historic site(s) would not result in the loss of integrity. For purposes of Section 106, the determination of effect would be adverse effect.

Major: Disturbance of the historic site(s) is substantial and results in the loss of most or all of the site and its integrity. For purposes of Section 106, the determination of effect would be adverse effect.

Duration:
Short-term: Any disturbance to historic structures would be permanent, and are considered long-term.
Long-term: Any disturbance to historic structures would be permanent, and are considered long-term.

3.5.2.3 Regulations and Policies

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Provide protection of all historic resources by preventing the destruction, alteration, or impairment to all or part of the historic site. The qualities that contribute to the eligibility for listing or listing of historic properties on the NRHP are protected in accordance with the Secretary of the Interior's Standards (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).	National Historic Preservation Act; Executive Order 11593, Protection and Enhancement of the Cultural Environment; Archeological and Historic Preservation Act; the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation; Programmatic Memorandum of Agreement Among the NPS, Advisory Council on Historic Preservation, and the National Council of State Historic Preservation Officers (1995); NPS Management Policies; National Environmental Policy Act

3.5.2.4 Analysis of Alternatives and Impacts on Historic Resources

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the use of mechanical equipment to cut and limit brush competition and the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased soil erosion and the potential for more intense wildfires that are difficult to suppress/manage. Potential for increased high intensity wildfire could result in the destruction of uninventoried historical sites and historic sites, such as the Stanley Cabin. This effect would be direct, long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires.

The potential increase use of mechanical equipment to cut and limit brush would result in no direct, adverse impacts (ensuring that fuels reduction does not include removal of vegetation from cultural landscape) to such resources. Indirect beneficial impacts would include reducing the threat of wildland fire near the historic structures, reducing the potential damage of vegetation encroachment on the resources, and preserving more of the open character field associated with these types of sites. The indirect impacts would be localized, short-term to long-term, negligible to minor, and beneficial.

Prescribed fire would allow for advance clearance and avoidance of historic resources. Known historic resources could be excluded from prescribed burn units. Prescribed burning would

reduce the probability of severe wildfires, thus reducing the potential for damage to known and unknown historic resources and enhancing protection of these resources. Standard management strategies would be adopted to preclude or minimize impacts (e.g., cultural resources inventories would be completed prior to all prescribed burns, a cultural specialist or an archeologist would monitor initial ground-disturbing activities, should historic resources be identified during prescribed burns, all work would cease in the immediate vicinity of the discovery until the resources could be identified and documented and an appropriate mitigation strategy developed in consultation with the State Historic Preservation Officer). Based upon current information, the No Action alternative impacts would be indirect, minor to moderate, long-term, beneficial, and site-specific.

The direct adverse impact of fire suppression tactics on historic structures would be limited to the potential to damage such structures by contact with firefighting equipment. Indirect adverse impacts include the possibility of damaging the historic integrity of sites. However, fire suppression tactics in conjunction with the proposed hazard fuel reduction projects near historic structures would result in localized, negligible to minor, direct and indirect adverse effects on historic structures.

Overall, however, the No Action alternative would have direct, minor, adverse, long-term, and localized effects on unknown historic resources. In addition the use of prescribed fire would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain the historic resources.

Cumulative Impacts

Modifications to the Stanley Cabin, dismantling of the Voth Mill, the structural deterioration and loss of homestead structures, and management practices (e.g., prescribed burns), within the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in indirect, minor to moderate, long-term, beneficial, site-specific impacts as well as direct, minor, adverse, long-term, and localized effects due to potential future severe wildfires from potential fuel buildup in areas adjacent to communities and invasive mid-story brush.

Conclusion

The No Action alternative would result in direct, minor, adverse, long-term, and localized effects on archaeological resources in the preserve. In addition, the use of prescribed fire would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain the historic resources. Limiting the fire program to presently approved and occurring fire management activities could also have direct, minor to moderate, long-term, adverse, localized impacts to historic resources through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be direct, minor to moderate, long-term, beneficial, localized impacts to historic resources.

Impacts to Alternative II: Preferred Alternative

Historic resource impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control invasive brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Targeted herbicide application would be applied by hand and applied to specific basal or foliar plant areas, which would minimize chances for overspray and drift. Thus impacts would be negligible.

Cumulative Impacts

Modifications to the Stanley Cabin, dismantling of the Voth Mill, the structural deterioration and loss of homestead structures, and management practices (e.g., prescribed burns), within the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, minor to moderate, long-term, beneficial, site-specific impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Conclusion

The Preferred Alternative would result in direct, minor, adverse, long-term, and site-specific effects on unknown archaeological resources. In addition the use of prescribed fire in conjunction with targeted herbicide application would have direct, long-term, minor to moderate, beneficial, site-specific effects by helping to maintain historic resources. Cumulative effects under this alternative would be direct, minor to moderate, long-term, beneficial, localized impacts to historic resources.

3.6 Socioeconomic Resources

3.6.1 Oil and Gas Development

3.6.1.1 Affected Environment

When the Preserve was created, private entities or the State of Texas retained the subsurface mineral interests while the federal government acquired surface ownership. Currently, there are 5 active well sites and 638 miles of transpark oil and gas pipelines with 1.5 miles of associated access roads. Figuring a 50-ft. right-of-way, the pipelines cover approximately 3,867 acres.

Leaks and spills of oil and gas and other hazardous substances have affected park resources, primarily soils, vegetation, and water quality.

There are 217 documented plugged and abandoned wells in the park, all of which were determined to have been restored to relatively natural conditions over time, and there was not a need for restoration of well pads and access roads (NPS 2010).

Oil and gas exploration, development, and transportation play an important role in the local economy within the five-county area that includes the park, and are also important to the regional economy within Railroad Commission of Texas District 3.

3.6.1.2 Methodology and Intensity Threshold

The methodology used for assessing oil and gas resource impacts included using available literature to identify the oil and gas resources present and identifying the potential effects to oil and gas resources by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts would result in a change to oil and gas resources, but the change would be so slight that it would not be of any measurable or perceptible consequence.

Minor: Impacts would cause limited localized change to oil and gas resources. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Impacts would have measurable impacts to oil and gas resources that would be consequential, but would be relatively local. Mitigation measures, if needed, to offset adverse effects occurring outside the Park, would likely succeed.

Major: Impacts would cause substantial alteration to oil and gas resources on a regional scale. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Duration:
Short-term: Impacts that generally last for the duration of the project.
Long-term: impacts that generally last beyond the duration of the project

3.6.1.3. Regulations and Laws

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Public participation in planning and decision-making will ensure that the Park Service fully understands and considers the public's interests in the parks, which are part of their national heritage, cultural traditions, and community surroundings. NPS will actively seek out and consult with existing and potential visitors, neighbors, people with traditional cultural ties to park lands, scientists and scholars, concessioners, cooperating associations, gateway communities, other partners, and government agencies. The Service will work cooperatively with others to improve the condition of parks; to enhance public service; and to integrate parks into sustainable ecological, cultural, and socioeconomic systems. Possible conflicts between the proposed action and oil and gas operations for the project area and the extent to which the park will reconcile the conflict are identified in this NPS environmental document.	NPS Management Policies, National Environmental Policy Act

3.6.1.4 Analysis of Alternatives and Impacts on Oil and Gas Development

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Due to potential fuel build up in and around oil and gas facilities, the potential for a catastrophic accident would be higher and the safety to the public and firefighters would be placed at a higher risk. This effect would be direct, long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires that could damage oil/gas facilities.

Prescribed fires would reduce the potential for fuel build up in and around oil and gas facilities, thus creating a safety buffer and defensible space zones. Reduced fuel loads would limit the amount of heat that is generated during future wildfires, thus decreasing the potential for an

explosion or damage to the oil and gas facilities and reducing the safety hazard to the public and firefighters. This would have a direct, long-term, minor to moderate, beneficial, site-specific impact.

Mechanical and manual hazardous fuels reduction would occur near oil and gas structures. There would be no direct adverse impacts of mechanical and manual hazardous fuels reduction actions to such resources. Indirect beneficial impacts would include reducing the threat of wildland fire near the oil and gas structures and reducing the potential damage of vegetation encroachment on the resources. The indirect impacts would be localized, short-term to long-term, negligible to minor, and beneficial.

There may also be temporary closures of areas being treated by prescribed fire to oil and gas operations. These closures would be related to protection of human health and safety, but would be short-term and coordinated with oil/gas operators. This effect would be direct, short-term, adverse, negligible to minor, and site-specific to oil and gas operations and should not change oil and gas resources.

Cumulative Impacts

Existing transpark oil and gas pipelines, new drilling and production wells, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor to moderate, long-term, beneficial, site-specific impacts as well as direct, minor to moderate, long-term, adverse, localized impacts. This is due to potential future severe wildfires from potential fuel buildup in areas adjacent to communities and invasive mid-story brush.

Conclusion

The No Action alternative would result in direct, negligible to minor, adverse, short-term, and site-specific impacts from temporary closures of burn unit areas during prescribed fires. Limiting the fire program to presently approved and occurring fire management activities could also have direct, minor to moderate, long-term, adverse, localized impacts to oil and gas resources through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be direct, minor to moderate, long-term, adverse, localized impacts to oil and gas resources.

Impacts to Alternative II: Preferred Alternative

Oil and gas development resource impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control

invasive brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities. Due to reduced fuel build up in and around oil and gas facilities, the potential for a catastrophic accident would be reduced and the safety to the public and firefighters would also be placed as a low risk. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Cumulative Impacts

Existing transpark oil and gas pipelines, new drilling and production wells, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, minor to moderate, long-term, adverse, localized impacts to oil and gas resources.

Conclusion

Extending the fire program tools to include targeted herbicide use would have direct, minor to moderate, long-term, beneficial, localized impacts. Cumulative effects under this alternative would be direct, minor to moderate, long-term, beneficial, localized impacts to oil and gas resources.

3.6.2 Adjacent Landowners and Uses

3.6.2.1 Affected Environment

Adjacent land uses include residential development, commercial and private forestry, industrial development (oil and gas; forest products), agriculture, and publicly owned facilities (e.g., Town Bluff Dam, water diversion, and sewage treatment facilities). Approximately 95% of the land uses immediately adjacent to the Preserve are commercial and private forestry (Harcombe and Callaway 1997).

Residential development in the seven-county area of the Preserve is generally rural; however, there are residential developments adjacent to: Big Sandy Creek (e.g., Alabama-Coushatta Indian Reservation); Hickory Creek Savannah (e.g., Wildwood subdivision); Pine Island Bayou-Little

Pine Island Bayou Corridor (e.g., Pinewood Estates and Bevil Oaks subdivisions); and the Beaumont Unit (Cook's Lake Road residents).

3.6.2.2 Methodology and Intensity Threshold

The methodology used for assessing adjacent landowner impacts included using NRCS GIS data and available literature to identify the adjacent landowners and uses present and identifying the potential effects to adjacent landowners, uses ,and resources by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts would result in a change to land use, but the change would be so slight that it would not be of any measurable or perceptible consequence.

Minor: Impacts would cause limited localized change to land use. Mitigation measures, if needed to offset adverse effects, would be simple and successful.

Moderate: Impacts would have measurable impacts to adjacent land uses that would be consequential, but would be relatively local. Mitigation measures, if needed, to offset adverse effects occurring outside the Park, would likely succeed.

Major: Impacts would cause substantial alteration to land use on a regional scale. Extensive mitigation measures would be needed to offset any adverse effects, and their success would not be guaranteed.

Duration:
Short-term: Impacts that generally last for the duration of the project.
Long-term: impacts that generally last beyond the duration of the project

3.6.2.3. Regulations and Laws

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Public participation in planning and decision-making will ensure that the Park Service fully understands and considers the public's interests in the parks, which are part of their national heritage, cultural traditions, and community surroundings. NPS will actively seek out and consult with existing and potential visitors, neighbors, people with traditional cultural ties to park lands, scientists and scholars, concessioners, cooperating associations, gateway communities, other partners, and government agencies. The Service will work cooperatively with others to	NPS Management Policies, National Environmental Policy Act

Desired Condition	Source
improve the condition of parks; to enhance public service; and to integrate parks into sustainable ecological, cultural, and socioeconomic systems. In the spirit of partnership, the Service implemented an MOU for cooperative management agreements with the primary adjacent landowners, which will allow for more effective and efficient fire management of the parks, as authorized by §802 of the National Parks Omnibus Management Act of 1998. Possible conflicts between the proposed action and adjacent landowners (including local, state or Indian tribe), and the extent to which the park will reconcile the conflict are identified in this NPS environmental document.	

3.6.2.4 Analysis of Alternatives and Impacts on Adjacent Landowners and Uses

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Due to potential fuel build up, the potential for a catastrophic accident would be higher and the safety to the adjacent landowners and surrounding communities would be placed at a higher risk. Severe wildfires could result in damage or loss to buildings (e.g., fences, facilities), loss of life if area residents were unable to escape a high intensity wildfire, permanent changes to vegetation due to soil sterilization, and/or physical alterations to the soil, leading to a decrease in amount and quality of harvestable timber. This effect would be direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires.

Large wildfires could result in unpredictable, temporary closures of roads and reduced visibility from smoke to adjacent landowners and surrounding communities. Prescribed fires could result in predictable, temporary closures of roads and reduced visibility from smoke to adjacent landowners and surrounding communities. These road closures would be related to protection of human health and safety. This effect would be direct, short-term, adverse, negligible to minor, and localized and should not change land uses or adjacent lands resources.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor to moderate, short to long-term, adverse, localized impacts due to increased potential of future severe wildfires from potential fuel buildup in areas adjacent to communities and invasive mid-story brush and potential road closures.

Conclusion

The No Action alternative would result in direct, negligible to minor, adverse, short-term, and localized impacts from temporary road closures and reduced visibility. Limiting the fire program to presently approved and occurring fire management activities could also have direct, minor to moderate, long-term, adverse, localized impacts to adjacent landowners and uses through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be direct, minor to moderate, long-term, adverse, localized impacts to adjacent landowners and uses.

Impacts to Alternative II: Preferred Alternative

Adjacent landowner impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control invasive mid-story brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities. This would then provide better protection than the “no action alternative” for adjacent communities and landowners. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, agricultural and forestry operations; development (residential, urban, Preserve buildings); road construction, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, beneficial, long-term, and localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

Conclusion

The Preferred alternative would result in direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up. Cumulative effects under this alternative would be direct and indirect, short-term and long-term, adverse and beneficial, localized impacts to adjacent landowners and uses.

3.7 Human Resources

3.7.1 Visitor Use and Experience

3.7.1.1 Affected Environment

Visitation Trends

Yearly visitation to the Preserve during the period of 1981 to 2011 was approximately 80,500 with approximately 137,700 in 2011 alone. While the majority of visitor use is regional, the visitor registration log found at the Preserve's information station, showed all 50 states and at least 20 countries are represented annually.

Visitor use of the Preserve is predictable during the spring and fall seasons. Spring is the busiest visitor use period with bird watchers, school groups participating in Preserve educational programs, and an increase in recreationists (i.e., hiking, fishing, and boating) using the Preserve. Summer visitor use is low due to humidity and high temperatures. Fall visitor use is moderate to high consisting of late seasonal travelers and school groups. Depending on weather conditions, regional visitor use can be high as people are enjoying outdoor recreation during the cooler temperatures and lower humidity of fall. Winter use is light, with seasonal travelers consisting of retirees and some regional visitors. During hunting season, from October through early January, up to 2,300 permits are issued for hunting in select units. Hunting limits other visitor uses, such as hiking, horseback riding, and off- road bicycling, due to safety issues and concerns.

Visitor Activities

Common visitor uses include bird watching, hiking, canoeing, trapping, and hunting. There are 26 day uses areas within 10 management units of the Preserve that provide picnic areas and parking, river access, and public boat launches.

There are three designated paddling routes within the Preserve—Cook's Lake, Franklin Lake to Johns Lake, and Village Creek. Most of the creeks or rivers flowing through the Preserve are navigable year-round, seasonally, or after a significant rainfall event. Canoeing and boating possibilities also exists in secondary channels, sloughs, and oxbow lakes.

Bird migrations through the Preserve peak between late March and early May, and again in October and November. The more sought- after birds for bird watchers are the red- cockaded woodpecker, the brown- headed nuthatch (*Sitta pusilla*), and the Bachman's Sparrow. Dense vegetation can make birding for migratory songbirds difficult in much of the Preserve. There are eight birding hotspots within the Preserve, Collin's Pond, Birdwatcher's Trail, Teel House Road, Pitcher Plant Trail, Sundew Trail, Kirby Nature Trail, McQueen's Landing, and Cook's Lake.

Since 1979, approximately 2,000 permits have been issued annually for hunting, and approximately 12 permits for trapping have been issued annually within the Preserve. Hunting and trapping in the Preserve is allowed by permit that can be obtained at annual sign-ups in July and August, on a first-come, first-served. Permitted hunters may hunt in one of the following open units: Big Sandy Unit, Beech Creek Unit, Lance Rosier Unit, Beaumont Unit, and areas in the Neches Bottom/Jack Gore Baygall Unit. A total of 47,400 acres in these units are open to hunting. Hunting season generally begins October 1 and continues through January 15 each year. Texas State seasons and bag limits are followed during this period. While applying general Texas hunting regulations, the superintendent applies additional restrictions to hunters in order to protect Preserve resources and provide for additional hunter and visitor safety. Hunting areas are not generally closed to public use during hunting season, but backcountry camping is not permitted in areas open to hunting during hunting season. During the 2008–2009 season (October to January), 4,580 trips were made by hunters into hunting areas. Hunters harvested 185 deer, 1,912 squirrels, 168 hogs, 81 rabbits, and 35 waterfowl.

Trapping is permitted in the Lance Rosier Unit, the Beaumont Unit, and in areas of the Neches Bottom/Jack Gore Baygall Unit, a total of 35,000 acres. As with hunting, Texas State regulations apply and the superintendent applies additional restrictions to trappers in order to protect Preserve resources and provide for additional visitor safety. During the 2008-2009 season (December to January), there were 80 trap nights with 141 raccoon, 31 opossum, and one otter harvested. No nutria, mink, or bobcat were harvested.

No hunting is permitted on the lands that have been added to the Preserve since 1993.

3.7.2.2 Methodology and Intensity Threshold

The methodology used for assessing visitor use and experience impacts included identifying the potential effects to visitor use by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Visitors would not be affected or changes in visitor use and/or experience would be below or at the level of detection. Any effects would be short-term. The visitor would not likely be aware of the effects associated with the alternative.
Minor: Changes in visitor use and/or experience would be detectable, although the changes would be slight and likely short-term. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.

Moderate: Changes in visitor use and/or experience would be readily apparent and likely long-term. The visitor would be aware of the effects associated with the alternative, and would likely be able to express an opinion about the changes.

Major: Changes in visitor use and/or experience would be readily apparent and have substantial long-term consequences. The visitor would be aware of the effects associated with the alternative, and would likely express a strong opinion about the changes.

Duration:
Short-term: Impacts that generally last less than one year and would affect only one *season's* use by visitors.
Long-term: Impacts that generally last more than one year and would be more permanent in nature.

3.7.1.3. Regulations and Laws

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
Visitor and employee safety and health are protected. Visitors understand and appreciate park values and resources and have the information necessary to adapt to park environments; visitors have opportunities to enjoy the parks in ways that leave park resources unimpaired for future generations. Park recreational uses are promoted and regulated and basic visitor needs are met in keeping with park purposes. All reasonable efforts will be made to make NPS facilities, programs, and services accessible to and usable by all people, including those with disabilities.	NPS Management Policies; National Environmental Policy Act, Americans with Disabilities Act

Desired Condition	Source
The park has identified implementation commitments for visitor carrying capacities for all areas of the unit.	

3.7.1.4 Analysis of Alternatives and Impacts on Visitor Use and Experience

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Due to potential fuel build up, the potential for a catastrophic accident would be higher and could require more frequent public use restrictions while fires are being suppressed and smoke generated by those fires would negatively impact the experience of visitors using other areas of the park or surrounding lands. Depending on the wildfire severity and size, this could remove large tracts of vegetation reducing the visitor experience. This effect would be direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires.

In addition, allowing the accumulation of thick underbrush could also restrict access to some Preserve areas.

Prescribed fire, mechanical and manual hazardous fuel reduction would result in direct adverse impacts due to temporary displacement of some visitor activities during prescribed burn operations, smoke in scenic views, odors, temporary restrictions in access to some areas, and the presence of blacked areas within natural areas. However, these adverse impacts would be localized, short-term, and negligible to minor. The presence of fire, smoke, and blackened areas may present an opportunity for education and interpretation of natural values and processes, which may provide a minor, long-term, beneficial impact. Overall, the indirect effects of this alternative would be localized, short-term, minor, and adverse or beneficial based on the effect noted by the specific fire in the localized area.

Cumulative Impacts

Boundary encroachments, pollution from industry outfalls and discharge from improperly constructed private septic tanks, existing transpark oil and gas pipelines, new drilling and production wells, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The No Action Alternative in combination with the past, present, and foreseeable future actions would result in long-term, minor cumulative negative impacts to visitor use and experience due to increased potential for uncharacteristic wildfires from increased fuel buildup would result in

increased potential for public use closures or smoke impacts due to fire or fire suppression activities.

Conclusion

There would be long-term, minor negative impacts to visitor use due to public use closures from fire potential and associated fire suppression tactics. Also, indirect effects of this alternative would be localized, short-term, minor, and adverse or beneficial due to the educational opportunity to explain natural process and benefits of prescribed fire..

Impacts to Alternative II: Preferred Alternative

Visitor use impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control invasive brush species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success of restoration to longleaf pine ecosystems and other unique vegetation communities; thus, increasing native herbaceous plant communities to regenerate that support native wildlife species. As bird watching is one of the popular recreation activities, the perpetuation of native vegetation communities and native wildlife would enhance the visitor experience.

There would be temporary visitor use restrictions in various sections of the project area to assure that there are no visitors where herbicide is actively being applied. Short-term, such restrictions would negatively impact the visitor experience of those people who are prevented from accessing the area. Furthermore, areas adjacent to the closures would still be open to visitor use**.**

Use of these targeted applications could also reduce future repeated manipulation of brush and vegetation in specific landscape units, helping return vegetation communities to the range of natural variation where prescribed burning could be utilized as the primary natural change agent. In general, this would reduce disturbance by repeated mechanical intrusions over the long term, leading to a less disturbed and more natural area, which would be more aesthetically enticing to preserve visitors.

Overall, this alternative would have direct, short-term negligible adverse impacts in the immediate area of treatment during the treatment period and is expected to have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel hazard reduction increases (i.e., invasive mid-story brush).

Cumulative Impacts

Boundary encroachments, pollution from industry outfalls and discharge from improperly constructed private septic tanks, existing transpark oil and gas pipelines, new drilling and production wells, publicly owned facilities (water impoundments, water diversion structures, and sewage treatment), and management practices (e.g., prescribed burns), within and outside of the Preserve could contribute to cumulative impacts.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in short-term, minor to moderate cumulative negative impacts to visitor use and experience and long-term, minor cumulative positive impacts to visitor use and experience.

Conclusion

There would be short-term, minor negative impacts to visitor use due to public use closures and long-term, minor positive impacts to visitor experience due to the reduced potential for future severe wildfires and the perpetuation of native vegetation communities and associated wildlife that visitors can enjoy.

3.7.2 Human Health and Safety

3.7.2.1 Affected Environment

The health and safety of visitors, employees, and surrounding landowners of the project area, and fire personnel are of primary importance to NPS. Fire management activities and wildfires can pose risks to the public and employees, but firefighters and other fire staff face direct risks. Smoke on roads in and adjacent to the park is of concern. Smoke from sources on and off the burn unit can be a safety issue to the visiting public. The flaming front of a fire can put unsuspecting members of the visiting public at risk. For this reason, areas affected by fire of any cause will be closed to the public. There is always a risk that curious park visitors will actually approach a fire rather than flee it.

Prior to the ignition of any prescribed fire in the project area, all the burn parameters of the approved prescribed fire burn plan must be met to ensure a safe and effective prescribed fire. Neighboring landowners and residences adjacent to prescribed burns will be notified in advance of burns, then updated immediately prior to ignition. Visiting public will be informed and educated when prescribed burns take place. In the event of a potentially hazardous wildfire within the park, the Park Superintendent and Public Information Officer would coordinate public notification efforts within and outside the park. The extent of public notice would depend on the specific fire situation. Assuring visitor and park staff safety would take priority over other activities.

As with prescribed burns, herbicides would only be used after the NPS approval process and when mechanical methods and prescribed burning have a low chance of success to meet objectives. Targeted herbicide applications would be implemented using hand applications and treated areas would be temporarily closed to the visiting public to ensure their safety.

3.7.2.2 Methodology and Intensity Threshold

The methodology used for assessing human health and safety impacts included identifying the potential effects to human health and safety by the Proposed Action. The thresholds of change for the intensity of an impact are defined as follows:

Negligible: Impacts would not have a noticeable effect on human health and safety, with no injuries or loss of life.

Minor: Impacts would be detectable, but would not have an appreciable effect on human health and safety, with few or minor injuries and no loss of life.

Moderate: Impacts would have readily detectable impacts and would result in substantial, noticeable effects to human health and safety on a local scale, with possible serious injuries, but no loss of life.

Major: Impacts would have readily detectable impacts and would result in substantial, noticeable effects to human health and safety on a regional scale, or with the possibility of extremely serious injuries and/or loss of life.

Duration:
Short-term: Impacts that generally last for the duration of the project.
Long-term: impacts that generally last beyond the duration of the project

3.7.2.3. Regulations and Laws

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
All necessary precautions to prevent human exposure to hazards (fire, chemical, smoke) will be taken.	NPS Management Policies; Director's Orders 58; NPS Wildfire Management Reference Manual 18

3.7.2.4 Analysis of Alternatives and Impacts on Public Health and Safety

Impacts of Alternative I: No Action Alternative

Under this alternative, the Preserve fire management program would be limited to presently approved and occurring fire management activities. The inability to use herbicides could reduce the number of acres restored successfully, thus increase the buildup of fuels in areas adjacent to communities and invasive mid-story brush. This could lead to increased potential for more intense wildfires that are difficult to suppress/manage. Direct impacts to firefighter health and safety include exposure to heat, smoke inhalation, accidental spills from fire retardants and foams, injuries from the use of fire-fighting equipment or fireline construction, potential steep and rocky terrain, and in severe cases, injuries from wildfires. In addition damage to adjacent landowners would be high and the safety to the adjacent landowners and surrounding

communities would be placed at a higher risk. Severe wildfires could result in damage or loss to buildings (e.g., fences, facilities), loss of life if area residents were unable to escape a high intensity wildfire, exposure to smoke, and loss of quantity and quality of harvestable timber. Overall, this effect would be direct, short- to long-term, minor to moderate, adverse, localized due to potential fuel build up and the increased risk for severe wildfires.

Prescribed fire, mechanical and manual hazardous fuel reduction would involve pre-planning for the protection of health and safety, and operations would take place under more controlled conditions. Therefore, the potential for direct and indirect impacts associated with management actions, though it is not possible to eliminate them entirely, would overall be reduced. The impacts to health and safety because of management actions would be short-term, negligible to minor, adverse, localized with minimal human health and safety concerns for fire fighters and the public.

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, recreational activities (e.g., canoeing, trapping, hunting), future prescribed fires, surrounding community populations, and number of visitors to the parks could impact cumulative effects.

The No Action alternative in combination with the past, present, and foreseeable future actions would result in direct, minor, short to long-term, adverse, localized impacts due to potential future severe wildfires from potential fuel buildup in areas adjacent to communities and increased invasive mid-story brush. Minor, long-term, beneficial, localized impacts due to the fuel reduction that would occur due to prescribed burns and hazardous fuel reduction activities within the preserve. The cumulative impacts to human health and safety because of management actions would be negligible to minor and short- term because of careful pre- planning and actions conducted within thoroughly prepared prescriptions.

Conclusion

Limiting the fire program to presently approved and occurring fire management activities could also have direct, minor to moderate, long-term, adverse, localized impacts to firefighters, adjacent landowners, and the public through future severe wildfires from potential fuel buildup. Cumulative effects under this alternative would be direct, minor to moderate, long-term, adverse, localized impacts due to potential future severe wildfires from potential fuel buildup in areas adjacent to communities and increased invasive mid-story brush and minor, long-term, beneficial, localized impacts due to the fuel reduction that would occur within the preserve.

Impacts to Alternative II: Preferred Alternative

Human health and safety impacts under this alternative would be the same as the No Action alternative; however, targeted herbicide application, such as hand applications, would be used. This would be limited to areas where successful restoration is low by prescribed fire, manual, and/or mechanical methods. The use of targeted herbicide would help to control invasive brush

species and controlling invasive, nonnative plant species. The ability to remove more invasive mid-story brush would increase the success rate of ecological restoration efforts by opening the mid-story vegetation layer and allowing an increase growth and germination of ground cover (grasses, forbs, wildflowers, and longleaf pine seedlings). This would increase the potential for lower intensity ground fires, which are easier to manage/suppress. In addition, targeted herbicide would increase success on some critical hazard fuel reduction projects (i.e., critical areas adjacent to communities), thus reducing the potential for an uncharacteristic wildfire and making wildfire control more manageable next to communities. This would then provide better protection than the "no action alternative" for adjacent communities and landowners. Thus, the Preferred Alternative would have direct, minor to moderate, beneficial, long-term, localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel continuity is broken up.

All treatment areas would have individual treatment plans submitted for herbicide use to be approved at the state and regional levels. Approval may be given by the regional and national level staff after considering numerous factors including: the target use, location where the application will occur, potential T&E species concerns, potential for getting into surface or ground water, persistence in the ecosystem, safety to employees and the public, type of application (example, spot spraying), etc. Furthermore, herbicides would only be used after visitors were out of the area and appropriate informational signing was placed at all human entryways to the spraying area, and all staff utilizing herbicide will be trained in approved procedures related to proper handling, storage, transportation, mixing, spill prevention, and application procedures. Furthermore, federal FIFRA regulations and federal agency water quality monitoring indicate that use of herbicides in forestry constitutes low risk to humans (Shepard et al. 2004).

Cumulative Impacts

Existing oil and gas operations and associated infrastructure (e.g., compressors, flowlines), transpark oil and gas pipelines, new drilling and production wells, recreational activities (e.g., canoeing, trapping, hunting), future prescribed fires, surrounding community populations, and number of visitors to the parks could impact cumulative effects.

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, negligible, short-term, adverse, localized impacts due to potential exposure to associated fire risks (e.g., heat, smoke inhalation). As well as direct, minor to moderate, beneficial, long-term, and localized impacts by minimizing the potential for future severe wildfires as the amount of area restored increases and fuel hazard reduction increases (i.e., invasive mid-story brush).

Conclusion

The Preferred Alternative in combination with the past, present, and foreseeable future actions would result in direct, negligible, short-term, adverse, localized impacts due to potential exposure to associated fire risks (e.g., heat, smoke inhalation). As well as direct, minor to moderate, beneficial, long-term, and localized impacts by minimizing the potential for future

severe wildfires as the amount of area restored increases and fuel continuity is broken up. The cumulative impacts to human health and safety because of management actions would be negligible to minor and short- term because of careful pre- planning and actions conducted within thoroughly prepared prescriptions.

4.0 Consultation and Coordination

The following federal and state agencies, affiliated Native American tribes, and affiliated interests were sent scoping information or were contacted for information regarding this EA.

Federal Agencies
U.S. Fish and Wildlife Service

State Agencies
Texas Parks and Wildlife Department
Texas State Historic Preservation Office

Affiliated Native American Groups
Apache Tribe of Oklahoma
Cheyenne-Arapaho Tribe
Caddo Tribe
Comanche Tribe
NAGPRA / Tribal Cultural Preservation Office
Fort Sill Apache Tribe
Jicarilla Apache Tribe
Kiowa Tribe
Mescalero Apache Tribe
Wichita & Affiliated Tribes

4.1 List of Preparers

Preserve Staff

Deanna Boensch, Fire Ecologist
Fulton Jeansonne, Fire Management Officer
Diane Lockwood, Lead Fire Effects Monitor
DW Ivans, Fuels Specialist
Rodney Monk, Wildland Fire Operations Specialist
Brian Lockwood, Biologist
Stephanie Burgess, Oil and Gas Program Manager
Doug Neighbor, Superintendent
Lisa Hanson, Fire Compliance and Planning, Intermountain Support Office

EMI Staff

Stephanie Lee, NEPA Specialist, Ecosystem Management, Inc.

Bob Lineback, Fire Specialist, Ecosystem Management, Inc.
Mike Tremble, Project Manager, Ecosystem Management, Inc.

4.2 Environmental Assessment Review and List of Recipients

The Environmental Assessment will be released for public review on ___ 2012. To inform the public of the availability of the Environmental Assessment, NPS will publish and distribute a letter or press release to various agencies, tribes, and members of the public on the National Park's mailing list, as well as place an ad in the local newspaper. Copies of the Environmental Assessment will be provided to interested individuals upon request. Copies of the document will also be available for review at the BTNP visitor center and on the NPS PEPC website at www.parkplanning.nps.gov/bith.

The Environmental Assessment is subject to a 30-day public comment period ending ____2012. During this time the public is encouraged to post comments online at http://parkplanning.nps.gov/Plans.cfm or mail comments to Deanna Boensch; Attn: Big Thicket National Preserve; 860 CR 1040, Woodville, TX 75979. Following the close of the comment period, all public comments will be reviewed and analyzed prior to the release of a decision document. NPS will issue responses to substantive comments received during the public comment period, and will make appropriate changes to the Environmental Assessment as needed.

Addressees included local landowners, state and local government officials and:

<u>Federal Agencies</u>
U.S. Army Corps of Engineers, Galveston District
U.S. Department of Agriculture (USDA)
- Natural Resources Conservation Service
- USDA Beaumont Field Office
- USDA Jasper Field Office
- USDA Liberty Field Office
- USDA Livingston Field Office
- USDA Polk County Office
- USDA Lower Neches Soil and Water Conservation District

U.S. Forest Service
- Southern Research Station

U.S. Department of the Interior
- U.S. Fish and Wildlife Service
- Anahuac National Wildlife Refuge
- McFaddin National Wildlife Refuge
- Texas Point National Wildlife Refuge
- Trinity River National Wildlife Refuge

U.S. Geological Survey
- Water Resources Division, Texas District

National Park Service
- Intermountain Regional Office, Denver

Rivers, Trails, and Conservation Assistance Program

State Agencies
Office of Rural and Community Affairs
Texas State Governor Rick Perry.
Texas State Congressman Ted Poe
Texas State Congressman Kevin Brady
Texas State Congressman Chuck Hopson
Texas State Congressman Lois Kolkhorst
Texas State Congressman Joe Deshotel
Texas State Congressman Allan Ritter
Texas Senator Kay Bailey Hutchinson
Texas Department of Public Safety
Texas Department of Transportation, Beaumont District
Texas Forest Service
Texas Historical Commission
Texas Parks and Wildlife Department
Texas Railroad Commission
Texas Travel Industry Association
Texas Travel Information Center
Texas Water Development Board
Texas Dept. of Water Resources
Texas Commission on Environmental Quality
Village Creek State Park

Regional Agencies
Angelina and Neches River Authority
Deep East Texas Council of Governments
Houston – Galveston Regional Councils of Governments
Lower Neches Valley Authority
Sabine River Authority
South East Texas Resource Conservation and Development Project
South East Texas Regional Planning Commission
Upper Neches River Municipal Water Authority

Affiliated Native American Groups
Alabama-Coushata Tribe of Texas

City and County Government
Chamber of Commerce, Beaumont
Chamber of Commerce, Cleveland
Chamber of Commerce, Jasper
Chamber of Commerce, Kirbyville
Chamber of Commerce, Kountze
Chamber of Commerce, Liberty- Dayton
Chamber of Commerce, Lumberton

Chamber of Commerce, Newton
Chamber of Commerce, Orange County
Chamber of Commerce, Polk
Chamber of Commerce, Port Arthur
Chamber of Commerce, Silsbee
Chamber of Commerce, Sour Lake
Chamber of Commerce, Tyler County
Chamber of Commerce, Vidor
City of Beaumont
City of Beaumont, Convention and Visitor Bureau – Dean Conwell
City of Kountze
City of Lumberton
City of Orange
City of Silsbee
City of Sour Lake
City of Vidor
City of West Orange
City of Woodville
Hardin County Judge
Hardin County Commissioner, Precinct 1
Hardin County Commissioner, Precinct 2
Hardin County Commissioner, Precinct 3
Hardin County Commissioner, Precinct 4
Hardin County Emergency Management Coordinator
Hardin County Floodplain Coordinator
Jasper County Judge
Jasper County Sheriff
Jefferson County Judge
Jefferson County Sheriff
Kountze Independent School District, Superintendent Diane Daniels
Kountze Mayor Pro- Tem – Elaine Allums
Liberty County Judge
Liberty County Sheriff
Orange County Judge
Orange County Sheriff
Polk County Judge
Polk County Sheriff
Tyler County Judge
Tyler County Sheriff

Organizations and Businesses
Art Museum of Southeast Texas
Beaumont Enterprise
Ben J. Rogers Regional Visitors' Center
Big Thicket Association
Big Thicket Natural Heritage Trust

Cleveco
Conservation Fund
Custom Flooring
Entergy Corporation
French Museum
Golden Triangle Audubon
Hancock Forest Management
Hardin County Historical Society
Heritage Museum
Houston Advanced Research Center
Houston Audubon Society
Houston Wilderness Society
League of Women Voters of Texas
McFaddin - Ward House
National Parks and Conservation Association
National Trust for Historic Preservation
Nature Conservancy of Texas
Nature Conservancy, South East Region
Nature Heritage Society
Partnership of Southeast Texas
SEC Planning
Shine and Associates
Sierra Club – Golden Triangle Chapter
Sierra Club – Houston Chapter
Sierra Club - Lone Star Chapter
Texas Conservation Alliance
Texas Entergy Museum
Texas Folklore Society
Texas Travel Industry Association
The Conservation Fund, East Texas Field Office
City of Wildwood, Texas, Board of Directors
Willie Mae Community Church

Universities and Colleges
Lamar University at Beaumont
Northwestern University
Rice University
Texas A&M University

Newspapers
Beaumont Enterprise
Hearst Paper, Texas Group

5.0 References

Executive Orders
Executive Order 11988 (Floodplain Management)
Executive Order 11990 (Protection of Wetlands)
Executive Order 12898 (Environmental Justice in Minority Populations and Low-income Populations)
Executive Order 13007 (Indian sacred sites)

NPS Director's Orders
DO-12 Conservation Planning, Environmental Impact Analysis and Decision Making
DO-18 Wildland Fire Management
DO-24 Museum Collections
DO-28 Cultural Resource Management
DO-47 Sound Preservation and Noise Management
DO-77 Natural Resources Management Guideline (NPS-77)
DO-77-1 Wetland Protection
DO-77-2 Floodplain Management

Federal and Government
36 CFR Parks, Forests, and Public Property
40 CFR Protection of Environment
50 CFR Wildlife and Fisheries
1916 Organic Act
1963 Clean Air Act, as amended
1964 Wilderness Act
1966 National Historic Preservation Act
1969 National Environmental Policy Act
1970 General Authorities Act
1972 Clean Water Act
1973 Endangered Species Act
1979 Archeological Resources Protection Act
1981 Farmland Protection Policy Act
1993 Government Performance Results Act
Secretarial Order No. 3175 – Departmental Responsibilities for Indian Trust Resources

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APPENDIX A: MOU Between NPS and Texas SHPO