

**ENVIRONMENTAL ASSESSMENT AND ASSESSMENT OF EFFECT  
JEAN LAFITTE NATIONAL HISTORICAL PARK AND PRESERVE  
FIRE MANAGEMENT PLAN**

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Submitted to:

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## EXECUTIVE SUMMARY

The National Park Service (NPS) is considering actions at Jean Lafitte National Historical Park and Preserve (park) to manage wildland fire and use prescribed fire. This environmental assessment (EA) describes the effects of the proposed project on the human environment and provides an opportunity for the public to comment on the proposed project in accordance with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500–1508), and other applicable laws, regulations, and policies.

The purpose of the federal action is to update the 2004 Fire Management Plan (FMP) for the park to comply with the NPS's wildland fire policy directives and Director's Order (DO) 18, Wildland Fire Management. DO 18 requires that parks "with burnable vegetation . . . have an approved Fire Management Plan that will address the need for adequate funding and staffing to support its fire management program" (NPS 2008). The purpose of the revision is to incorporate approximately 3,000 acres of land acquired in 2009 into the park's FMP and to add the use of prescribed fire to further research and resource management objectives with the Barataria Preserve and the Chalmette Battlefield.

Two alternatives were considered, including the No Action Alternative (Alternative A) and the Preferred Alternative (Alternative B). The No Action Alternative would continue the current management practices operating under the most recent Federal Wildland Fire and NPS policies and the existing 2004 FMP. The existing FMP requires all wildland fires, regardless of origin, to be suppressed. No prescribed fires would be used at the park. Mechanical treatments (e.g., mowing, weed eating) to maintain existing defensible space around park building and sensitive resource sites would occur under the No Action Alternative. The 2004 FMP also describes research needs with regard to fire effects on non-native vegetation in the Barataria Preserve FMU marshes, and that, based on those research needs, the "FMP will be amended as appropriate to include prescribed fire." The park has been unable to complete this research because the amended FMP has not been completed.

The Proposed Action (Alternative B) would implement a revised FMP for the park. The FMP would function at the programmatic level and accommodate changes in federal wildland policy, guidance, and practices from ongoing improvements in the science of wildland fire management. The FMP would provide a flexible range of options and activities that could be used to respond to changes in environmental conditions and the specific needs of fire management within the park. The Proposed Action would allow for implementation of a full range of fire management activities, including wildland fire suppression, the management of wildfire for resource objectives, and fuels management (prescribed fire/mechanical treatments). Prescribed fire is a potentially powerful management tool for the Barataria Preserve. Managers are interested in researching the effects of fire on the Barataria Preserve marsh areas with a wider scope that includes vegetation community and wildlife population dynamics, as well as the potential effects of fire to increase accretion and reduce subsidence rates.

Impact topics evaluated in detail included air quality, soils, hydrology, vegetation, wildlife, archaeological resources, recreation and visitor experience, and energy resources. All other impact topics or issues were eliminated from consideration because either the resources are not present in the areas proposed for management implementation or because there are no anticipated impacts to the resource from the alternatives.

No significant impacts to resources are identified in this EA. Public scoping was conducted to assist with the development of this document and development of the alternatives, any comments received were considered in this impact analysis.

## **PUBLIC COMMENT**

Public, or external, scoping was conducted through the NPS Planning, Environment, and Public Comment website where a scoping notice and brochure were posted on January 12, 2015, to inform the public of the proposed project. The scoping brochure was also sent to the park's mailing list to solicit feedback for the EA. The letter was also distributed to camp owners in the park by the Edward Wisner Donation on January 16, 2015. The public scoping period ended on February 10, 2015. Eleven comments were received during the public scoping period. Two comments were received from the general public noting no concerns with the proposed FMP revision and inquiring about the resources listed in the scoping brochure. The Choctaw Nation of Oklahoma requested to be a consulting party for the project. The Seminole Tribe of Florida Tribal Historic Preservation Office requested a copy of the EA. One comment was received from KourCo Environmental Services, representing Entergy Louisiana LLC, which expressed concern about potential power line outages that could result from fire management activities.

The FMP EA will be available for public comments for 30 days; comments are due September 15<sup>th</sup> 2015. Copies of the EA will be provided to interested individuals upon request. Reviewers should provide comments on the EA during the review period. Comments on the EA should be specific and discuss the adequacy of the analysis and the merits of the alternatives discussed. Following closure of the review period, all public comments will be reviewed and analyzed prior to release of the decision document. NPS will issue responses to any substantive comments received during the review period and will make appropriate changes to the EA as needed.

If you wish to comment on this EA please go to: <http://parkplanning.nps.gov/JELA>. The open for comment link on the left hand side provides access to the EA. Comments can also be submitted by mail to the address below. Comments must be submitted by September 15<sup>th</sup> 2015. Comments cannot be received by email.

Superintendent  
Jean Lafitte NHP & Preserve  
Fire Management Plan  
419 Decatur Street  
New Orleans, LA 70130

Before including your address, telephone number, e-mail address or other personal identifying information in your comments, you should be aware that your entire comment (including personal identifying information) may be publically available at any time. While you may include in your comment direction to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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## Acronyms and Abbreviations

BMP	best management practice
CFR	Code of Federal Regulations
DO	Director's Order
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
ESF	Environmental Screening Form
FMP	Fire Management Plan
FMU	Fire Management Unit
IPCC	Intergovernmental Panel on Climate Change
LNHP	Louisiana Natural Heritage Program
MIST	Minimum Impact Suppression Tactics
MODIS	Moderate Resolution Imaging Spectroradiometer
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NWCG	National Wildfire Coordinating Group
NWLON	National Water Level Observation Network
park	Jean Lafitte National Historical Park and Preserve
PM <sub>10</sub>	particulate matter equal to or less than 10 microns in diameter
PM <sub>2.5</sub>	particulate matter equal to or less than 2.5 microns in diameter
PMS	Product Management System
RMP	Resource Management Plan
SHPO	State Historic Preservation Officer
SO <sub>2</sub>	sulfur dioxide
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound

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# 1 PURPOSE AND NEED FOR ACTION

## 1.1 INTRODUCTION

The National Park Service (NPS) is considering actions at Jean Lafitte National Historical Park and Preserve (park) to manage wildland fire and use prescribed fire. This environmental assessment (EA) describes the effects of the proposed project on the human environment and provides an opportunity for the public to comment on the proposed project in accordance with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500–1508), and other applicable laws, regulations, and policies.

NEPA requires that every federal agency conduct an analysis of impacts for “major Federal actions significantly affecting the quality of the human environment” along with alternatives to those actions. Agencies are required to make informed decisions based on analysis conducted under NEPA and input obtained from the public and interested stakeholders. This EA complies with NEPA, the U.S. Department of the Interior’s NEPA regulations (43 CFR 46), and the NPS Director’s Order (DO) 12 and its accompanying Handbook (2001). This EA also analyzes the effects of the project on historic properties in accordance with Section 106 of the National Historic Preservation Act and federally listed species in accordance with Section 7 of the Endangered Species Act.

## 1.2 PARK PURPOSE AND SETTING

The park was established by an act of Congress on November 10, 1978 (Public Law 95-625), in order to “preserve for the education, inspiration, and benefit of present and future generations significant examples of natural and historical resources of the Mississippi Delta region and to provide for their interpretation in such a manner as to portray the development of cultural diversity in the region.”

The park consists of six physically separate units: the Barataria Preserve, the Chalmette Battlefield and Chalmette National Cemetery, the Acadian Cultural Center, the French Quarter Visitor Center, the Prairie Acadian Cultural Center, and the Wetlands Acadian Cultural Center. This EA addresses the Barataria Preserve and the Chalmette Battlefield, as they are the only two units that have burnable vegetation and thereby require a Fire Management Plan (FMP) (Figure 1). These areas, located in Jefferson Parish and St. Bernard Parish respectively, would remain the focus of the revised FMP.

The Barataria Preserve encompasses approximately 22,200 acres and contains a mix of bottomland hardwood forest, cypress-tupelo swamp, and freshwater to intermediate marsh habitats. The NPS manages approximately 17,600 acres of federal land within the preserve, including about 3,000 acres added in 2009. The remainder consists of private and other public in-holdings. Additional lands are authorized for acquisition outside the legislated boundary of the park at the preserve.

The Chalmette Battlefield, site of the Battle of New Orleans during the War of 1812, and the adjacent Chalmette National Cemetery make up the Chalmette Battlefield Fire Management Unit (FMU). The Chalmette Battlefield FMU contains approximately 120 acres of mixed grass and mixed hardwood habitats, and contains one small in-holding where an inactive sewage treatment plant is located.



FIGURE 1. PROJECT VICINITY.

### **1.3 FIRE HISTORY**

The Mississippi River deltaic plains have had a varied fire history. Prior to European colonists, fire was commonly used by Native Americans to increase game numbers and improve navigation through marshes. Following colonization, settlers reduced fire frequency up until a period around 1910 when fire was again used as a means to improve wildlife habitat for trappers and hunters (Wade et al. 2000), and reduce fuel loads to prevent catastrophic fires (NPS 2015a). More recent decades saw a decline in the use of anthropogenic fire. The era of fire exclusion in the park (from 1958–2005) has seen an increase in the woody scrub/shrub habitat in the Barataria Preserve FMU (NPS 2015a) and the related establishment of Chinese tallow (*Sapium sebiferum*) in marshes there. Research questions have been posed regarding the effects of prescribed fire on addressing the shrub encroachment (Battaglia et al. 2007; Makweche et al. n.d.; Nyman and Chabreck 1995; Shirley and Battaglia 2006). It is thought that more frequent fire would have sustained a more open, herbaceous-dominated marshland ecosystem.

The historical role of fire in the bottomland hardwood ecosystem that typifies portions of the Barataria Preserve is largely unclear (Stanturf et al. 2002; Wade et al. 2000). Low to moderate intensity wildfires may have been frequent historically (Lentz 1931; Toole and McKnight 1956) but were largely influenced by drought cycles. Low intensity fires are the norm in these forests because fuel loads are generally light (except after storms) due to rapid decomposition on these moist, humid sites and periodic flooding that washes away leaf litter and prevents the accumulation of surface fuel (Fleury 2000). Large fires are rare, only occurring after extended drought, usually when a dry fall is followed by a dry spring (Stanturf et al. 2002).

Although Moderate Resolution Imaging Spectroradiometer (MODIS) data show fires to be fairly common in Louisiana coastal areas, naturally ignited wildfire is rare in the wetland areas of the park. When compared with wildfire occurrence data from the Louisiana Department of Agriculture and Forestry (2010), the MODIS data suggest that fires in fresh and intermediate marshes are under-reported coastwide, and incident data from the park indicate that the vast majority of fires there are set by people (personal communication between Dusty Pate [NPS] and Coleman Burnett [SWCA], March 26, 2015). Coastwide, fire in fresh and intermediate marshes occurs most often in the winter months with some occurrence in the fall and spring (personal communication between Dusty Pate [NPS] and Coleman Burnett [SWCA], March 26, 2015).

The Wildland Fire Management Information Fire Reporting System contains 75 reported fires within the park since 1981. Approximately 70%, or 53 occurrences, of the fires were located along roadways and many were associated with abandoned vehicles. The remaining 30% were fires occurring in the wetland marsh, near picnic use areas, or in fields. Two of the fires were prescribed burns at the Chalmette Battlefield in 1986.

### **1.4 PURPOSE OF THE ACTION**

The purpose of the federal action is to update the FMP for the park to comply with the NPS's wildland fire policy directives and DO 18, Wildland Fire Management. DO 18 requires that parks "with burnable vegetation must have an approved Fire Management Plan that will address the need for adequate funding and staffing to support its fire management program" (NPS 2008). In addition, the purpose of the revision is to incorporate approximately 3,000 acres of land acquired in 2009 into the park's FMP and to add the use of prescribed fire to support resource management objectives at the Barataria Preserve and the Chalmette Battlefield.

### **1.5 NEED FOR THE ACTION**

The existing FMP for the park needs to be revised to meet current NPS policies. NPS and National Interagency Fire Center policies have changed since the 2004 FMP was written. Revisions and updates have been made to

NPS Reference Manual 18 (NPS 2014a) to comply with the 2009 Guidance for Implementation of Federal Wildland Fire Management Policy (U.S. Department of the Interior and U.S. Department of Agriculture 2009).

In addition to changes in fire management policies, the park's 2004 FMP states that the scope of wildland fire elements to be implemented does not include prescribed fire, and that all unplanned ignitions will be suppressed. However, the FMP (NPS 2004) also describes research needs with regard to fire effects on non-native vegetation in the Barataria Preserve FMU marshes, and that, based on those research needs, the "FMP will be amended as appropriate to include prescribed fire." The park would like to add prescribed fire as a tool to its fire management program at this time.

Prescribed fire is a potentially powerful management tool for the Barataria Preserve. Managers are interested in researching the effects of fire on the Barataria Preserve marsh areas with a wider scope that includes vegetation community and wildlife population dynamics, as well as the potential effects of fire to improve accretion and reduce subsidence rates. The park's Resource Management Plan (RMP) identifies the need to control the encroachment of non-native species, such as Chinese tallow and nutria (*Myocastor coypus*), within the Barataria Preserve wetlands as serious management concerns (NPS 1997). Research within coastal Louisiana has recorded land loss of 24 square miles per year over the last 78 years due to a combination of natural and anthropogenic factors including sea level rise and subsidence (Couvillion et al. 2011, USGS 2015). This coastal land loss represents approximately 25 percent of the 1932 land area.

Park managers would also like to consider the incorporation of prescribed fire into vegetation maintenance at the Chalmette Battlefield. Prescribed fire was used in the 1980s as an alternative to mowing the Chalmette Battlefield. The practice was stopped in the mid-1990s as a response to NPS policy changes. Prescribed burns at the battlefield would be a useful tool for managing grass cover while minimizing impacts to cultural resources, including the cultural landscape of the battlefield, that can occur from frequent mowing, such as wheel-rutting and uniform "lawn stripes."

### **1.5.1 Objectives in Taking Action**

Objectives are desired outcomes for the proposed project and what must be accomplished for the action to be considered a success (NPS 2001). Together, an action's purpose, need, and objectives help frame the reasonable range of alternatives considered by the park.

The objective in taking this action is to develop and implement a FMP that allows the park to:

- Conduct scientific research within the park following the "do no harm" principle, using best available science to restore, maintain, or preserve wetlands within the Barataria Preserve FMU and use information gained through research and monitoring to improve the park's fire management program;
- Allow wildland fires to function as an ecological process and natural agent of change in maintaining and restoring vegetation communities;
- Use planned ignitions (prescribed fire) to supplement the role of fire as an ecosystem process, achieve resource management objectives, and treat non-native, invasive species;
- Allow natural processes to continue by managing fire through monitoring with little or no suppression action, to the maximum extent possible, to achieve resource benefits;
- Promote various stages of wetland succession to support wildlife and special status species, such as golden canna (*Canna flaccida*), western umbrella grass (*Fuirena simplex*), and swamp milkweed (*Asclepias incarnata*); and
- Protect natural and cultural resources from adverse effects of fire and fire management activities.

These objectives are consistent with federal wildfire policies and the park's existing plans, including the General Management Plan (NPS 1995) and RMP (NPS 1997). The FMP would also meet the following fire management actions/objectives:

- Public and firefighter safety would be prioritized in every fire management activity.
- Minimum Impact Suppression Tactics (MIST) would be used throughout the park (National Interagency Fire Center 2003).
- Minimum tool assessments and superintendent approval would be needed for certain fire activities in order to reduce impacts.
- Communities at risk would be protected in the wildland urban interface.
- Natural and cultural resources would be protected throughout the park.
- Collaboration with agencies and stakeholders would be planned and implemented.

### **Related Laws, Policies, and Plans**

This section contains a brief summary of the laws, policies, and plans that include mandates and guidance relevant to fire management planning within NPS units. This section is not intended to be a comprehensive list of all applicable laws, policies, and plans, but an overview of those documents most relevant to the revision of the park's FMP. As stated in the introduction, this EA is written to comply with all applicable environmental and resource protection laws, regulations, and executive orders, which are cited as necessary in the resource impacts analysis found in Section 3.

### **National Park Service Organic Act of 1916**

The NPS Organic Act of 1916 directs the NPS to manage units “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations” (16 United States Code [USC] 1). Congress, recognizing that the enjoyment by future generations of the national parks can be ensured only if the superb quality of park resources and values is left unimpaired, has provided that when there is a conflict between conserving resources and values and providing for enjoyment of them, conservation is to be predominant (NPS 2006). Before approving a Proposed Action that could lead to an impairment of park resources and values, an NPS decision-maker must consider the impacts of the Proposed Action and determine, in writing, that the activity will not lead to an impairment of park resources and values, “except as may have been or shall be directly and specifically provided by Congress” (16 USC 1a-1).

### **Enabling Legislation for Jean Lafitte National Historical Park and Preserve**

While the NPS Organic Act of 1916 created the national system, individual parks are generally created by separate legislative acts of Congress. In this way, Congress can address specific goals and needs with respect to a particular park (U.S. Department of Justice 2015). This results in a management system under which park officials must manage each park in accordance with the overarching national system as well as the park's own legislation and policies (U.S. Department of Justice 2015).

In 1978, Congress legislatively recognized the national importance of the lower Mississippi River Delta region and directed the NPS to establish the Jean Lafitte National Historic Park and Preserve. The enabling legislation directed the NPS to oversee the Barataria Marsh, Big Oak Island, area or areas within the French Quarter of New Orleans for interpretive and administration facility, folk life centers in the Acadian region, and the former Chalmette National Historical Park. Historical forts, plantations, and areas such as the Garden District of New Orleans and Acadian towns were suggested in the legislation as the resource that may be considered for potential cooperative units (NPS 1982). The legislation also directed the NPS to acquire up to 8,600 acres of lands, water, and interests within the Barataria Preserve.

The Omnibus Public Land Management Act of 2009 amended the enabling legislation for the park to remove the previous acreage ceiling for the Barataria Preserve and identified a new boundary map, which included approximately 8,900 acres for future acquisition (PL 111-11).

## **National Park Service Management Policies 2006**

The NPS Management Policies (current version 2006) is the highest level of guidance documents in the NPS Directive System. The policies are intended to improve the management of the National Park System and “to set a firm foundation for stewardship that will continue to earn the trust and confidence of the American people” (NPS 2006). There are many underlying principles for the NPS Management Policies, one of which is for the NPS to ensure that park resources and values are passed on to future generations in a condition that is as good as, or better than, the conditions that exist today. In particular, the NPS will strive to restore the integrity of park resources that have been damaged or compromised in the past (NPS 2006). Restoration activities will be guided by the natural and cultural resource-specific policies identified in the NPS Management Policies 2006.

Fire management is specifically addressed in Section 4.5 of the 2006 NPS Management Policies:

Fire management consist of a program of activities designed to meet management objectives for protection of resources values, life, and property and, where appropriate, for using naturally ignited and human-ignited wildland fires as management tools. Park fire management programs designed specifically to meet park resource management objectives-including allowing fire to perform its natural role as much as practicable-will ensure that firefighter and public safety are not compromised. Parks with vegetation capable of burning will prepare a fire management plan...designed to guide a program that:

- Responds to the park’s natural and cultural resource objectives;
- Provides for safety considerations for park visitors;
- Addresses potential impacts on public and private neighbors and their property adjacent to the park; and
- Protects public health and safety.

## **Director’s Order 18: Wildland Fire Management**

DO 18 implements the Federal Wildland Fire Management Policy and requires all parks with burnable vegetation have an approved FMP to address the need for adequate funding and staffing to support its fire management program. Parks with an approved FMP and accompanying NEPA compliance may use wildland fire to achieve resource benefits in predetermined fire management units (NPS 2008). DO 18 also directs the Associate Director, Visitor and Resource Protection, to prepare and issue Resource Manual 18, which is the technical expression of background information, standardized definitions, agency requirement, standards, and procedures for implementing the order. DO 18 identifies three paramount considerations for each park fire management program:

- Protect human life and property both within and adjacent to park areas;
- Perpetuate, restore, replace, or replicate natural processes to the greatest extent practicable; and
- Protect natural and cultural resources and intrinsic values from unacceptable impacts attributable to fire and fire management activities.

## **U.S. Department of the Interior Manual, Series 31, Part 532, Chapter 1: Climate Change Policy**

The U.S. Department of the Interior 523 DM 1, section 1.4 outlines the climate change policy for any bureau or office that is responsible for managing water, lands, natural and cultural resources, and infrastructure under the jurisdiction of the U.S. Department of the Interior. The policy directs the NPS to consider climate change when developing or revising management plans, setting priorities for scientific research and assessments, and making major investment decisions (U.S. Department of the Interior 2012). The Proposed Action considered in this EA would allow park management to use the best available science to better understand the effects and potentially identify climate adaptation strategies. Therefore, the Proposed Action, revision of the FMP, is consistent with the Department of the Interior's climate change policy.

### **General Management Plan**

The General Management Plan/Development Concept Plan for the park was adopted in 1982 by the Delta Region Preservation Commission. The plan's purpose is to direct park management for 10 to 15 years. The plan outlines the kinds of visitor experiences and interpretive programs to be offered at the park and identifies developments and facilities needed to support the programs. Relevant to the FMP, natural resource management objectives identified in the General Management Plan include 1) protect representative natural communities; 2) manage the Barataria Preserve FMU core area as a natural area as nearly as possible, recognizing the past development of levied waterways; and 3) to extinguish wildfires, pending research to determine the role of fire in the natural ecosystem and establishment of a fire management program (NPS 1982).

The General Management Plan was amended in 1995 and 2011 to address changes that occurred with the park over the years since the original plan was written. The 1995 amendment provided guidance for management of the new Acadian units, guidelines for future cooperative agreements and resource additions, and direction for natural resource management and interpretation in the Barataria Preserve FMU. The 1995 amendment also revised the natural resource objectives to include "determine the role of fire in the natural ecosystem and establish a fire management program" (NPS 1995). The amendment also calls for a study to research the role of fire and its effects (NPS 1995). The 2011 amendment established a 20-year management strategy for the Chalmette Battlefield FMU and created a schematic site design and development program to enhance the unit (NPS 2011).

### **Resource Management Plan**

The park's RMP was approved in 1997 with the purpose of serving as the primary planning document for addressing critical resource issues and problems. The RMP includes a list of natural resource program statements, which are expressed as resource management concerns and necessary projects to address those concerns. The need for a FMP is identified within the RMP as project number JELA-N-015. The current FMP was approved in 2004, and its revision is the subject of this EA.

### **Foundation Document**

The park has developed a Foundation Document for all units under the Jean Lafitte National Historical Park and Preserve. The Foundation Document is a statement of the park's purpose and significance, most important resources and values, and the interpretive themes that tell the park's important stories. Although the Foundation Document is not a decision-making document and does not include actions or management strategies, it describes a shared understanding of what is most important about the park. The Foundation Document for the park describes a need to update the FMP, and to monitor the effects of fire on park resources (NPS 2015b).

## **1.6 SCOPING**

Scoping is an early and open process to determine the scope of environmental issues and alternatives to be addressed in the EA. Both internal (with NPS staff) and external (with the public) scoping was conducted for the proposed FMP.

### **1.6.1 Internal Scoping**

Internal scoping was conducted on October 15 and 16, 2014, by an interdisciplinary team of professionals from the park and the NPS Southeast Regional Office, including representatives from fire management, resource management, interpretation, law enforcement, NEPA specialists, the Assistant Superintendent, and the private contractor working on the EA. The interdisciplinary team discussed the following project elements:

- Introduce the project to the larger team and review the 2004 FMP;
- Discuss communication protocols for the project;
- Draft the purpose and need statement and define project objectives;
- Identify issues to be discussed and analyzed in the EA;
- Update the Environmental Screening Form (ESF); and
- Discuss data needs for subsequent project milestones.

Internal scoping was facilitated using the NPS ESF. All resources listed on the form were thoroughly reviewed and discussed by the interdisciplinary team. The ESF was ultimately updated and used to inform the development of the Draft EA. The interdisciplinary team met on several occasions after the internal scoping meeting to refine the list of impact topics to be fully analyzed in the EA.

### **1.6.2 Public Scoping**

Public, or external, scoping was conducted through the NPS Planning, Environment, and Public Comment website where a scoping notice and brochure was posted on January 12, 2015, to inform the public of the proposed project. The scoping brochure was also sent to the park's mailing list to solicit feedback for the EA. The letter was also distributed to camp owners in the park by the Edward Wisner Donation on January 16, 2015. The public scoping period ended on February 10, 2015.

Eleven comments were received during the public scoping period. Two comments were received from the general public noting no concerns with the proposed FMP revision and inquiring about the resources listed in the scoping brochure. The Choctaw Nation of Oklahoma requested to be a consulting party for the project. The Seminole Tribe of Florida Tribal Historic Preservation Office requested a copy of the EA. One comment was received from KourCo Environmental Services, representing Entergy Louisiana LLC, which expressed concern about potential power line outages that could result from fire management activities. NPS staff, KourCo Environmental Services, and Entergy Louisiana LLC staff met on February 20, 2015, to discuss how fire management activities would be implemented under the revised FMP.

The Edward Wisner Donation, representing in-holdings within the park, responded to the scoping notice and volunteered to distribute the scoping materials to individual camp owners within the scoping period. Confirmation of consultation initiation was provided by the Louisiana State Historic Preservation Officer (SHPO), the U.S. Fish and Wildlife Service (USFWS), and the Louisiana Office of Coastal Management. U.S. Environmental Protection Agency (EPA) Region 6 responded with a request for the EA to address the history of fire within the Barataria Preserve FMU and the benefits and risks of using fire as a management tool. The USFWS Southeast Inventory and Monitoring Network responded with a recommendation to consider

prescribed fire management and smoke management in the EA and FMP. It was also recommended to consult researchers familiar with southeast Louisiana coastal erosion issues when developing fire management projects to study accretion and subsidence rates within the wetland. A researcher with the U.S. Geological Survey (USGS) National Wetlands Research Center responded expressing no concerns about the proposed project.

Refer to Section 4, *Consultation and Coordination*, for more information about the scoping period, including correspondence with agencies and Indian tribes.

## **1.7 ISSUES AND IMPACT TOPICS**

The purpose of this EA is to analyze anticipated impacts resulting from the Proposed Action and alternatives on certain resources, park visitors, and neighbors. The impacts are organized by topic, such as vegetation, visitor use, and park operations. Impact topics serve to focus the environmental analysis and to ensure the relevance of impact evaluation. Impact topics were developed from the questions and comments brought forth during scoping, staff knowledge of park resources, and laws, regulations, policies, or orders applicable to the proposed project. Some topics have been eliminated from detailed analysis because the issue is not relevant to the Proposed Action, a particular resource is not present within the proposed project area, or because the Proposed Action and alternatives would have no impact.

### **1.7.1 Impact Topics Retained for Analysis**

The issues identified during scoping that are evaluated in this EA are summarized in Table 1, including reasons for retaining the topic and relevant laws, regulations, and policies.

**TABLE 1. ISSUES RETAINED FOR DETAILED ANALYSIS**

Impact Topic	Reason(s) for Retaining Impact Topic	Relevant Laws, Regulations, and Policies
<b>Air Resources</b>	Air quality would be impacted from both planned and unplanned ignitions within the park. The impact of smoke to local community members and park visitors would depend on weather conditions when fires are active and an individual's sensitivity to smoke. Prescribed burn plans would follow Louisiana's Voluntary Smoke Management Guidelines (Louisiana Office of Forestry 2013).	NPS Organic Act of 1916, as amended; Clean Air Act, as amended; NPS Wildfire Management Reference Manual 18; Resource Management Guidelines (NPS-77); NPS Management Policies 2006; NEPA; Louisiana Voluntary Smoke Management Guidelines (2013)
<b>Soil Resources</b>	The Proposed Action could impact highly organic soils within the Barataria Preserve FMU and upland soils within the Chalmette Battlefield FMU.	NPS Management Policies 2006; NEPA
<b>Water Resources</b>	The Proposed Action would impact both hydrology and water quality within the Barataria Preserve FMU. Sheet flow could be altered if fire management activities remove or otherwise modify wetland vegetation. Fire management activities could also contribute short-term impacts to water quality.	NPS Organic Act of 1916, as amended; Clean Water Act, as amended; Resource Management Guidelines (NPS-77); NPS Management Policies 2006; NEPA
<b>Vegetation, Including Non-native Species</b>	The Proposed Action could result in the temporary removal of native vegetation. Several forms of vegetation located in the proposed project area could be impacted by the implementation of the FMP, including floatant marsh. The project would target portions of the marsh dominated by non-native invasive vegetation, such as Chinese tallow.	NPS Organic Act of 1916, as amended; NPS Management Policies 2006; Resource Management Guidelines (NPS-77); Federal Noxious Weed Control Act; Executive Order 13112 for Invasive Species; NEPA
<b>Wildlife</b>	The rich estuarine environment of coastal Louisiana supports an abundance and diversity of wildlife. The Barataria Preserve's marsh provides habitat for resident and migratory wildlife, including migratory birds. Activities necessary to carry out the Proposed Action would involve increased human activity and the use of heavy equipment. This would create disturbances and may temporarily displace wildlife from the area.	NPS Organic Act of 1916; NPS Management Policies 2006; Resource Management Guidelines (NPS-77); Fish and Wildlife Coordination Act of 1934 (Public Law 85-624) as amended; Executive Order 12088; Migratory Bird Treaty Act; NEPA
<b>Recreation and Visitor Experience</b>	The Proposed Action could disturb visitors during implementation activities due to reduced access within portions of the Barataria Preserve and closures at the Chalmette Battlefield. The visitor experience would be impacted, including hunting and touring activities at the Barataria Preserve FMU. Temporary recreational area closures, smoke, and increased noise may result from the Proposed Action.	NPS Management Policies 2006; NEPA
<b>Archeological Resources</b>	Archeological resources are present with both the Barataria Preserve and Chalmette Battlefield FMUs. The alternatives considered in the EA would have both adverse and beneficial impacts to archeological resources.	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 (2008); NPS Management Policies 2006; DO-28; NEPA
<b>Energy Resources and Communication Infrastructure</b>	Multiple oil and gas pipelines, overhead electric transmission lines, and communication sites are located on lands within the Barataria Preserve. Scoping comments received from transmission line operators requested potential impacts to power line infrastructure be considered in the EA.	NPS Management Policies 2006; NEPA

## 1.7.2 Impact Topics Dismissed from Further Consideration

Impact topics serve to focus the environmental analysis and ensure the relevance of impact evaluation. Impact topics were developed from the questions and comments brought forth during internal and external scoping, staff knowledge of park resources, and laws, regulations, policies, or orders applicable to the proposed project. The following impact topics or issues were eliminated from consideration because either the resources are not present in the areas proposed for management implementation or because there are no anticipated impacts to the resource from the alternatives.

### Floodplains

Executive Order 11988 instructs federal agencies to avoid, to the extent possible, adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of development in floodplains wherever there is a practicable alternative. Requirements of Executive Order 11988 are applied to NPS facilities in DO 77-2 and the supporting Procedural Manual 77-2: Floodplain Management. Large portions of both the Barataria Preserve and Chalmette Battlefield FMUs would be considered a floodplain due to seasonal flooding and elevation in comparison to the adjacent Mississippi River, respectively. However, the Proposed Action would not result in any development or related adverse impacts to floodplains. As a result, this topic was not retained for further analysis.

### Wetlands

More than 95% of the Barataria Preserve is classified as emergent and forested wetlands according to the 1992 USFWS National Wetlands Inventory (USFWS 2015). NPS policy (DO 77-1) states that activities with the potential to adversely impact wetlands are subject to the NPS procedures for implementation of Executive Order 11990 (NPS 2012a). These are activities with the potential to degrade any of the natural and beneficial biotic, cultural, and other functions and values of wetlands. Examples of activities with the potential to adversely impact wetlands include water diversion, pumping, flooding, dredging, channelizing, filling, nutrient enrichment, impounding, placing of structures or other facilities, and other activities that degrade natural wetland processes, functions, or values. Neither alternative considered in this EA proposes any of these activities. In fact, one of primary objectives of the FMP revision would be to manage for long-term beneficial impacts to wetlands within the park.

NPS Procedural Manual 77-1: Wetland Protection identifies actions that may be excepted from the statement of findings requirement and compensation requirements outlined in DO 77-1 (NPS 2012a). The Proposed Action is intended to result in mostly beneficial impacts to wetlands, and the intent of this project is to restore and protect the wetlands at the Barataria Preserve and the isolated wetlands at the Chalmette Battlefield. The Proposed Action, revision of the FMP to incorporate the use of prescribed fire, would allow for planned fire management activities within park wetlands. Many components of the Proposed Action are water dependent, meaning they cannot accomplish their intended purpose unless they are located in wetlands. Best management practices (BMPs) and other conditions specifically identified in the procedural manual Appendix 2 will be followed.

The Proposed Action, revision of the FMP, would not result in new adverse impacts to wetlands regulated by Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, Executive Order 11990 Protection of Wetlands, the Coastal Zone Management Act, NPS DO 77-1 Wetland Protection and its accompanying Procedural Manual DO 77-1: Wetland Protection, and the NPS no net loss of wetlands goal. Therefore, a DO 77-1 “Wetland Statement of Findings” is not required.

The following topics related to wetlands are covered elsewhere as described:

- Wetland soils are addressed in the Soil Resources section (3.3);

- Hydrologic features that maintain wetlands are covered in the Water Resources section (3.4); and
- Plant species composition of wetlands, including abundance and species richness of invasive non-native plant species are covered in the Vegetation, Including Non-native Species section (3.5).

### **Prime and Unique Farmland**

In 1980, the CEQ directed federal agencies to assess the effects of their actions on farmland soils classified as prime or unique by the U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS). Prime farmland is defined as land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops *and that is available for these uses* [emphasis added]. Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops (U.S. Department of Agriculture 2014). There are map units designated as prime farmlands at the Barataria Preserve and Chalmette Battlefield FMUs (U.S. Department of Agriculture 2013). However, these areas are unavailable for agricultural uses because of their incorporation into JELA. There are no map units designated as unique farmlands at the Barataria Preserve and Chalmette Battlefield FMUs (U.S. Department of Agriculture 2013). Therefore, this topic was dismissed from further analysis.

### **Threatened or Endangered Species**

Special status species include species listed as threatened or endangered under the Endangered Species Act and other species considered sensitive by the park. The NPS retrieved species listings for Jefferson and St. Bernard Parishes, which respectively contain the Barataria Preserve and Chalmette Battlefield FMUs, from the U.S. Fish and Wildlife Service on February 3, 2015, that indicate the potential for 13 threatened, endangered, or candidate species to be present in project areas. No critical habitat for threatened or endangered species exists within project areas however. On February 10, 2015, the NPS requested an Endangered Species Act Technical Assistance Form from the Louisiana Ecological Field Services Office that indicated further review of the project was warranted, and initiated coordination under Section 7(a)(2) of the Endangered Species Act of 1973. Consultation with the USFWS was concluded on February 27, 2015, with a concurrence of no effect to federally listed species protected by the Endangered Species Act (Appendix A). No response was received from the National Marine Fisheries Service. Therefore, the topic was dismissed from further analysis.

### **Historic Structures**

Because of the boundaries of the FMUs and avoidance mitigation, the park determined that there would be no adverse impacts to historic structures in the project area. No known historic structures occur within the Barataria Preserve FMU. Historic structures in the Chalmette Battlefield FMU include Rodriguez Canal (used by General Jackson to front the earthen rampart he had built to defend the city from the invading British troops), Chalmette Monument (built between 1855 and 1908 to commemorate the War of 1812), Spotts Marker (erected ca. 1890s to commemorate the role of First Lieutenant Samuel Spotts in the Battle of New Orleans), Grand Army of the Republic Monument (erected in 1882 to honor Union Civil War troops and relocated in 1956), and the Malus-Beauregard House (built in the 1830s as a residence, remodeled in the 1850s, and expanded in 1866 and the 1890s) that are cited in the 1985 National Register of Historic Places documentation for the Chalmette Battlefield FMU (NPS 2011). These structures would be heavily protected during any fire management activity, and no adverse effects to these structures would occur under the Proposed Action. If evidence of historic structures is inadvertently discovered during fire management activities, work in the area would cease, and qualified NPS personnel would assess the sites and recommend an appropriate course of action to the park superintendent in consultation with the Louisiana SHPO. Consultation with the Louisiana SHPO was concluded on May 29, 2015 (Appendix A). Based on these factors, the topic was dismissed from further analysis.

## **Cultural Landscapes**

Cultural landscapes are geographic areas (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values (NPS 2014b). The NPS Management Policies (2006) state, “The treatment of a cultural landscape will preserve significant physical attributes, biotic systems, and uses when those uses contribute to historical significance.” The Chalmette Battlefield and National Cemetery was placed on the National Register of Historic Places in 1966 as the Chalmette National Historical Park (NPS 2011). The Chalmette Battlefield and National Cemetery are significant because they contain the archeological and cultural landscape remnants of the Battle of New Orleans in the War of 1812 (NPS 2011). The use of prescribed burns at the Chalmette Battlefield FMU would be used as a substitute for mowing and bush-hogging, thereby mitigating impacts to the battlefield’s cultural landscape from mechanical treatment (i.e., rutting and wheel tracks).

The Barataria Unit National Historic District was placed on the National Register of Historic Places in 1989 (U.S. Department of the Interior 1989). Within the Barataria Preserve, the cultural landscape consists of prehistoric shell piles; colonial roads, ditches, and settlements; nineteenth century sugar plantations; a nineteenth and twentieth century logging canal; and an early twentieth century subdivision and pecan grove (U.S. Department of the Interior 1989). The implementation of the FMP would temporarily impact portions of the cultural landscape within both FMUs as a result of planned ignitions (also referred to as prescribed burns) and responding to unplanned ignitions. Cultural landscape features would be heavily protected during any fire management activity, and no impacts to these resources would occur under the Proposed Action. If evidence of historic features is inadvertently discovered during fire management activities, work in the area would cease, and qualified NPS personnel would assess the sites and recommend an appropriate course of action to the park superintendent in consultation with the Louisiana SHPO. Consultation with the Louisiana SHPO was concluded on May 29, 2015 (Appendix A). Based on these factors, the topic was dismissed from further analysis.

## **Ethnographic Resources**

The NPS defines ethnographic resources as any “site, subsistence, or other significance in the cultural system of a group traditionally associated with it” (NPS DO 28). Ethnographic resources within the park are associated with American Indian tribes and African American communities, in particular the former African American community known as Fazendeville that was on the Chalmette site from 1867 to 1964, the Isleño people, and other traditional users of resources in the park. The Barataria Preserve FMU represents an ethnographic resource to both tribal and non-tribal community members. According to the park’s traditional use study, the Barataria Preserve “represents a set of resources and a landscape that have provided for and continue to provide for, traditional uses of natural resources by the residents of the communities near the Preserve” (Downs et al. 1998). The use of fire within the Barataria Preserve is not new, as the traditional use study for the Barataria Preserve notes trappers and hunters historically conducted annual burns of plant material in the marsh to improve hunting results and “rejuvenate” the marsh (Downs et al. 1998:55).

American Indian tribes with interest in the project area were notified of the proposed project during the project scoping period, with tribal consultation letters mailed on January 30, 2015. Two responses were received from the tribes regarding the project. The Choctaw Nation of Oklahoma requested to be a consulting party for the project. Consultation is currently underway. The Seminole Tribe of Florida Tribal Historic Preservation Office requested a copy of the EA. No responses were received from the general public regarding ethnographic resources during the scoping period. Fire management activities would be conducted in a manner to protect and enhance the natural resources that support traditional uses within the park; therefore, the topic was dismissed from further analysis.

## **Museum Collections**

The park's museum collection is not likely to be impacted by the proposed project because it would not result in the intentional excavation of archeological sites. Museum collections associated with the park are primarily housed at another park location. There is one small collection storage area at the Barataria Preserve, and portions of the park's collection are displayed in the visitor centers at the preserve and the Chalmette Battlefield. Museum collections would not be directly impacted by implementation of the FMP. Therefore, this topic was dismissed from further analysis.

## **Soundscapes**

A park's natural soundscape encompasses the natural sounds that occur in the park, including the physical capacity for transmitting those natural sounds and the interrelationship among park natural sounds of different frequencies and volumes (NPS 2006). The implementation of the FMP would include periodic noise from mechanical equipment, airboats, and possible use of helicopters. The noise contributed to the park's soundscape from the Proposed Action would be temporary, infrequent, and dispersed over different parts of the park at different times. Planned activities would comply with the local airboat ordinance for Jefferson Parish (Article V, Sec. 20-102 and Article X, Sec. 36-304), and routes would be planned to access prescribed burn areas to avoid unnecessary impacts to the park's soundscape. Implementation of the FMP is not expected to change the character of the soundscape at either the Barataria Preserve or Chalmette Battlefield FMUs. The frequency, duration, and magnitude of noise from the proposed project would not exceed those levels already produced by park staff, special park uses, and visitors during normal park activities; therefore, this topic was dismissed from further analysis.

## **Land Use**

In accordance with NPS Management Policies (2006), the NPS must apply appropriate land protection methods to protect park resources and values from incompatible land uses. The overall land use of the park would not change under the Proposed Action. The park would be maintained as a battlefield park (for the Chalmette Battlefield FMU) and wetland (for the Barataria Preserve FMU). Jefferson Parish has management units in their coastal zone management program that include the Barataria Preserve (Louisiana Department of Natural Resources 2015). The land use management goals and objectives for the Barataria Preserve, as identified in the Coastal Zone Management Plan, do not conflict with the Proposed Action (Louisiana Department of Natural Resources 2015). The proposed project would not result in modification of the land use; therefore, this topic was dismissed from further analysis.

## **Socioeconomics**

Implementation of the FMP is not expected to impact the population, income, or employment base of neighboring communities. The Proposed Action would not have a measurable impact on the local or regional economy. Proposed fire management activities would require the need for additional personnel during prescribed burns or suppression events. Also, short-term park closures may be necessary to protect public health and safety during planned and unplanned ignitions.

A swamp tour company is located immediately adjacent to the Barataria Preserve and provides public tours within the preserve under a commercial use authorization from the NPS. The Chalmette Battlefield is a destination for a daily riverboat excursion along the Mississippi River. The riverboat company also operates under a commercial use authorization in order to allow the passengers to disembark for a 30-minute visit of the Chalmette Battlefield and National Cemetery. The park would coordinate with both tour operations when planning prescribed burns at either unit. Park closures may temporarily impact the tour schedules; however, these types of closures for park maintenance are currently addressed in the commercial use authorizations for each tour. Additionally, the view experience of the tour company's patrons would be enhanced by observing the post-burn conditions of both units as they would have an opportunity to learn about the role of fire on the

landscape. Because there would be beneficial impacts and no adverse impacts to the socioeconomic conditions, this impact topic was dismissed from further analysis.

### **Environmental Justice**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs agencies to address environmental and human health conditions in minority and low-income communities to avoid the disproportionate placement of any adverse effects from federal policies and actions on these populations. The population demographics were reviewed for the communities adjacent to both FMUs. Neither community is identified as an environmental justice community based on the available U.S. Census Data (2010). The area around the park may include low-income and minority populations, but these populations would not be disproportionately adversely affected by the activities associated with the implementation of an FMP. Therefore, this topic was dismissed from further analysis.

### **Other Agency or Tribal Land Use Plans and Policies**

The Chalmette Battlefield FMU is located within St. Bernard Parish, which has recently adopted a Comprehensive Plan (St. Bernard Parish 2014). The Chalmette Battlefield is referenced in the Comprehensive Plan; however, the concepts proposed for the Chalmette Battlefield area do not conflict with the Proposed Action. Jefferson Parish has management units in its coastal zone management program that include the Barataria Preserve (Louisiana Department of Natural Resources 2015). The management goals and objectives for the Barataria Preserve, as identified in the Coastal Zone Management Plan, do not conflict with the Proposed Action (Louisiana Department of Natural Resources 2015). Therefore, this topic was dismissed from further analysis.

### **Urban Quality, Gateway Communities**

The Chalmette Battlefield FMU is located within an urban landscape; however, the presence of the unit does not define the community or dominate the character of the area. Neither the Barataria Preserve FMU nor the Chalmette Battlefield FMU represents a gateway community. Therefore, this topic was dismissed from further analysis.

### **Long-term Management of Resources**

One of the overall natural resource management goals for the park is the enhancement of ecosystem services, including but not limited to, climate mitigation such as carbon sequestration, and improvements to wetlands, hydrology, nutrient cycling, habitat for special status species, and water quality. The Proposed Action would not hinder the long-term management of resources within the park. The revised FMP is intended to improve the resource management flexibility available to park managers and is consistent with the current park plans summarized in the *Relevant Laws, Policies, and Plans* section above. This topic was dismissed from further analysis.

### **Public Health and Safety**

In accordance with NPS Management Policies (2006), the NPS would seek to provide a safe and healthful environment for visitors and employees. Due to the emphasis placed on safety in all federal fire management policies and the current park practice of using available resources to notify the public of planned and unplanned ignitions, the revision of the FMP is not anticipated to impact public health and safety. Potential impacts of fire management on public health from the release of airborne constituents are discussed in Section 3.2 Air Resources and potential impacts to visitor safety are addressed in Section 3.8 Recreation and Visitor Experience.

Operational guidance directs all fire management activities to be conducted to enhance and provide resource benefit and mitigate risk from unwanted wildfire while providing for firefighter and public safety. All actions would conform to safety policies defined in, but not limited to: Interagency Standards for Fire and Fire Aviation Operations guide (Red Book), Directors Orders # 18, and the Standards for Operations and Safety chapter in NPS Reference Manual 18 (NPS 2014a).

Firefighter safety is of primary concern and its procedures are dictated by laws, regulations, policies and guidelines. National fire policy states that firefighter safety is the first priority in fire management activities. Directors Order # 18 makes similar commitments. Firefighter safety is common to both alternatives and would not differ in either alternative. In addition, firefighter safety procedures are updated frequently and would be followed regardless of the alternative implemented. Therefore, this topic was dismissed from further analysis.

## **2 ALTERNATIVES CONSIDERED**

NEPA requires federal agencies to explore a range of reasonable alternatives aimed at addressing the purpose, need, and objectives of the Proposed Action. The alternatives under consideration must include the “No Action” alternative as prescribed by CEQ regulations for implementing NEPA (40 CFR 1502.14).

This section describes two alternatives: the No Action Alternative and the Proposed Action (revision of the FMP). Alternatives considered but dismissed from further analysis are described, and the reasons for dismissal are provided. Rationale for selecting the environmental preferred alternative and the NPS preferred alternative are also provided.

### **2.1 ALTERNATIVE A: NO ACTION ALTERNATIVE**

NPS DO 12 defines the No Action Alternative as a “baseline of existing impact continued into the future against which to compare impacts of action alternatives.” The No Action Alternative would continue the current management practices operating under the most recent Federal Wildland Fire and NPS policies and the existing 2004 FMP. The existing FMP requires that all wildland fires, regardless of origin, be suppressed. No prescribed fires would be used at the park. Mechanical treatments (e.g., mowing, weedeating) to maintain existing defensible space around park buildings and sensitive resource sites would occur under the No Action Alternative.

### **2.2 ALTERNATIVE B: PROPOSED ACTION (PREFERRED ALTERNATIVE)**

The Proposed Action, the park’s preferred alternative, would implement a revised FMP for the park. The FMP would function at the programmatic level and accommodate changes in federal wildland policy, guidance, and practices from ongoing improvements in the science of wildland fire management. The FMP would provide a flexible range of options and activities that could be used to respond to changes in environmental conditions and the specific needs of fire management within the park. All actions described in the Proposed Action are consistent with the approved 1982 General Management Plan, as amended in 1995 and 2011; the RMP (NPS 1997); related park documents; and federal NPS policy. The Proposed Action would allow for implementation of a full range of fire management activities, including wildland fire suppression, the management of wildfire for resource objectives, and fuels management (prescribed fire/mechanical treatments).

The Interagency Standards for Fire and Fire Aviation Operations (U.S. Department of the Interior and U.S. Department of Agriculture 2015) defines a wildland fire as any non-structure fire that occurs in vegetation or natural fuels. Wildland fire includes both wildfire and prescribed fire. Wildfires are unplanned ignitions or prescribed fires that have escaped. Prescribed fires are planned ignitions used by management under an approved plan to meet specific objectives. The terms prescribed fire and planned ignition are used interchangeably in this document.

All fire management activities, including non-fire fuels treatments and prescribed burns, would be implemented using review and planning procedures in accordance with NPS DO-18 and its accompanying Reference Manual (RM). The FMP would include a multi-year fuels treatment plan, which would be reviewed and revised by the park on an annual basis. Proposals for fuels treatments would be identified in the multi-year fuels treatment plan whether they originate internally from NPS staff or through external partnerships, such as research projects. Individual non-fire treatment or prescribed fire plans would be completed for each project. All proposed fire management activities would be consistent with the objectives identified in the FMP. If compliance documentation for fuels management projects is not covered under the programmatic FMP/EA, those projects would undergo separate and independent review prior to approval in accordance with NPS RM 18. Related actions such as research permits would also be independently reviewed.

The Proposed Action would be implemented to achieve the following objectives:

- Conduct scientific research within the park following the “do no harm” principle, using best available science to restore, maintain, or preserve wetlands within the Barataria Preserve FMU and use information gained through research and monitoring to improve the park’s fire management program.
- Allow wildland fires to function as an ecological process and natural agent of change in maintaining and restoring vegetation communities.
- Use planned ignitions (prescribed fire treatments) to supplement the role of fire as an ecosystem process, achieve resource management objectives, and treat non-native, invasive species.
- Allow natural processes to continue by managing fire through monitoring with little or no suppression action, to the maximum extent possible, to achieve resource benefits.
- Promote various stages of wetland succession to support wildlife and special status species, such as golden canna, western umbrella grass, and swamp milkweed.
- Protect natural and cultural resources from adverse effects of fire and fire management activities.

The following required actions/objectives would apply to all fire management activities under the Proposed Action:

- Public and firefighter safety would be prioritized in every fire management activity.
- MIST would be used throughout the park.
- Minimum tool assessments and superintendent approval would be needed for certain fire activities in order to reduce impacts.
- Communities at risk would be protected in the wildland urban interface.
- Natural and cultural resources would be protected throughout the park.
- Collaboration with agencies and stakeholders would be planned and implemented.

## **2.2.1 Fire Management Units**

Under this alternative wildland fire would be managed within two separate FMUs, the Barataria Preserve FMU and the Chalmette Battlefield FMU (Figure 2 and Figure 3).

### **Barataria Preserve Fire Management Unit**

The NPS currently owns approximately 17,585 acres within the legislative boundary of 22,188 acres. The majority of the northern and eastern sides of the FMU are bordered by a hurricane protection levee. The southern side of the FMU is bordered by Bayou Barataria. Lakes Cataouatche and Salvador (separated by Couba Island) border the FMU to the west.

Development within this FMU includes a park visitor center, law enforcement office, maintenance compound, environmental education building, two restroom buildings, and three special use permit hunting camps with cabins. Approximately 130 additional camps with cabins are located on Edward Wisner Foundation lands within the legislative boundary of the Barataria Preserve FMU. These lands are administered by the donation trust’s principal trustee, the City of New Orleans. About 22 additional camps are located on private land between the Outer Cataouatche Canal and Lake Cataouatche.

Under the Proposed Action, prescribed fire or other fuels management activities would occur primarily within the marsh ecosystems of the Barataria Preserve FMU; however prescribed fires could extend into the swamp forests depending on the location of and conditions within fuels treatment units. No planned ignitions (prescribed burns) would occur in the bottomland hardwood forests within the FMU. Initially, planned

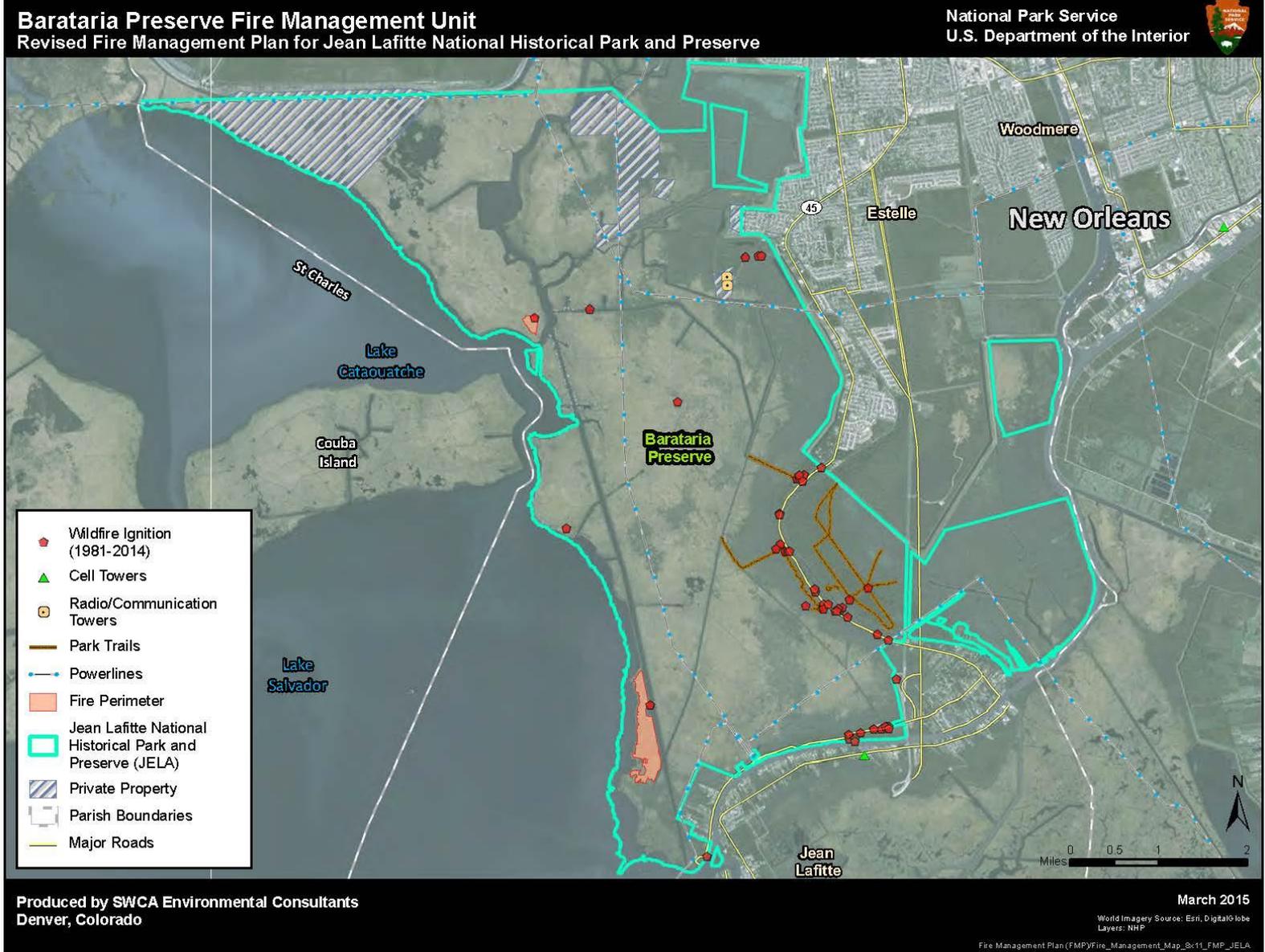
ignitions within the Barataria Preserve FMU would not occur until prescribed burn prescriptions are developed and monitoring plots are established. The first planned ignitions would be small, likely focused on fuels treatment units with areas around 200 acres, and there would be relatively few (1-3) prescribed fires included each year in initial multi-year fuels management plans. As managers become more familiar with the effects of fire on the marsh ecosystems, planned fire activity could increase in both size of the prescribed burns (fuels treatment areas up to around 3,000 acres) and frequency (more than 3 burns per year). Any increase in planned ignitions, both frequency and size, would be guided by monitoring before, during, and after the earlier, smaller prescribed burns.

### **Chalmette Battlefield Fire Management Unit**

This FMU contains approximately 143 acres. It is bordered by the St. Bernard Highway and the Norfolk Southern Railway along the northwest, the Chalmette National Cemetery along the northeast, the Mississippi River along the southeast, and the Port of St. Bernard along the southwest. A public in-holding containing an unused sewage treatment plant is located within the central portion of the southeastern side of the FMU.

Developments within this FMU include the site headquarters/administrative offices, a visitor center, a maintenance building, a sheltered garage and fuel storage building, a black powder magazine, the historic Malus-Beauregard House, a 1.5-mile tour road with six interpretive stops, parking, restrooms, a footpath, and a picnic area.

Under the Proposed Action, planned fire management activities would occur primarily within the grassland of the Chalmette Battlefield FMU, which is estimated to be 120 acres. Initially, planned ignitions would occur 1 to 2 times annually on portions of the grassland area. As managers become more familiar with the effects of fire within the FMU, prescribed burns may increase in both size (burning the entire 120 acres at one time) and frequency (multiple times per year). Any increase in planned ignitions would be guided by monitoring before, during, and after the earlier, smaller prescribed burns. In addition, ongoing coordination with the St. Bernard Parish Fire Department would ensure any permitting requirements are met.



**FIGURE 2. BARATARIA PRESERVE FIRE MANAGEMENT UNIT.**



**FIGURE 3. CHALMETTE BATTLEFIELD FIRE MANAGEMENT UNIT.**

## 2.2.2 Fire Management Strategies

### Wildland Fire Suppression Strategies

A number of wildfire suppression strategies could be available to manage unplanned wildfire in both FMUs. Suppression activities would strive to minimize potential damage to natural and cultural resources and would take into consideration the threat to public safety (including firefighting personnel), economic expenditures, firefighting resources, and other fire priorities (local, regional, and national preparedness).

#### *Full Suppression*

More aggressive suppression activities could be used when human life and property, and/or critical cultural and natural resources, are threatened by the fire. These could include direct attack or a combination of direct and indirect attack to establish anchor points at or near the flaming fire zone from which to extinguish the fire at its head or along its flanks. Full suppression strategies may require significant mop-up and patrol actions.

#### *Confine and Contain*

This suppression strategy uses indirect attack to create a fuel break around a wildfire and either allows the fire to burn up to the fuel break or to use firing devices to burn out fuel between the fuel break and the flaming fire zone. Confine and contain actions often use natural barriers where possible or could use mechanical/manually constructed lines. The use of natural barriers would potentially reduce potential impacts to natural and cultural resources from ground disturbance. Monitoring of the fire behavior would be critical under a confine/contain strategy and the response strategy could change in the event that objectives are no longer being met, potentially justifying a shift to a full suppression or point protection strategy. Mop-up and patrol activities are generally curtailed or limited to smaller portions of a burning/burned area than under full suppression. This is partially because these fires are larger and securing a perimeter can be accomplished without extinguishing all burning material.

#### *Point Protection*

This strategy may involve a variety of suppression tactical actions to prevent fire encroachment from threatening identified natural/cultural values at risk. Actions could include constructing fuel breaks or fire lines and burning them out, reducing fuel concentrations and modifying fuel continuity both vertically and horizontally, covering resources with material to shelter them from fire, and deploying water pumps and sprinkler systems. The park would work with resource specialists to determine the location of critical resources requiring protection and or mitigated suppression actions.

Under the Proposed Action, aerial resources may be used for all suppression strategies. This could involve aerial reconnaissance, detection, transportation of personnel and equipment, and fire control missions using retardant/bucket drops.

Under this alternative, the park would adopt MIST for all suppression strategies. MIST requires fire managers and firefighters to select management tactics that are commensurate with the existing fire behavior and fire potential while minimizing the impacts to the resources being protected. Adopting MIST also prioritizes firefighter safety above all other resources.

Under the Proposed Action, the park, fire managers, and incident commanders would monitor the conditions of a fire and determine if the response strategy selected needs to be revised.

## **Management of Fire for Resource Objectives**

Unplanned ignitions could be managed to accomplish specific resource management goals and objectives depending on conditions within each FMU. This action would only be possible where allowing the fire to burn would not threaten life, property, and critical natural and cultural resources. Fires could be used to reduce hazardous fuels, restore fire in fire-adapted ecosystems, remove invasive species, restore native vegetation, and contribute to park research objectives (e.g., the study of fire effects on marsh ecosystems). Managing unplanned ignitions for resource objectives would require continuous monitoring, MIST, and use of resource advisors to ensure that critical natural and cultural resources are not threatened.

### **2.2.3 Fuel Management Strategies**

#### **Prescribed Fire**

The park has identified that prescribed fire may be a useful tool for the following uses:

- Restoring natural ecological processes;
- Controlling the spread of invasive species; and
- Exploring research objectives relating to fire effects in the wetland ecosystem.

Under the Proposed Action, prescribed fire would be allowed in the Barataria Preserve and Chalmette Battlefield FMUs. Annual coordination with the interdisciplinary team, subject matter experts, and external stakeholders would provide valuable input for adapting the fire management program as needed. A multi-year fuels plan would be drafted in which prescribed fire treatments would be planned for multiple years as part of the FMP. The multi-year fuels plan would be reviewed and updated annually in response to factors such as changing federal regulations and guidelines, fire effects monitoring results, lessons learned in the field, budgets, staffing needs, and administrative changes within and outside the NPS.

Prescribed fire would be planned and prioritized annually by the park, before being used as a tool, and individual prescribed burn plans would be developed that adhere to the guidelines set forth in the FMP and the Proposed Action identified in the EA. Each prescribed burn plan would need to be approved by the park superintendent. Treatment boundaries identified within the site-specific prescribed burn plan would correspond with existing features on the landscape, such as roads and waterways. Treatment unit boundaries could also be augmented by mechanical means to improve firefighter safety during fire operations by reducing fire intensity along the treatment edge, thereby creating areas where fire would be contained and controlled. Each prescribed fire would be managed and monitored by qualified personnel prior to and during all operations until the fire is declared to be extinguished. Each prescribed burn plan would specify ignition tools and patterns, which would be ground or aerially based and could include use of mixed gasoline and diesel fuel in drip torches, railroad-type flares, flare fire from hand-held pistols, gelled gasoline, and incendiary plastic spheres. This list does not preclude the use of new ignition tools developed during the life of this fire management plan. Prescribed burns that exceed the scope of the approved prescribed burn plan would be managed as wildfires.

#### **Mechanical Fuel Treatment**

Mechanical or non-fire fuel reduction methods would be used as needed and where appropriate to prepare for prescribed burns. Mechanical fuel treatments (for example, mowing) along burn area boundaries, around sensitive resource areas (for example cultural resources or sensitive wildlife habitat), and park facilities would be conducted to reduce hazardous fuels and provide a fire line to facilitate firefighting efforts. Mechanical fuel treatment would also be used to enhance prescribed fire in attaining FMP objectives. Thinning of vegetation would be accomplished using hand-operated power tools and hand tools, such as chainsaws or other cutting tools, and wheeled or tracked mechanized equipment such as tractors, marsh masters, airboats, and similar

equipment to construct fire lines, create compression lines, thin fuels, and clear vegetation, including non-native species. Heavy equipment that uses large tires or large tracks resulting in less ground disturbance would be the first choice for use. Projects that require equipment with possible ground-disturbing effects would be planned and implemented with mitigation measures when resource conditions allow for reduced impacts to soil and vegetation.

Vegetation thinning would reduce the fuel load available to support either a prescribed fire or wildfire. Fuel reduction could be used alone to reduce the intensity of a potential wildfire or it could be used prior to a prescribed burn to minimize the intensity and help maintain control of the fire. The need for using fuel reduction techniques would be determined in consultations between NPS resource management specialists, fire ecologists, and a fire management officer.

## **Cooperation and Collaboration**

Under the Proposed Action, the NPS would establish a fire management interdisciplinary team consisting of subject matter experts from a variety of fields and divisions from within the park and the NPS Southeast Region. The interdisciplinary team would consist of (but may not be limited to) the fire management officer, a fire ecologist, a prescribed fire specialist, the park chief of resource management, the park natural resource program manager, the park ecologist, park cultural resource specialists, , and the regional fire planner. The team would continue to coordinate during planning, implementation, and response operations. The interdisciplinary team would meet annually to review and update the FMP and multi-year fuels treatment plan, adding one additional out-year to the representative scope of work. The interdisciplinary team would determine whether impacts from the changes and actions proposed to the plan are within the scope of impacts analyzed in this environmental assessment or if supplemental compliance is required.

## **2.3 MITIGATION MEASURES/BEST MANAGEMENT PRACTICES**

The NPS places a strong emphasis on avoiding, minimizing, and mitigating potentially adverse environmental impacts. To help ensure the protection of natural and cultural resources, protect the safety of firefighters and the public, and promote biodiversity and ecosystem health, the mitigation measures and BMPs discussed below would be implemented as part of the Proposed Action.

### **2.3.1 Air Quality**

- The park would follow the current version of the State of Louisiana's Voluntary Smoke Management Guidelines for all prescribed burns (Louisiana Office of Forestry 2013).
- Burning prescriptions to meet specific vegetation management objectives would be developed for each prescribed burn unit. Variables considered in the prescription would include wind parameters and receptors, live and dead fuel moisture and fuel loading, temperature, firing methods, timing of burn seasonally, relative humidity, and dispersion.
- Media releases would be used to inform the public and park visitors about wildland fire, informing them about potential smoke impacts, closures, or restrictions. Signage would be used throughout the park to inform visitors and caution signs would be installed where smoke may impact transportation corridors inside and outside the park. If necessary, the superintendent would authorize temporary closure of some areas to the public and visitors.
- Other agencies and the public would be notified by park staff for all prescribed burns, and particular attention would be placed on neighboring residents that might be impacted by smoke from prescribed burns. Each burn plan would contain a list of contacts.

- The prescribed burn plan would outline prescription windows for appropriate weather, fuel, fire behavior, fire management staffing, and social considerations.
- Park staff would coordinate with adjacent agencies, landowners, and infrastructure owners/operators regarding prescribed fire planning to limit potential cumulative smoke impacts from simultaneous ignitions.
- Prior to initiating a prescribed fire, the park would apply for a Letter of No Objection from the State of Louisiana Department of Environmental Quality.
- Prior to initiating prescribed fire activities within the Chalmette Battlefield FMU, the park would need to obtain a permit from St. Bernard Parish.
- The park superintendent would be involved in initial planning to limit effects of prescribed fire smoke during holidays, special events, and busy visitation periods. Superintendent approval is required prior to ignition.
- To mitigate smoke impacts, prescribed burns would be conducted during periods of relatively low fuel moisture in order to provide better combustion, better transport and lofting of the smoke column, and less residual burning.
- Timing and methods of ignition on prescribed burns would be constantly assessed and reviewed by fire managers to minimize smoke impacts. Personnel would be trained in emission reduction techniques as outlined in the National Wildfire Coordinating Group (NWCG) Smoke Management Guide (Hardy et al. 2001) and continuous monitoring would be required throughout the burn.
- Sensitive smoke receptors would be identified during planning. On the day of the burn, the burn boss would assess wind direction, transport winds, and dispersion prior to ignition. If plume trajectory maps reveal that sensitive smoke receptors would be impacted by the burn, the burn would be rescheduled.

### 2.3.2 Natural Resources

- Monitoring would be employed during wildfire and prescribed burn planning and during implementation to ensure no long-term adverse impacts to organic soils and accretion rates.
- Sensitive soils and vegetation communities would be protected from potential fire spread through pre-treatment of surrounding fuels and construction of containment lines.
- Fire management would support the use of research to incorporate new science regarding the impact of wildland fire on wetland soils and vegetation into planning.
- Burning prescriptions to meet specific vegetation management objectives would be developed for each prescribed burn unit. Variables considered in the prescription would include wind parameters and receptors, live and dead fuel moisture and fuel loading, temperature, firing methods, timing of burn seasonally, relative humidity, etc.
- Park resource specialists would be involved during and after wildfire and during prescribed burn planning to ensure that prescriptions and burn objectives do not conflict with objectives for the protection of sensitive vegetation and wildlife populations and habitat.
- Vegetation inventory data would be used to identify sensitive vegetation communities, including old cypress (*Taxodium distichum*) and oak (*Quercus* sp.) trees, also known as “witness trees.” These individuals would be identified and avoided in burn plans. Sensitive communities would be protected from potential fire spread through pre-burn treatment actions creating containment lines or reducing fuel loads around sensitive populations.
- Prescribed fire would be used with varying intensity and intervals.
- When constructing containment lines, vegetation removal would be limited to the minimum width necessary for containment to protect natural and cultural values.

- During fire management operations, funnels and spouts would be used when dispensing fuel and/or oil, spill containment would be used during portable pump operations, and containers would be filled to the appropriate level to prevent overflow and spills. Spill containment supplies and equipment would be on-hand and readily available during fuel or oil transfers.
- In the event of a spill of potentially harmful pollutants, park staff and firefighters would deploy absorbent materials as needed.
- Wherever possible, refueling would be avoided in the park, particularly when in marsh and wetland areas.
- No foam or retardant would be used for fire suppression in water or wetlands.
- If aerial water drops are used in fire management, the tanks of air tankers would be cleaned to reduce contamination into both FMUs.
- To reduce potential for the spread of invasive species, all equipment used for prescribed burning activities would be washed and inspected prior to the burn.
- Firefighters would use MIST to minimize impacts of fire suppression operations whenever possible.
- Equipment operators would use MIST as they relate to soil and vegetation disturbance, compaction, and displacement.
- Wherever possible, natural features and existing human-made barriers would be used for containment lines to minimize additional disturbance to soils.
- The use of large mechanized equipment would require superintendent approval.
- Transport of fire personnel and equipment would use existing roads and canals wherever possible.
- Fire line construction to mineral soil would be avoided whenever possible; mowing, mastication, and compression of vegetation would be the preferred technique for containment lines.
- In the event of a wildfire, resource specialists would examine maps and information resources to assess and discuss potential effects of the fire.
- Aviation use would be carefully considered and impacts to wildlife mitigated through timing of operations, exclusion of low level aviation use, or avoidance of certain areas of the park.
- Fire effects monitoring on species and habitat would be used to inform multi-entry prescribed burning and maintenance activities.
- Fire management personnel would be briefed on potential resources of concern and their locations within a burn unit in order to facilitate avoidance of habitat for special status species or other potentially sensitive resources.
- Mop-up methods would use minimal impact techniques to protect natural resources, including soils, water resources, vegetation, and wildlife.
- If a major wildfire occurs, the use of Burned Area Emergency Rehabilitation teams would be considered through consultation with the NPS regional office and park resource specialists.

### **2.3.3 Cultural Resources**

- The park would continue coordination with the Southeast Archeological Center to ensure that the park has the most current data regarding archeological resources within its boundaries. The park's cultural resource specialists would provide recommendations on how to mitigate adverse effects on these resources during fire management activities and would coordinate compliance with Section 106 of the National Historic Preservation Act, as appropriate.
- Historic structures and sensitive cultural sites would be protected from wildland fire via maintenance (mowing and weed-eating during the growing season) of existing defensible space around them.

- During all suppression activities, MIST guidelines would be incorporated to the greatest extent feasible and appropriate for the given situation. Tactics directly or indirectly facilitating the protection of archeological/cultural/historic resources include:
  - Keeping engines or slip-on units on existing roads;
  - Not using heavy equipment (e.g., bulldozers, plows) for constructing fireline;
  - Not using fireline explosives;
  - Using existing natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of fireline construction whenever possible;
  - Keeping fireline width as narrow as possible;
  - Mapping, marking, or flagging cultural resources during wildfire suppression, rehabilitation, and prescribed burn implementation; and
  - Providing all workers with basic training about cultural resources.
- Ground disturbance would be avoided within known archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations, it would involve as little ground disturbance as possible and be located as far outside known resource boundaries as possible.
- Soaker hoses, sprinklers, or foggers would be used in mop-up, avoiding boring and hydraulic action.
- The park’s cultural resource specialist(s) would be contacted immediately if previously unrecorded cultural resources are discovered during any wildland fire operations. The cultural resources would be recorded, delineated, and protected.
- In instances of wildfire, a post-fire data recovery and/or restoration program would be developed that is sensitive to cultural resource concerns.

### **2.3.4 Visitor Use and Experience**

- Firefighter and public safety would be the highest priority in all fire management activities.
- The public would be notified of upcoming prescribed burning operations and wildfires through press releases.
- Prescribed fire notifications and fire information would be posted at public locations, such as trailheads, boat docks, canals, around hunting areas, and visitor centers.
- Hunters would be notified of any wildland fire activities through the park’s permitting process and daily check-ins.
- Educational outreach would be implemented prior to any closure or restrictions to explain the role of fire as a management tool.
- Fire management staff would work with protection staff and local agencies on posting smoke hazard signs if smoke could impact roadways.
- Other agencies and the public would be notified by park staff for all prescribed burns and wildfires and particular attention would be placed on neighboring residents that might be impacted by smoke. For prescribed burns, the burn plan would contain a list of contacts.
- The park superintendent would be involved in initial planning to limit effects of prescribed fire smoke during holidays, special events, and busy visitation periods. Superintendent approval is required prior to ignition.
- Fire staff would coordinate closely with rangers to determine the location of visitors and use road/trail closures and restrictions to ensure prescribed fire or wildfire operations do not put visitors at risk.
- Visitors would be excluded from the immediate vicinity of the wildfire or prescribed burn when fire management activities are underway.

- Weather conditions would be closely monitored during the prescribed fire to ensure that any changing conditions do not suddenly put visitors at risk.
- Following a wildland fire and as burned areas are opened to visitors, signage would be used to inform visitors of the potential hazards (e.g., snags, stumps, and holes). This information would also be disseminated during hunter registration.

### **2.3.5 Energy Resources**

- Park staff would coordinate with the owners and operators of energy infrastructure, including transmission lines and communication sites within the FMUs, early and often, including during the annual prescribed burn planning process. If there is need for a “request for outage” along an electric transmission line, this would be coordinated at least 6 weeks in advance of the prescribed burn.
- Only park staff certified through Entergy’s Louisiana Clearance Training would be allowed to make a “request for outage.”
- The park would develop a site-specific plan to avoid impacts to transmission lines and communication sites. For example, electric transmission lines and poles would be used as starting points to burn away from lines and continual monitoring would occur along the infrastructure during prescribed burns.
- Communication with owners and operators of energy infrastructure would be a requirement placed in site-specific burn plans as applicable.
- Fires are known to occur in the Barataria Preserve that are not reported, or about which park staff may not be immediately aware. If there is a known, unplanned ignition, the park would communicate with potentially impacted owners and operators of energy infrastructure. .

## **2.4 ALTERNATIVES CONSIDERED BUT DISMISSED FROM DETAILED ANALYSIS**

Additional strategies to reduce fuels in the park were considered during the development of the alternatives, including the use of herbicides. Non-native, invasive plants in the park are treated under a separate management program in accordance with NPS Management Policies 2006 (Section 4.4.4 – Management of Non-native Species). Therefore, the additional use of herbicides as part of the FMP was not considered necessary.

## **2.5 ENVIRONMENTALLY PREFERRED ALTERNATIVE**

According to the CEQ regulations implementing NEPA (43 CFR 46.30), the environmentally preferred alternative “causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural, and natural resources. The environmentally preferred alternative is identified upon consideration and weighing by the Responsible Official of long-term environmental impacts against short-term impacts in evaluating what is the best protection of these resources.”

Alternative B, revision of the FMP, is the NPS Environmentally Preferred Alternative. Alternative B would allow for implementation of a full range of fire management activities, including wildland fire suppression, the management of wildfire for resource objectives, and fuels management. This is the environmentally preferred alternative for several reasons. It would provide a programmatic framework for the long-term use of fire in the park, which could be effective in helping to restore and maintain the wetland ecosystem. It would provide park managers a powerful management tool for vegetation and wildlife at the Barataria Preserve and the vegetation at the Chalmette Battlefield. It would allow the park to engage in research efforts to determine the effects of fire on accretion and subsidence rates at the Barataria Preserve. For these reasons, the preferred

alternative causes the least damage to the biological and physical environment and best protects, preserves, and enhances historical, cultural and natural resources, thereby making it the environmentally preferred alternative.

Alternative A, which would continue current management, is not environmentally preferable. Prescribed fire would not be used as a research and management tool within the park, and efforts to determine, among other things, the effects of fire on accretion and subsidence rates at the Barataria Preserve would not occur, nor would prescribed fire be an alternative to mowing for vegetation maintenance at the Chalmette Battlefield.

## **2.6 COMPARISON OF ALTERNATIVES**

Table 2 summarizes the anticipated environmental impacts for Alternatives A and B. Only the impact topics carried forward for further analysis are included. Chapter 3, Affected Environment and Environmental Consequences provides a more detailed explanation of the impacts.

**TABLE 2. COMPARISON OF ALTERNATIVES BY RESOURCE/IMPACT TOPIC**

FMU	Alternative A: No Action	Alternative B: FMP Revision
<b>Air Resources</b>		
Barataria Preserve	Alternative A would result in very small, if any, contributions of emissions to the local airshed through unplanned ignitions. A few unplanned ignitions may occur; however, those impacts would likely result in localized contributions of smoke to the local airshed lasting the duration of the unplanned ignition. Lack of control over atmospheric and drought conditions when unplanned wildland fires begin increases their potential to contribute emissions to the local airshed. In rare drought conditions, adverse air quality impacts could occur for weeks, or possibly months, if unplanned ignitions result in smoldering peat fires.	Alternative B would result in adverse impacts to localized air quality primarily in the form of smoke and particulate matter from planned and unplanned ignitions. The duration of the impact would coincide with the duration of prescribed burn activities. Air quality impacts from unplanned ignitions have the potential to contribute more smoke for a longer duration to the surrounding communities due to the lack of control over atmospheric and drought conditions when unplanned wildland fires begin. Beneficial impacts would occur from the reduced threat of smoke-inducing wildfires.
Chalmette Battlefield	Alternative A would result in de minimis impacts to air quality because unplanned ignitions with the Chalmette Battlefield FMU would be immediately suppressed.	Alternative B would result in de minimis impacts to air quality because unplanned ignitions with the Chalmette Battlefield FMU would be immediately suppressed and planned ignitions would last approximately 4 hours or less under appropriate atmospheric conditions.
<b>Soil Resources</b>		
Barataria Preserve	Under Alternative A, research studies would not be pursued, and therefore experimental measures to combat subsidence for the protection of marsh and swamp vegetation and soils would not be implemented. Since research advances would not be made, the duration of the adverse impacts to soils would coincide with the duration of unplanned ignitions. Adverse impacts to soils would continue due to continued subsidence, .	Alternative B would result in adverse impacts to soils, during the prescribed fire in the Barataria Preserve FMU. Alternative B would promote research into the impacts of prescribed burning on wetland accretion rates. Nutrient cycling would be altered by prescribed fire; the extent of the impact would be further determined through research. Prescribed fire would lower fuel loading, thereby reducing the risk of wildfire ignitions that could adversely impact soils.
Chalmette Battlefield	Under Alternative A, existing vegetation management actions like mowing would continue, deteriorating battlefield soils as a result of compaction and rutting. Alternative A would result in cumulative, adverse impacts to soils in the Chalmette Battlefield FMU.	Under Alternative B, mechanical treatments would be used to prepare the Chalmette Battlefield FMU area for prescribed fire, and prescribed fire would be implemented as an alternative to mowing. This alternative would result in adverse impacts to soil during the prescribed fire and beneficial impacts to soils in the Chalmette Battlefield FMU as a result of reduced compaction and rutting. .
<b>Water Resources</b>		
Barataria Preserve	Under Alternative A, land subsidence and salt water intrusion trends would continue that result in degraded hydrology and water quality within the Barataria Preserve.	Fire management activities under Alternative B would result in adverse impacts to water quality due to potential spills and nutrient loading associated with prescribed burns in the Barataria Preserve. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial impacts could occur if prescribed burns within the Barataria Preserve result in enhanced or unaffected accretion rates in the wetland, which would maintain and possibly improve the hydrologic conditions and water quality in the FMU.
Chalmette Battlefield	No impacts to water resources at the Chalmette Battlefield FMU are expected from Alternative A due to the lack of waterways within the FMU.	No impacts to water resources at the Chalmette Battlefield FMU are expected from Alternative B due to the lack of waterways within the FMU.

FMU	Alternative A: No Action	Alternative B: FMP Revision
<b>Vegetation, Including Non-native Species</b>		
Barataria Preserve	Wetland vegetation communities in the Barataria Preserve FMU are deteriorating. Current management is not abating this threat. Coupled with negative impacts of climate change, Alternative A would result in continued deterioration of vegetation communities. Under Alternative A, adverse impacts to soils would continue indefinitely..	Wetland vegetation communities in the Barataria Preserve FMU are deteriorating. Under Alternative B, shrub encroachment could be reduced through the use of prescribed fire and some localized mechanical treatment. Research would be applied to determine the impacts of fire on accretion rates, vegetation community response, and invasive species. Fire management actions related to the implementation of prescribed fire can be readily mitigated to reduce their impacts on vegetation. Although adoption of Alternative B would generate some adverse impacts to vegetation during the duration of the prescribed fire and for 1-2 growing seasons post burn, , the knowledge gained as a result of implementing research into fire effects on wetland vegetation at the park would provide beneficial impacts in the form of more diverse vegetation communities and improved ecological function. The resultant vegetation community would be more resilient to disturbance by invasive species, insects, disease, and drought. Prescribed fire improves soil nutrient cycling and promotes plant productivity.
Chalmette Battlefield	Impacts to vegetation communities in the Chalmette Battlefield FMU under Alternative A could be adverse due to the potential for unplanned ignitions. Continued mowing and soil compaction would result in increased presence of non-native species.	Impacts to vegetation communities in the Chalmette Battlefield FMU under Alternative B would be adverse as a result of localized disturbance to plant communities during the duration of the prescribed fire and for 1-2 growing seasons post fire, but in the long term, impacts would be beneficial due to the improved nutrient cycling and reduced soil disturbance associated with prescribed fire operations as compared to mowing, as well as valuable information gathered through research opportunities
<b>Wildlife</b>		
Barataria Preserve	Alternative A would result in short duration adverse impacts during unplanned ignitions and continued adverse impacts to wildlife due to habitat degradation. Fire suppression activities including trampling and compression lines may cause temporary impacts; however, most large mammal and avian species can easily move away from impact sources. Species in less mobile life stages (juvenile or nestlings) and less mobile species (amphibians and reptiles) would be most impacted by unplanned ignitions or suppression actions. Wildlife species may experience habitat loss from wildfire but most species evolved in the presence of fire and have behavioral and other adaptations to fire. Foraging opportunities may increase following fire. The policy of fire suppression under this alternative would reduce any beneficial impacts to wildlife that may result from increased plant productivity and enhancement of wetland habitat. The current trend of subsidence within the Barataria Preserve FMU would continue, threatening the longevity of habitat for wetland dependent species.	Fire management activities under Alternative B would be managed in a way to optimize benefits and minimize adverse impacts to wildlife and their habitats. Temporary human disturbance would cause adverse impacts to many species including direct mortality due to fire, crushing and trampling, and loss of forage and cover for 1 to 2 growing seasons. However, improved habitat quality and structure would provide benefits to most species, particularly species dependent on emergent wetland vegetation, and species that select for more open, early seral habitat. Some species that prefer greater vegetation or litter density may be adversely impacted until vegetation cover is restored. Many species would benefit from diverse habitat structure created by multiple entry prescribed fire.
Chalmette Battlefield	Wildlife species diversity is limited in the Chalmette Battlefield FMU due to a lack of habitat diversity. Alternative A would result in adverse impacts to the limited wildlife that inhabit the FMU, due to temporary loss of habitat or loss of individuals in the event of an unplanned ignition. In the event of an unplanned ignition, fire suppression activities including vehicle traffic and noise, disturbance of habitat due to fireline construction, and hose laying. However, most species found in the FMU are accustomed to human activity.	Under Alternative B, the introduction of prescribed fire into the Chalmette Battlefield FMU could result in beneficial impacts to wildlife species through more diverse vegetation communities and improved ecological function. The resultant vegetation community would be more resilient to disturbance by invasive species, insects, disease, and drought. Prescribed fire improves soil nutrient cycling, promotes plant productivity, and in turn increases available forage. Some less mobile wildlife species may experience injury or mortality but these impacts would be localized lasting only the duration of the prescribed fire or 1 to 2 growing seasons post fire.

FMU	Alternative A: No Action	Alternative B: FMP Revision
<b>Archeological Resources</b>		
Barataria Preserve	Under Alternative A, impacts to archeological sites within the Barataria Preserve FMU could occur from unplanned ignitions, especially ignitions that are not reported to park personnel. Adverse impacts to archeological sites could occur as subsidence and erosion continues to sink or expose archeological sites.	Under Alternative B, impacts to archeological sites within the Barataria Preserve FMU could occur from unplanned ignitions, especially ignitions that are not reported to park personnel. Prescribed burn plans would include protective measures to avoid impacts to known archeological sites within the Barataria Preserve FMU. Beneficial impacts to archeological sites within the Barataria Preserve would occur if research studies lead to BMPs that reduce subsidence rates within the wetland.
Chalmette Battlefield	No direct impacts to archeological sites are expected to occur under Alternative A.	Under Alternative B, prescribed burn plans would include protective measures to avoid impacts to known archeological sites within the Chalmette Battlefield FMU.
<b>Recreation and Visitor Experience</b>		
Barataria Preserve	Alternative A would result in adverse impacts to recreation and visitor experience at the Barataria Preserve. Research would not provide the necessary tools to manage encroachment of non-native species and wetland subsidence at the Barataria Preserve. The wetland environment would continue to gradually change and be lost to future generations of visitors.	Alternative B would result in adverse impacts to recreation and visitor experience from public closures during prescribed burning activities. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial impacts would result from improved game habitat for hunters and the removal of non-native species within the Barataria Preserve.
Chalmette Battlefield	Alternative A would rely only on mowing as the only vegetation control method at the Chalmette Battlefield and would continue to place evidence of modern landscape management on a historic, cultural landscape.	Alternative B would result in adverse impacts to recreation and visitor experience from public closures during prescribed burning activities. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial impacts would result at the Chalmette Battlefield as a result of reducing mowing and less mechanically maintained appearance of the battlefield.
<b>Energy Resources</b>		
Barataria Preserve	Under Alternative A, there would be no direct impact to energy infrastructure within the park. However, there would be an adverse indirect impact to relationships and communication protocols with the energy infrastructure's owners and operators because no such protocol exists in the 2004 FMP.	Under Alternative B, the implementation of the FMP would result in beneficial impacts to pipelines, transmission lines, and communication sites because the planned ignitions would include protection measures and coordination with infrastructure owners and operators and reduce the threat of unplanned ignitions within the wetland. Training opportunities and communication protocols with infrastructure owners would result in improved communication processes.
Chalmette Battlefield	No transmission lines or communication sites occur within the Chalmette Battlefield FMU. No impacts to energy resources would occur under Alternative A.	No transmission lines or communication sites occur within the Chalmette Battlefield FMU. No impacts to energy resources would occur under Alternative B.

## **3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

### **3.1 METHODOLOGY FOR IMPACTS ANALYSIS**

This section analyzes both beneficial and adverse impacts that would result from implementing either alternative described above in Section 2. It is organized by resource topic and provides a comparison between alternatives based on the topics considered for detailed analysis. This document addresses the direct and indirect potential environmental impacts from all aspects of the No Action Alternative and the Proposed Action, revision of the park's FMP. As required by CEQ regulations implementing NEPA, a summary of the environmental consequences for each alternative is provided in Table 2, which can be found at the end of Section 2.

For all environmental consequences analyses provided below, it is assumed that the mitigation measures and best management practices described in Section 2: *Alternatives Considered* would be implemented under the Proposed Action, in accordance with the park's revised FMP. These mitigation measures are intended to minimize adverse impacts to resources, while achieving the objectives of the FMP. One of the primary objectives of the Proposed Action is to "use best available science to restore, maintain, or preserve the wetland within the Barataria Preserve FMU and use information gained through research and monitoring to improve the park's fire management program." This includes the use of prescribed fire within the Barataria Preserve as a potential tool to combat subsidence rates and invasive species within the wetland.

The following environmental consequences analyses are approached using the assumption that park management would implement the Proposed Action at manageable and controllable scales following the "do no harm" principle. Management would ensure protection of the park's wetlands by carrying forward research successes to other locations within the FMU, and carefully considering or halting any fire management activities that are found to be detrimental at small scales. The discussion of land subsidence and accretion rates as they relate to fire management activities, a key aspect of this consideration, can be found in the Soils Resources section below.

#### **3.1.1 Climate Change**

Climate change refers to any significant changes in average climatic conditions (such as mean temperature, precipitation, or wind) or variability (such as seasonality, storm frequency, etc.) lasting for an extended period (decades or longer). Recent reports by the U.S. Climate Change Science Program, the National Academy of Sciences, and the United Nations Intergovernmental Panel on Climate Change (IPCC) provide evidence that climate change is occurring and may accelerate in the coming decades. There is strong evidence that global climate change is being driven by human activities worldwide, primarily the burning of fossil fuels and tropical deforestation. These activities release carbon dioxide and other heat-trapping gases, commonly called "greenhouse gases," into the atmosphere (IPCC 2007).

Climate change and the resulting sea level rise are affecting coastal Louisiana, especially the Mississippi River deltaic plains, which are vulnerable to erosion and inundation (Burkett et al. 2001). For the past 3,000 years, coastal Louisiana has experienced an average rate of relative sea level rise of about 0.1 to 0.2 mm/year, but by the end of the twentieth century the rate has increased to 1.0 to 2.0 mm/year (IPCC 1996). The 2001 report of the IPCC projected an additional two- to four-fold acceleration of sea level rise over the coming century. The mid-range estimate of sea level rise in this IPCC report translates to a net 1.0 meter decline in elevation relative to the mean sea level over the next 100 years (IPCC 2001). Data from the National Water Level Observation Network (NWLON) for the park area indicate a stable rate of relative sea level rise at 9.24 mm/year (NPS 2015a).

While directly combating climate change, including slowing the rate of sea level rise, is beyond the resources of the park, monitoring sea level change, evaluating impacts on the park's landscape, and using management actions to mitigate for those impacts are valid management issues/endeavors. The wetlands within the Barataria Preserve are threatened by climate change and the resulting sea level rise, as well as associated increased salinity. Sea level changes will continue to threaten the marsh communities and cypress swamp. There has already been a loss of bottomland hardwood forest (Handley 2006), and climate change brings a threat of further habitat loss. Conner and Brody (1989) use a bottomland hardwood succession model to predict changes in forest composition for the Upper Barataria and Verret watersheds. Their model predicted that bottomland forest would be replaced by cypress-tupelo swamp in some locations while others would see a decline of both forest types and even losses of both forest types in some areas over a period of 50 to 100 years (NPS 2015a). Other vegetation communities may experience altered ranges; this is of particular concern with regards to non-native, invasive species, which may be able to take advantage as habitat becomes compromised.

The Proposed Action could result in emissions conservatively modeled at around 36,000 tons of carbon dioxide equivalent per year if a large portion of the Barataria Preserve (2,900 acres) and the Chalmette Battlefield (120 acres) FMUs were burned (personal communication with H. Pate regarding First Order Fire Effects Modeling 6.0 results for tall fescue vegetation). During responses to wildfires or the management of prescribed fires, the Proposed Action could also result in a temporary increase in emissions of greenhouse gases from the operation of firefighting equipment, though these emissions would be far smaller than emissions from the associated fire. Emissions associated with wildland fire are potentially mitigated by carbon sequestered as a result of fire effects, such as additions to soil carbon stocks and increased plant growth above and below ground. These beneficial effects are more likely with the application of prescribed fire, and increased fuels management could create additional potential benefits by mitigating the effects of wildfires that may increase carbon emissions through the consumption of large woody vegetation and/or organic soils (Cahoon et al. 2010; Mitchell et al. 2014; Sommers et al. 2014). There are other potential benefits associated with answering research questions about the effects of fire on park resources, including accretion and subsidence rates at the Barataria Preserve FMU in that a more resilient landscape would be more likely to sequester carbon.

Impacts of climate change on the park are likely to be of a subtle, gradual nature. Rising relative sea levels have modified the environment of the Barataria Preserve FMU and are expected to continue to do so, even increasing over the coming decades as a result of eustatic sea level rise. Changes in climate such as general warming, changes in water availability, and storm frequency, intensity, or duration could cause changes in the rate of land loss, vegetation communities, and habitat for fish and wildlife, among other effects, within the park. The proposed revision to the park's FMP would give park managers a greater understanding of the role that fire plays in the context of park resources expected to be affected by climate change, which would provide opportunities for climate change response. Climate change may limit opportunities for the application of prescribed fire, however (Mitchell et al. 2014).

For context, a typical coal-fired power plant produces around 3.5 million tons of carbon dioxide equivalent per year (Union of Concerned Scientists 2015). The global impact of adding prescribed fire to park management would be de minimis, and multiple mitigating factors associated with prescribed fire and research into the effects of fire on park resources likely further reduce the overall effect of revising the park's FMP on climate change. The proposed revision to the FMP would create additional understanding of the potential role of fire in managing park resources to respond to the effects of climate change.

The potential effects of this dynamic climate on park resources are not analyzed in detail under the environmental consequences discussion for each impact topic because of the uncertainty and variability of outcomes resulting from climate change when compared to the shorter-term planning horizon for the FMP. Furthermore, the global scale of climate change is beyond the control of the park and impacts from climate change would not differ between the alternatives. Instead, alternatives that improve the park's ability to actively manage natural resource conditions, such as the use of active fire management and research opportunities under the Proposed Action, would be expected to provide greater beneficial impacts that

counteract the effects of climate change compared to those alternatives that provide less flexibility in managing natural resource conditions.

### 3.1.2 Similar and Cumulative Actions

Per the NPS DO 12 NEPA Handbook, connected, similar, and cumulative actions are actions that result as a direct or indirect consequences of the Proposed Action and can be undertaken by federal, state, or local entities. There are no connected actions associated with the Proposed Action, revision of the FMP. Similar actions are those that have similar geography, timing, purpose, or other similar feature to the Proposed Action. Cumulative actions are those actions that have additive, or cumulative, impacts on a particular resource. Cumulative actions may have occurred in the past, present, or are reasonably foreseeable to take place in the future. Table 3 summarizes similar and cumulative actions.

**Table 3. Similar and Cumulative Actions to Be Analyzed in the EA**

Project Name	Lead Agency	Location	Brief Description of Project
Future land acquisitions	NPS	Barataria Preserve	Congress authorized the acquisition of up to 8,900 acres to expand the Barataria Preserve, approximately 3,000 acres of which were added to the preserve upon enactment of the Omnibus Public Land Management Act of 2009.
Canal reclamation program	NPS	Barataria Preserve	In 2009–2010, the NPS completed the NEPA process to reclaim approximately 20 miles of non-historic canals within the Barataria Preserve. Implementation of the project is ongoing with approximately 4.3 miles of canals reclaimed to date.
Hunting program	NPS	Barataria Preserve Hunt Zones	The NPS issues permits annually to hunters for white-tailed deer ( <i>Odocoileus virginianus</i> ), wild pigs ( <i>Sus scrofa</i> ), squirrel (Sciuridae), nutria ( <i>Myocastor coypus</i> ), rabbit (Leporidae), and migratory game birds and waterfowl.
Nutria bounty program	State	Barataria Preserve	The NPS issues permits annually for trappers to take nutria in the Barataria Preserve, and the state bounty program makes that more economically viable. Program participants also trap areas around the preserve.
Nutria trapping/direct reduction program	NPS	Barataria Preserve	As above, the NPS issues permits to trappers and conducts direct invasive species reduction by shooting in areas inaccessible to trappers. Focal areas are waterways adjacent to marshes.
Wild pig management program	NPS, West Jefferson Levee District	Parkwide; Barataria Preserve is the focal area	After eradication from the park in the 1980s, wild pigs returned circa 2006. The park conducts small-scale efforts and is currently working toward a management plan for the species. The West Jefferson Levee District engages in management activities that are focused on the levee system adjacent to the park.
Vegetation restoration programs	NPS, Coalition to Restore Coastal Louisiana, and others	Barataria Preserve and Chalmette Battlefield	Past vegetation management actions have generally included invasive non-native species treatments, native species restoration, and other plantings. These activities are expected to continue.
Navigation canal maintenance	U.S. Army Corps of Engineers, New Orleans District	Bayou Segnette Waterway and Gulf Intracoastal Waterway, within and adjacent to Barataria Preserve	Navigation channel maintenance is ongoing within the park. These activities result in direct and indirect impacts throughout the park. The spoilbanks created as the channels were dredged are the most obvious representation of those indirect effects and are a source of hydrologic disruption, which extends the effects beyond the canals. Spoil disposal associated within maintenance is an ongoing activity, resulting in impacts to resources.

<b>Project Name</b>	<b>Lead Agency</b>	<b>Location</b>	<b>Brief Description of Project</b>
Right-of-way maintenance	Pipeline and electric transmission line companies	Barataria Preserve	There are five electrical transmission lines and multiple distribution lines, as well as four natural gas pipelines and one crude oil pipeline that cross the Barataria Preserve. Effects associated with the operation and maintenance of these linear energy transmission features include regular vegetation maintenance and irregular structure replacement.
Research	Government agencies including the NPS and the U.S. Geological Survey, and a variety of academic institutions	Barataria Preserve and Chalmette Battlefield	Research at the Barataria Preserve is primarily focused on its natural resources—biotic or abiotic—and is ongoing. Research at the Chalmette Battlefield is primarily focused on cultural resources.
Battlefield entrance repair	NPS	Chalmette Battlefield	The NPS would replace the existing cast iron picket fence and entrance gates at the Chalmette Battlefield. The project would be limited to the northwest corner of the Chalmette Battlefield FMU.
Passage to Unity: Chalmette Memorial	NPS, the Bicentennial Commission of the Battle of New Orleans	Chalmette Battlefield	The NPS and the Bicentennial Commission of the Battle of New Orleans have developed plans for a memorial garden within the forested area along the north side of the Chalmette Battlefield. Design concepts include a bridge, memorial markers, and vegetation enhancements.
Rampart repair and maintenance	NPS	Chalmette Battlefield	Approximately 700 feet of the rampart at the Chalmette Battlefield is scheduled for maintenance in fiscal year 2016.
Compensatory wetland mitigation	U.S. Army Corps of Engineers, New Orleans District, Louisiana Coastal Protection and Restoration Authority	Barataria Preserve	Impacts to park and non-park wetlands associated with the construction of improvements to the Greater New Orleans Hurricane Storm Damage Risk Reduction System would be mitigated at locations within the Barataria Preserve. Construction of mitigation features would involve placement of dredged sediment or outside borrow into wetland creation areas and modification of spoilbanks to improve hydrology.

## **3.2 AIR RESOURCES**

### **3.2.1 Affected Environment**

The Clean Air Act establishes 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 to meet all federal, state, and local air pollution standards. The park is designated as Class II air quality area under the Clean Air Act, which means emissions of particulate matter and sulfur dioxide (SO<sub>2</sub>) 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, such as visibility, vegetation, water quality, wildlife, cultural resources, and most other elements of a park's environment (NPS 2006).

Ambient monitoring and estimates generated by NPS and based on regional air quality sites indicate that the park is in compliance with the National Ambient Air Quality Standards (NAAQS) (NPS 2015a). Most air pollution at the park originates outside the park boundaries with point (smoke-stack emissions) and mobile (motor vehicle) sources being the primary causes of air pollution in St. Bernard and Jefferson Parishes. The Chalmette Battlefield is within the urban area of Chalmette, located 5 miles east of downtown New Orleans. Chalmette is within St. Bernard Parish, which is in non-attainment for SO<sub>2</sub> (Louisiana Department of Environmental Quality 2015). St. Bernard Parish also has a ban on open burning without a permit from the local fire chief. The Barataria Preserve is located approximately 7 miles southwest of downtown New Orleans, immediately west of the community Estelle in Jefferson Parish. Jefferson Parish is considered "in attainment" of the NAAQS.

Wildfires generate smoke and ash, and produce a number of criteria pollutants including particulate matter (particulate matter equal to or less than 10 microns in diameter [PM<sub>10</sub>] and particulate matter equal to or less than 2.5 microns in diameter [PM<sub>2.5</sub>]), carbon monoxide, nitrogen oxides, and SO<sub>2</sub> regulated under Title I of the Clean Air Act of 1970, as amended, and Louisiana Air Control Law (Louisiana Revised Statutes 30:2051 et seq.). Nitrogen oxides and volatile organic compounds (VOCs) produced by wildfires can contribute to the formation of another criteria pollutant, ozone. Wildfires also produce a number of toxic air pollutants including, but not limited to, the VOCs acrolein, benzene, and formaldehyde, but in much lower concentrations than particulate matter and carbon monoxide (Ammann n.d.; California Air Resources Board 2003). These toxic air pollutants are regulated under Title III of the Clean Air Act and Louisiana Revised Statutes 30:2060.

More than 500,000 acres of forest, range, and agricultural lands are burned annually in Louisiana (Louisiana Office of Forestry 2013). The state acknowledges the ecological benefits and the cost effectiveness of prescribed fire; however, there is a need to lessen the impact of smoke generated from prescribed burning on the public's health and welfare. In 2013, the Louisiana Department of Agricultural and Forestry and the Louisiana Forestry Association developed the state's Voluntary Smoke Management Guidelines (2013). These guidelines outline the procedure to be used prior to implementing a prescribed burn: 1) determine category day, 2) determine proper screening distance, 3) determine trajectory of smoke plume, 4) identify smoke-sensitive and any other potential impacted areas, and 5) plan accordingly, then evaluate the results (Louisiana Office of Forestry 2013).

### **3.2.2 Environmental Consequences**

#### **Impact Analysis Method**

Impacts to air quality were analyzed for each alternative using available information on air quality in the area and the professional judgment of NPS staff and consultants. The analysis area includes the immediate locations

where fire management action would take place and the surrounding airshed where air pollutants may accumulate. For this analysis, proposed fire management actions may occur anywhere within the park's FMUs. Air quality impacts that originate in the park and extend to the surrounding regional environment are addressed.

## **Alternative A: No Action**

### *Barataria Preserve*

Under the No Action Alternative, fire management would continue to be limited to suppression activities only. Adverse impacts to air quality would only occur in the event of an unplanned wildfire, and under the existing FMP such fires would be suppressed. Since the park, in recent history, has not experienced a high fire frequency, it is expected that unplanned wildfires would be rare. Unplanned ignitions within the park are typically arson fires along roadways within the Barataria Preserve. These events are responded to quickly by local fire departments. A few unplanned ignitions within the wetland may occur; however, based on recent history, those impacts would likely result in short-term, localized contributions of smoke to the local airshed lasting the duration for which the unplanned ignition burns. The lack of control over atmospheric and drought conditions when unplanned wildland fires begin increases their potential to contribute emissions to the local airshed. If a wildfire does occur under extreme drought conditions, peat could ignite and smolder for many weeks, causing adverse air quality impacts for weeks, or possibly months. The No Action Alternative would result in adverse impacts to air quality.

### *Chalmette Battlefield*

As with the Barataria Preserve, fire management activities under the No Action Alternative would continue to be limited to suppression activities only within the Chalmette Battlefield FMU. Due to the size and accessibility of the Chalmette Battlefield, unplanned ignitions within the FMU would be immediately suppressed; therefore, de minimis impacts to air quality would occur.

### *Cumulative Impacts*

Several ongoing or future projects identified in Table 3 would cumulatively impact air quality. These projects include the canal reclamation project, vegetation restoration, and navigation canal maintenance projects. These projects would primarily generate emissions through the use of equipment with combustible engines and fugitive dust. These emissions would be limited to the duration of each project's activity schedule.

In addition, both FMUs are located either within (Chalmette Battlefield) or adjacent to (Barataria Preserve) the New Orleans metropolitan areas, which has heavy industrial development that contributes pollution to the airshed. Most notably, the Chalmette Refinery is located 0.8 mile from the Chalmette Battlefield and is the source of ongoing monitoring for compliance with the NAAQS (Louisiana Department of Environmental Quality 2009). The Greater New Orleans Area region is home to five other refineries (Greater New Orleans Inc. 2015). Other industrial development in the area includes petrochemical plants, power plants, shipping terminals, and manufacturing plants (Greater New Orleans Inc. 2015). These industrial activities would have local and regional long-term cumulative impacts on air quality. In addition, human-caused fires are known to occur on private land in the project vicinity for a variety of purposes. Seasonal burns on privately owned wetland are conducted for game management purposes and farmers burn sugar cane fields to reduce the amount of leafy extraneous material delivered with the cane to the factories for processing (Louisiana State University Ag Center 2000). These burning activities on private land would have local and regional short-term cumulative impacts on air quality. Under the No Action Alternative, unplanned ignitions that are allowed to burn would contribute to the adverse air quality by adding smoke and particulate matter to the local airshed for the duration of the unplanned ignition. Fire suppression activities within the park, when implemented, would result in a cumulative benefit to air quality.

## *Conclusion*

Overall, management actions under Alternative A would result in very small, if any, contributions of emissions to the local airshed through unplanned ignitions primarily within the easily accessible portions of the park. A few unplanned ignitions may occur; however, those impacts would likely result in localized contributions of smoke to the local airshed. The duration of the impact would coincide with the duration of the unplanned ignition. Lack of control over atmospheric and drought conditions when unplanned wildland fires begin increase their potential to contribute emission to the local airshed. In rare drought conditions, adverse air quality impacts could occur for weeks, or possibly months, if unplanned ignitions result in smoldering peat fires.

## **Alternative B: FMP Revision (Preferred Alternative)**

Smoke would be an impact to air quality from both planned and unplanned ignitions within the park. The impact of smoke on local community members and park visitors would depend on weather conditions when fires are active and an individual's sensitivity to smoke.

The park would take measures to manage smoke impacts resulting from prescribed fire. Prior to implementing a prescribed fire, a prescribed fire plan would be written that meets the requirements established in the Interagency Prescribed Fire Planning and Implementation Procedures Guide (NWCG, Product Management System (PMS) 484, 2014). The prescribed fire plan would follow the PMS 484 prescribed fire plan template (PMS 484 - Appendix A) to include a go/no go checklist, complexity analysis, site description, map, personnel and equipment to be used, desirable weather conditions, desired fire behavior factors, and emergency protocol. Additionally, prescribed fire plans would follow Louisiana's Voluntary Smoke Management Guidelines (Louisiana Office of Forestry 2013). The park applied for a Letter of No Objection focused on prescribed fire at the Barataria Preserve FMU from the State of Louisiana Department of Environmental Quality on June 12, 2015.

This pre-burn planning and agency coordination would help guarantee that appropriate conditions exist during implementation of a prescribed fire and the likelihood for lower air emissions, such as smoke, to migrate away from the site-specific burn area. Prescribed fires would be carefully evaluated to consider smoke dispersal into the New Orleans metropolitan area. As a result, the effects to air quality from prescribed fire would be short term and localized near the prescribed fire area. The duration of the impact would coincide with the duration of prescribed burn activities.

## *Barataria Preserve*

Under the Proposed Action, fire management activities within the Barataria Preserve would contribute smoke and particulate matter to the local area. Planned ignitions would result in impacts to air quality; however these impacts are expected to be short term and minimal due to the implementation of mitigation measures discussed above, such as the application of Louisiana's Voluntary Smoke Management Guidelines as part of the prescribed fire plan and the Interagency Prescribed Fire Planning and Implementation Procedures Guide. These mitigation measures would reduce, if not eliminate, smoke impacts to sensitive receptors in the nearby communities. Fuels management and preparation of the FMU for prescribed burning could also improve the effectiveness of a response to unplanned ignitions; thereby resulting in beneficial impacts to regional air quality.

Unplanned ignitions would result in impacts to air quality within and near the park. A variety of fire management strategies would be available to manage unplanned ignitions, including full suppression, point/zone protection, and monitor/confine/contain. Management of wildfire could affect air quality and visibility in the park and the surrounding areas depending on the location of the fire and wind conditions. If a wildfire does occur under extreme drought conditions, peat could ignite and smolder for many weeks, causing adverse air quality impacts for weeks, or possibly months. Based on the fire history within the park over the last few decades, impacts to air quality from unplanned ignitions are expected to be short term and localized.

The duration of the impact would coincide with the duration of the unplanned ignition. There are no documented cases of air quality concerns, including smoke impacts, to the New Orleans metropolitan area from wildfires occurring with the park. However, lack of control over atmospheric and drought conditions when unplanned wildland fires begin increases their potential to contribute emissions to the local airshed.

Wildland fire management actions would require the use of mechanical equipment, such as mowers, engines, pumps, all-terrain vehicles, airboats, helicopters, marsh masters, that would result in exhaust emissions that may include nitrogen oxides and SO<sub>2</sub>, which are criteria pollutants. These emissions would be intermittent and temporary, lasting only for the duration of fire management events. Emissions from the use of mechanical equipment would be small relative to the emissions generated by unplanned or planned ignitions.

### *Chalmette Battlefield*

The Chalmette Battlefield is within the urban area of Chalmette, located 5 miles east of downtown New Orleans. Chalmette is within St. Bernard Parish, which is in non-attainment for SO<sub>2</sub> (Louisiana Department of Environmental Quality 2015). Based on First Order Fire Effects Modeling, fire management activities would contribute smoke, particulate matter, and de minimis levels of SO<sub>2</sub> to the atmosphere (personal communication with H. Pate regarding First Order Fire Effects Modeling 6.0 results for tall fescue vegetation). Specifically, contributions of SO<sub>2</sub> would range seasonally from approximately 6 to 7 pounds per acre, or approximately 720 to 840 pounds of SO<sub>2</sub> per prescribed burn, based on a 120 acre area (personal communication with H. Pate regarding First Order Fire Effects Modeling 6.0 results for tall fescue vegetation). As discussed above, the park would follow air quality guidelines in the NWCG PMS 484 and Louisiana's Voluntary Smoke Management Guidelines, which establish minimum screening distances for downwind sensitive areas (Louisiana Office of Forestry 2013). Prior to initiating prescribed fire activities within the Chalmette Battlefield FMU, the park would need to obtain permits from St. Bernard Parish and the Louisiana Department of Environmental Quality. The park would burn the open grass battlefield on days where conditions allow for smoke to be dispersed into the atmosphere away from sensitive targets, such as hospitals, schools, communities, nursing homes, roads, and airports. Given the homogeneous, light fuels (grass), relatively small area (120 acres), and topography (flat) within the Chalmette Battlefield FMU, air quality impacts from prescribed fire within the park would be temporary, in the order of 4 hours or less for each prescribed burn. Impacts from planned fire management in the park would provide beneficial impacts to regional air quality by reducing the threat of high-intensity and smoke-inducing wildfire.

Wildland fire management actions would require the use of mechanical equipment, such as mowers, engines, pumps, and all-terrain vehicles that would result in exhaust emissions that may include nitrogen oxides and SO<sub>2</sub>, which are criteria pollutants. These emissions would be intermittent and temporary, lasting for the duration of fire management events. Emissions from the use of mechanical equipment would be small relative to the emissions generated by unplanned or planned ignitions.

Unplanned ignitions with the Chalmette Battlefield FMU would be immediately suppressed; therefore, de minimis impacts to air quality would occur.

### *Cumulative Impacts*

The cumulative impacts to air quality of other burning activities would be the same as those described for the No Action Alternative: local and regional, short and long term, and adverse. Periodic unplanned ignitions would also continue under the Proposed Action, as described above. The Proposed Action would add smoke and particulate matter emissions when prescribed burns occur. The Proposed Action would cumulatively contribute greater air quality emissions to the airshed than the No Action Alternative. The cumulative effects of the proposed project on air quality would be sporadic and temporary. The duration of the impact would coincide with the duration of prescribed burn activities. The application of the State of Louisiana's Voluntary Smoke Management Guidelines would reduce the intensity and duration of those contributions.

## *Conclusion*

The Proposed Action would result in short-term adverse impacts to local air quality primarily in the form of smoke and particulate matter from planned and unplanned ignitions at both the Chalmette Battlefield and the Barataria Preserve. Impacts from unplanned ignitions would be short term, infrequent, and unpredictable. Smoke impacts from unplanned ignitions have the potential to contribute more smoke to the surrounding communities due to the lack of control over atmospheric conditions when unplanned wildland fires begin. Impacts from prescribed burns would be short term and minimal due to the commitment to implement the Louisiana's Voluntary Smoke Management Guidelines, which preclude burning when conditions would severely impact neighboring communities and sensitive receptors.

## **3.3 SOIL RESOURCES**

### **3.3.1 Affected Environment**

The Barataria Preserve is positioned within the upper Barataria estuarine basin between two distributary arms of the Mississippi River (the current main stem of the river and Bayou Lafourche) and straddles an older distributary arm, the Bayou des Familles/Bayou Barataria, which is flanked by natural levees, formed from annual spring flooding and depositional processes (NPS 2015a). As the Mississippi River changed course, abandoned distributary beds slowly filled with sediment, leaving narrow tidal drainage streams, or bayous. The flat topography of the Barataria Preserve and abundance of slowly decaying organic matter present conditions that allow for the constant buildup of organic sediments (NPS 2009a), however, changes to the hydrology of the basin now largely prevent the deposition of mineral sediments.

Two broad categories of soils are found within the Barataria Preserve: mineral and organic soils (Figure 4). Mineral soils are characterized as very deep, level to gently undulating, somewhat poorly drained soils formed in clayey alluvium that is moderately to slowly permeable. Organic soils range in depth from about 16 to 100 inches, are very poorly drained, and formed from decomposed freshwater or brackish herbaceous and woody material over alluvial sediments (NRCS 2009). In general, the mineral soils are associated with the higher elevation Holocene epoch natural levee alluvial deposits from the Barataria/des Familles Mississippi River distributary (NRCS 2009; USGS 1998). The organic soils occur within the remainder of the Barataria Preserve and are associated with Holocene epoch fresh and brackish water deltaic plains (NRCS 2009; USGS 1998).

The majority of the Barataria Preserve is composed of Kenner muck soil (NRCS 2013), which consist of very deep, very poorly drained, very slowly permeable, organic soils (NRCS 2009). Kenner soils formed from herbaceous plant remains stratified with clayey alluvium in freshwater marshes. Other soil types that are less represented include Allemands muck, Barbary muck, Lafitte-Clovelly, and Schriever clay, Cancienne silt loam, and Cancienne silty clay loam (NRCS 2009) (Figure 4). The marshes that make up the Barataria Preserve FMU are composed primarily of peat soil, some of which is buoyant (flotant) and some semi-buoyant (tremblant). These organic floating mat soils are composed of a mat root zone of fibrous roots and an underlying mat peat zone (Sasser et al. 1996). These soils are characterized by a substrate depth of 10 to 30 centimeters, low bulk density, and high (>80%) organic dry mass (Sasser et al. 1996), with vegetated surfaces (NPS 2015a).

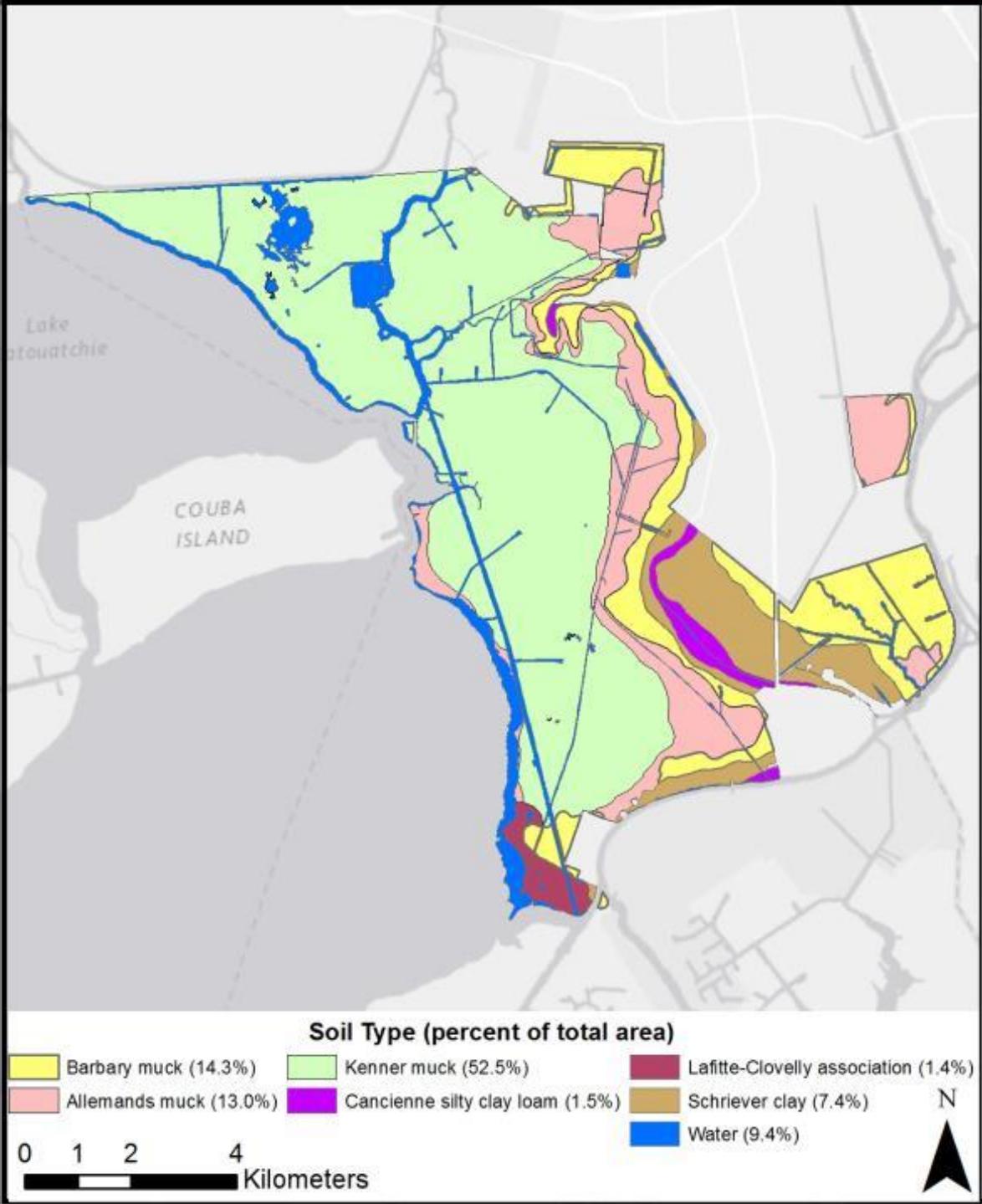


FIGURE 4. SOIL TYPES OF THE BARATARIA PRESERVE FMU. SOILS COMPRISING LESS THAN 1.0% OF THE TOTAL AREA ARE NOT SHOWN.

### *Chalmette Battlefield*

The battlefield is located on a recent deposit of deltaic soil (deposited over the last 3,500 years), and soils are defined as being characteristic of the Schriever series (NPS 2011), a very deep, poorly drained alluvium with slow permeability that is found on the lower Mississippi River alluvial plain (NRCS 2013). The soil is also generally saturated between 0 and 0.5 feet from December through April in normal years and moist in the subsoil layers below that depth. The soil is most frequently used for cropland, pasture, and hay crops with sugar cane and rice historically grown in that soil series (NRCS 2013). The NRCS has characterized the Schriever series as hydric soils in the State of Louisiana (NRCS 2009).

## **3.3.2 Environmental Consequences**

### **Impact Analysis Method**

To analyze impacts to soils all available soil data were compiled in consultation with park staff. Primary data were retrieved from the NRCS web soil survey (NRCS 2013) and the NRCS official soil series descriptions (NRCS 2009). Other supporting information includes recent park documents, scientific publications, and professional expertise.

### **Alternative A: No Action**

#### *Barataria Preserve*

Swamp soils in the Barataria Preserve FMU consist largely of clay, which is mainly Mississippi River sediment (Conner and Day 1987). In contrast the marsh areas have an increased thickness of organic soils, as a result of detritus deposited in the marsh environment that remains partially un-decomposed, resulting in the build-up of peat, some of which is buoyant and some semi-buoyant. The organic content of the soils in the marsh is about 67% (Conner and Day 1987), some areas have peat that is up to a meter thick with vegetated surfaces (NPS 2015a). Under normal conditions fire in these ecosystems would consume aboveground vegetation and result in only short-duration impacts to underlying soil, with some beneficial impacts associated with increased nutrient cycling. In rare instances, extreme drought can dry out the peat, and wildfires may be of a higher intensity (Watts 2012). Under the existing FMP, fire managers would have the ability to suppress these fires, if the conditions allow, before they can gain size; if the fire resists containment, potential impacts to soils include consumption of the organic peat layer, exposure of mineral substrate, damage to plant and tree roots, and subsequent changes to the plant community, indirectly impacting soil structure and stability. These impacts to soil would be lasting and adverse.

It has been documented that freshwater marsh communities and swamp forests within the Barataria Preserve are at risk of submergence due to sea level rise and subsidence (NPS 2015a). Naturally ignited wildfires are uncommon in the Barataria Preserve, but periodic fluctuations in the water table that correlate with weather cycles can increase combustibility of the vegetation community (Reardon et al. 2005). The fires that result generally consume available surface vegetation but little below ground organic soil material (Curtis 1959). However, in the rare event that a wildfire ignition occurs under extreme drought conditions there is potential that it would result in direct consumption of organic matter and peat, and loss of vegetation communities in the marsh (Johnson 1992; Kasischke and Stocks 2000; Reardon et al. 2005; Watts 2012). Even under normal conditions, a lightning strike may also ignite wax myrtle (*Morella cerifera*), which is a flammable species that burns vigorously (Christensen 1981); the continuous canopy of wax myrtle in some areas of the Barataria Preserve FMU may allow fire to move through the above ground vegetation and in rare instances move below ground igniting the peat layer. Although peat burns would be extremely rare, if they did occur there would be adverse impacts to soils within the Barataria Preserve FMU that would last for many years (Watts 2012). There is very little data regarding fire effects on marsh and swamp soils and vegetation in coastal areas. The impacts of burning on accretion rates in the marsh area and subsequent impacts on vegetation communities is a

research subject that the park wishes to explore further through its FMP. Under the No Action Alternative, these research studies would not be pursued and therefore experimental measures, such as the application of prescribed fire, to combat subsidence for the protection of marsh and swamp vegetation and soils would not be implemented. Since research advances would not be made, the impact of fire or lack of fire on soils and accretion would remain unknown.

### *Chalmette Battlefield*

The battlefield's soils are classified as Schriever silty clay loam. Schriever soils are very deep, poorly drained alluvium, and typically are associated with levee ridge backslope areas of the Mississippi River (NPS 2011). The grassland fuel type is expected to sustain fast moving wildfire of high intensity but minimal duration. Under the No Action Alternative, all wildland fire would be suppressed regardless of origin.

Fire management actions implemented to suppress wildfire in the Chalmette Battlefield FMU could cause soil compaction from firefighters trampling, tracks and tread from mechanical equipment, and compaction from the use of water applications. Mitigation measures to avoid the most sensitive soils would alleviate impacts resulting from compaction, and therefore adverse impacts are expected to last for the duration of the fire management actions.

Surface soil disturbance may occur as a result of the construction of lines or fuel breaks by firefighters to contain the fire.. Exposed mineral soils from suppression activities could be vulnerable to erosion. Mitigation measures to prevent soil losses through erosion would be used, and therefore adverse impacts from soil disturbance are expected to last for the duration of the fire management actions.

Under the No Action Alternative vegetation management actions include mowing, which causes rutting and compaction of battlefield soils. Continuing with the No Action Alternative would result in continued rutting, compaction, and potential soil erosion as a result of mowing, which would generate long-term adverse impacts to soils. Compaction and erosion can lead to the loss of soil productivity, reduced water infiltration and drainage, and the inability for soil to support vigorous vegetation growth.

### *Cumulative Impacts*

The past, present, and reasonably foreseeable similar, or cumulative actions that may affect soils include vegetation management programs and research activities. Vegetation management actions that include invasive non-native species treatments and plantings would result in soil disturbance at plant removal and planting sites that could cause localized short-term impacts to soils. Research activities in the Chalmette Battlefield FMU are usually related to cultural resources and artifacts. Depending on the nature of this research, there may be some degree of soil disturbance due to archaeological activities. Research activities at the Barataria Preserve occasionally include the installation of wells, which results in soil disturbance. These actions are expected to be short in duration, and mitigation actions and BMPs would be employed to minimize soil impacts.

Other past, present, and reasonably foreseeable actions have affected or could affect soils in the Barataria Preserve. Vegetation restoration programs, such as the removal of invasive non-native species, increase soil disturbance. Reclamation of approximately 20 miles of canals would create short-term adverse impacts to soils; however, long-term impacts would be beneficial due to the reclamation of high elevation spoilbanks, restoring more natural hydrology and vegetation, and improving soils (Lane et al. 2006). Conversely, the maintenance of navigation canals throughout the park causes ongoing soil disturbance and erosion, effects of which are short to long term and adverse. Efforts by the State of Louisiana, the NPS, and others to remove non-native animal species, such as nutria (*Myocastor coypus*) and wild pigs (*Sus scrofa*), result in a beneficial impact to soils as nutria and wild pigs destroy large swaths of wetland vegetation, resulting in soil erosion.

Compensatory wetland mitigation by the U.S. Army Corps of Engineers and Louisiana Coastal Protection and Restoration Authority would build wetland areas with the Barataria Preserve using dredged sediment and borrow material. Spoilbanks would also be modified to improve hydrology. These activities would beneficially

impact soils by reconstructing wetlands where they historically occurred and removing artificial impoundments caused by the spoilbanks. When combined with the short-term adverse impacts of the No Action Alternative, the cumulative impacts to soils as a result of other past, present, and reasonably foreseeable actions would be short-term adverse impacts and short- to long-term beneficial impacts.

### *Conclusion*

The No Action Alternative would result in adverse impacts to soils in the Barataria Preserve and Chalmette Battlefield FMUs as a result of continued degradation of habitat and impacts from unplanned ignitions. Cumulative impacts to soils would be adverse due to fire management actions that may cause soil disturbance and erosion during an unplanned ignition; however the No Action Alternative would contribute negligibly to cumulative adverse impacts.

## **Alternative B: FMP Revision (Preferred Alternative)**

### *Barataria Preserve*

Under this alternative, prescribed fire would be used to reduce existing fuel loads and a full range of suppression options would be available to firefighters in the event of a wildfire. Prescribed fire would be used in designated areas of the marsh. Prescribed fire would not be applied in the swamp ecosystem; however, the transitional area of vegetation between the marsh and swamp may be burned during prescribed fire if conditions are appropriate for burning. In the rare event that a wildfire occurs in either the swamp or marsh, fire managers would have greater discretion to manage these fires, and could include potential improvements to soils in their decision-making. However, if these fires gain size there is potential for loss of peat through fires burning underground and changes to the plant community as a result of top killing of plants and trees and damage to root systems.

In the long term, the use of planned prescribed fire to reduce the density of vegetation in the FMU would reduce the impacts of wildfire management associated with suppression of wildfires. Prescribed fire would be carefully managed and used within a strict window of weather conditions to mitigate impacts to soils, and MIST would be used for both wildfire suppression and prescribed burning activities. Discrete units within the marsh would be prepped for burning, including construction of containment lines and removal of dense areas of vegetation, as needed. Prescribed fire may spread to transitional areas between the marsh and swamp depending on the design of the burn unit, placement of containment lines, weather conditions under which burning would occur, and vegetative conditions. Adverse impacts could include exposure of soil to increased heating and drying and resulting compaction or burning of the soil. Equipment and personnel activity prior to and during the prescribed burn could cause localized compaction. Through mitigation and the use of BMPs, most impacts are expected to be temporary and would result in short-term adverse impacts to soil. More long-term adverse impacts may occur, however, if burning reduces accretion in marsh areas, as has been reported in some literature (Nyman and Chabreck 1995). Wildfires would continue to be suppressed during drought conditions or if the fire was not expected to meet research or resource, including soil, management objectives, and therefore direct impacts to organic soils are expected to be short term. Another direct impact from prescribed fire would be the potential for soil contamination from spills from firefighting equipment, e.g., hydraulic fluids and fuel. Through the use of BMPs for equipment use and handling of chemicals, this potential impact would be mitigated.

Fire management actions in wetland ecosystems can also impact soil nutrient cycling (DeBano et al. 1998; Reardon et al. 2005) as a result of changes to soil microbial composition and activity (Reardon et al. 2005). These wetland ecosystems are characterized by (water loving) hydric soils and plant communities with fluctuating hydrology that generates an interplay between aerobic and anaerobic processes (Gutknecht et al. 2006). Any alteration to water, sediment, and nutrient loads can impact that balance and cycling and overall ecosystem functioning. Alterations in microbial activity can result in nutrient cycling changes in nitrogen mineralization, nitrification rates, and phosphorous mineralization rates (Reardon et al. 2005).

Prescribed fire would be used in designated areas of the marsh. Burning in marsh environments may impact denitrification rates by affecting below ground plant production; however, this has not been well documented and in most marshes nitrate availability generally limits denitrification rates (Nyman and Chabreck 1995). The Barataria Preserve is experiencing encroachment by actinorhizal (nitrogen fixing) wax myrtle. The impact on soil nitrogen from burning wax myrtle could be explored through the research program proposed under the Proposed Action.

Wetland soils store larger volumes of organic carbon than terrestrial ecosystems (Reardon et al. 2005). Prescribed fires may increase the content of soil organic carbon post-fire, largely through increased plant growth (Komarek 1975; Nyman and Chabreck 1995). The abundance of soil organic carbon in marsh habitats post-fire has also been associated with the frequency of burning, with reduced carbon accumulation rates being attributed to increased frequency of below ground peat fires and reduced peat depths (Kuhry 1994). Impacts on soil carbon levels are thought to be temporary (Reardon et al. 2005). Soil organic matter, carbon to nitrogen ratio, pH values, microbial biomass, and nutrient availability have all been found to increase in marsh and wetland soils after burning (Badia and Marti 2003; Zhao et al. 2012); however, most studies find increases to be temporary in nature (Clay et al. 2009), persisting for only 1 to 2 years post-fire. Impacts from prescribed fire on soil nutrient cycling are expected to be adverse over the short term and beneficial over the long term. Reducing fuel loading and removing invasive species are thought to create long-term beneficial impacts to soil nutrient cycling.

It has been documented that wetland communities within the Barataria Preserve are at risk of submergence due to sea level rise and subsidence (NPS 2015a). Data from the NWLON near the Barataria Preserve FMU indicate a stable rate of relative sea level rise at 9.24 mm/year. Rates of subsidence within the park are not well known, as existing data from USGS and other sites are not yet sufficient to assess trends; however, park managers are concerned that the persistence of the freshwater marsh is threatened by this sea level rise (NPS 2015a). Accretion is an important component of the marsh ecosystem as it prevents submerging of wetland species as sea levels rise (Nyman et al. 2006).

There is a widespread assumption that vertical accretion depends on mineral sedimentation linked to river deposits, tidal, wave, and storm energy (Nyman et al. 2006; Stoddart et al. 1989; Temmerman et al. 2004; Lane et al. 2006). However, vertical accretion has also been linked to organic matter accumulation (Chmura and Hung 2004; Turner et al. 2000) or “accretion via vegetative growth” (McCaffrey and Thomson 1980). Marsh soils at the preserve are composed of approximately 65% organic matter, the primary source of which is believed to be debris derived from standing vegetation (NPS 2015a). Marsh burning may impact the vertical accretion of the marsh environment (Nyman and Chabreck 1995) since any action that positively or negatively impacts plant production would impact vertical development of the marsh, which occurs through the accumulation of organic matter (biogenic accretion) (Cherry et al. 2010; McKee and Grace 2012). The impacts of marsh burning on accretion rates are not well understood (Cherry et al. 2010); however, because fire may alter water quality, plant productivity, and ultimately accretion, prescribed fire may be a useful tool for enhancing elevation gain of marsh environments that have been threatened by submergence resulting from sea level rise (Cahoon et al. 2010; Cherry et al. 2010). Cahoon et al. (2010) suggest that burning could result in 1) rapid mineralization of organic matter, resulting in increased soil nutrient content; 2) increased exposure of the marsh surface and emerging shoots through the removal of standing dead materials; and 3) increased soil temperatures in the spring stimulating root growth.

However, it has also been postulated that burning that removes accumulated peat and organic matter would adversely impact accretion rates and risk the long-term persistence of marsh habitat (Nyman and Chabreck 1995). This would be most likely during drought conditions when wetland vegetation and peat become more available to burn. Nyman and Chabreck (1995) qualify that, depending upon burn frequency and intensity, plant biomass production could be stimulated without substantial loss of accumulated organic material (Nyman and Chabreck 1995).

McKee and Grace (2012), in an experimental study of prescribed fire in a Texas brackish marsh, found that although above and below ground production rates varied annually, they were unaffected by burning. They found that accretion rates were higher in burned plots and that prescribed burning on a 3- to 5-year interval does not pose a risk to long-term sustainability of the brackish marsh. They conclude that the potential effect of burning on elevation change in other marshes will depend on several site-specific factors, including geomorphic/ sedimentary setting, tide range, local rate of relative sea level rise, plant species composition, additional management practices (for example, for flood control), and disturbance types and frequency (for example, hurricanes or herbivore grazing) (McKee and Grace 2012: 1).

The contradictory accounts in the literature suggests that there is a sensitive balance between stimulated plant production resulting from fire, and consumption of organic matter reducing vertical accretion rates (Nyman and Chabreck 1995; McKee and Grace 2012); many authors conclude that this subject requires additional research (Cahoon et al. 2010; Cherry et al. 2010; McKee and Grace 2012; Nyman and Chabreck 1995). The interaction of non-native species within burned areas could also influence accretion rates within wetlands. McFalls et al. (2010) observed increased foraging by herbivores in areas where prescribed fire was applied and high nutria population densities occurred, which could lead to reduced accretion rates and increased inundation. The impacts of burning on accretion rates in the Barataria Preserve FMU is a research subject that the park wishes to explore further through its FMP. Prescribed burns in the Barataria Preserve FMU would be implemented in a strict prescription window and following BMPs and mitigation measures to closely monitor the impacts of prescribed burning on soil accretion rates. If prescribed burning does not result in long-term beneficial impacts to soil accretion rates, the use of fire in the marsh as a management tool would be closely re-evaluated.

### *Chalmette Battlefield*

Under this alternative, prescribed fire would be used as an alternative to mowing to reduce existing fuel loads and a full range of suppression options would be available to firefighters in the event of a wildfire.

The application of prescribed fire would release nutrients into the soil through ash deposits, recycling nutrients back into the soil and improving overall plant productivity. The addition of ash and other minerals post-fire combined with decomposing root systems and organic matter not fully consumed by the burn, ameliorates the soil, making it more porous and better able to retain water (DeBano et. al. 2005). Prescribed burning can also affect microbial activity particularly over the long term; microbial processes such as denitrification and production of methane and carbon dioxide have been found to increase in the year post-fire (Poth et al. 1995). Prescribed burning may also impact soil physical properties, such as texture, porosity, wettability, infiltration rates, and water holding capacity. Adverse impacts on soil properties are more common following high intensity wildfire or during prescribed fire if it transitions out of prescription. Because prescribed burning would occur during strict prescription windows, fire behavior is expected to be of a lesser intensity and firefighters would immediately suppress out-of-prescription prescribed fire. Therefore adverse impacts to soils would be mitigated and would be short term, with long-term beneficial impacts from improved nutrient cycling.

The removal of vegetative cover through prescribed fire could lead to potential increases in wind and water erosion. Potential impacts of erosion would be limited to a short period and would be eliminated once vegetation re-establishes; adverse impacts from erosion would therefore be short term.

### *Cumulative Impacts*

The cumulative impacts to soils from other past, present, and reasonably foreseeable actions would be similar to those described for the No Action Alternative. Fire management activities under the Proposed Action would contribute adverse impacts to soil resources during the duration of the prescribed fire activity, including the movement of personnel and equipment within the Barataria Preserve and Chalmette Battlefield FMUs. Overall, there would be adverse impacts to soil resources under the Proposed Action, including compaction and erosion

resulting from fire management activities, but beneficial impacts to nutrient cycling, soil structure and soil accretion rates as a result of efforts to improve soil conditions under the Proposed Action.

### *Conclusion*

Under this alternative, mechanical treatments would be used to prepare the marsh area for prescribed fire. Any wildfires that occur within the Barataria Preserve FMU are therefore likely to be of a reduced intensity, due to reduced fuel loading, previously established control lines, and increased response coordination. Lower intensity wildfires would require fewer damaging suppression actions and would therefore result in fewer adverse impacts to soils that would only last during the duration of the prescribed fire.. The Proposed action would contribute negligible adverse cumulative impacts during the duration of the prescribed fire, . The Proposed Action provides the Park with the potential to better understand fire effects and apply that knowledge to benefit soil management.

Under the Proposed Action, mechanical treatments would be used to prepare the Chalmette Battlefield FMU area for prescribed fire. This alternative would result in adverse impacts during the duration of the prescribed fire and long-term beneficial impacts to soils in the Chalmette Battlefield FMU. The Proposed action would contribute negligible adverse cumulative impacts during the duration of the prescribed fire, as a result of compaction and erosion associated with fire management activities, Cumulative impacts would be adverse impacts and short- to long-term beneficial impacts with the Proposed Action contributing additional adverse and beneficial impacts.

## **3.4 WATER RESOURCES**

### **3.4.1 Affected Environment**

The Mississippi River and the network of estuarine bayous, bays, and marshes connect to the Gulf of Mexico are major hydrologic influences on both the Barataria Preserve and Chalmette Battlefield FMUs. However, because Chalmette now sits in an artificial drainage basin surrounded by levees, it is almost completely cut off from those systems (NPS 2011). Therefore, no water bodies, streams, or tributaries are located within the Chalmette FMU, except for the river that forms the southern boundary of the unit (NPS 2011). Water resources in this unit are limited to isolated wetlands irregularly flooded by impounded precipitation.

The Barataria Preserve lies within the upper, freshwater portion of the Barataria Basin, which is defined as the portion of the Mississippi Delta bounded by Bayou Lafourche and the Mississippi River (NPS 2012b). Historically, the basin contained an active deltaic sublobe of the Mississippi River, known as the Bayou des Familles–Bayou Barataria branch of the St. Bernard delta complex. Bayou des Familles remains the largest natural waterway in the park, but today is only a narrow tidal stream because of natural sedimentation and human land use (NPS 1995). The Barataria Preserve is bound by Bayou Barataria on the east and Lakes Cataouatche and Salvador on the west (Figure 1).

In recent history, anthropogenic effects have played a large role in shaping the hydrology of the park. Before human intervention, hydrology was primarily affected by the Mississippi River, tidal actions, and precipitation (NPS 2012b). Construction of artificial levees and closing of channels has kept river water from entering the upper basin. Levees constructed for storm protection separate the Barataria Preserve from the uppermost Barataria Basin and increase influence from the Gulf of Mexico in the park unit. In addition, drainages and channelization of the streams in the area have significantly altered hydrology. Prior to the extensive levee construction on the Mississippi River, rainwater and river floodwaters provided freshwater inputs into the marshes and lakes through surface flow (NPS 2012b). Recent mitigation efforts, and most notably the Davis Pond Freshwater Diversion Project, have helped to restore inflow from the Mississippi River (NPS 2015a).

Tidal action also influences the park's hydrology. While tidal influence is minimal in the upper portion of the basin, strong storm surges can bring saltwater into the freshwater habitats (NPS 2012b). Saltwater intrusion has the potential to negatively affect plants and animals that tolerate low levels of salinity. In addition, salinity indirectly affects soil respiration by reducing root productivity and potentially directly affects respiration of the microbial community (Krauss et al. 2012).

Marsh habitats (herbaceous and scrub wetlands) comprise about 13,590 acres (61%) of the Barataria Preserve and consist of freshwater marsh, intermediate marsh, and scrub/shrub habitats (Jin et al. 2013; Nolfo-Clements 2006; Urbatsch 2009; White 1983). These are highly productive systems that support a variety of flora and fauna (NPS 1997; Nolfo-Clements 2006). The majority of these freshwater marshes are floatant where plants are rooted in an organic mat that detaches from the substrate and shifts vertically as water levels below rise and drop (Swarzenski et al. 1991). Historically, marshes buffered the influx of saltwater from storm surges, but reductions in marsh area in the region have diminished their abilities to slow the intrusions. Within the Barataria Preserve, intact marshes and their floatant vegetation continue to buffer interior sections of the basin.

Other water resource concerns for the park include water quality standards upheld by the EPA following the Clean Water Act (33 USC 1251 et seq.) and the Federal Water Pollution Control Act, as amended through Public Law 107-303, November 27, 2002). Only one small section of water adjacent to the park was included on the 2012 EPA 303(d) list of impaired waters (Louisiana Department of Environmental Quality 2012). This water body is a short length of the Intracoastal Waterway along the south side of the Barataria Preserve, which is considered impaired because of turbidity and microorganism contamination.

## **3.4.2 Environmental Consequences**

### **Impact Analysis Method**

Hydrology and water quality were analyzed for each alternative based on the effects of fire in the park. Available information on surface hydrology and water quality was obtained from the working draft of the Natural Resource Condition Assessment for the park (NPS 2015a) and the EPA's Office of Water online mapping system (EPA 2013). Impacts were analyzed qualitatively based on elements described under the Proposed Action using the professional judgment of NPS staff and consultants. The geographic area considered for hydrology and water quality includes the water bodies within and adjacent to the FMU boundaries for both the Barataria Preserve and the Chalmette Battlefield.

### **Hydrology**

#### **Alternative A: No Action**

##### *Barataria Preserve*

Potential adverse impacts could occur to hydrologic conditions at the Barataria Preserve over many years if subsidence and erosion leads to permanent loss of portions of the wetland, which could change sheet flow patterns within the Barataria Preserve.

##### *Chalmette Battlefield*

No impacts to hydrology at the Chalmette Battlefield would occur from the No Action Alternative. There are a few small wetlands within the battlefield; however, no known adverse impacts to hydrology have been identified as a result of current management.

### *Cumulative Impacts*

Other past, present, and reasonably foreseeable actions that may affect hydrology include the park's canal reclamation program within the Barataria Preserve, the vegetation restoration program, navigation canal maintenance, compensatory wetland mitigation activities, and future land acquisitions at the Barataria Preserve. The canal reclamation program involves approximately 20 miles of non-historic canals that are being filled and shaped to attempt to restore the marsh ecosystem where it previously existed within the canal footprint and indirectly affect adjacent wetlands. This activity is intended to restore hydrologic functions, which would have beneficial impacts to the preserve. Backfilling canals and building check meanders partially restores pre-canal drainage patterns by slowing and spreading out flow, which is more similar to natural sheet flow, and water movement through natural shallow drainages (NPS 2009a). Vegetation restoration, which includes the removal of invasive non-native species, such as Chinese tallow, would also beneficially impact hydrology by removing trees that can encourage growth of upland plant species in the marsh and encourage the growth of deeply rooted plants that can change the sheet flow and drainage patterns within the wetland.

Navigation canal maintenance contributes to the continual operation of large canals, which streamline the flow of saltwater inland, allowing for saltwater intrusion that destroys freshwater vegetation that is intolerant of salt, resulting in the loss of wetland habitat (Turner 1987). Canal spoilbanks prolong flooding and drying of interior wetlands, stressing marsh vegetation, and potentially creating more open water area (NPS 2009a). This impoundment of water can also trap saltwater behind spoilbanks and can result in long-term increased soil pore water salinity.

Compensatory wetland mitigation by the U.S. Army Corps of Engineers and Louisiana Coastal Protection and Restoration Authority would build wetland areas with the Barataria Preserve using dredged sediment and borrow material. Spoilbanks would also be modified to improve hydrology. These activities would beneficially impact hydrology by reconstructing wetlands where they historically occurred and removing artificial impoundments caused by the spoilbanks.

Several tracts of land have been acquired by the park in recent years, and the park is authorized to continue acquiring land for the Barataria Preserve. These acquired tracts protect additional areas of wetlands from development and adverse impacts that could occur under other management oversight. The acquisition, protection, and conservation of additional wetland areas has beneficial impacts on the hydrology of the park.

### **Alternative B: FMP Revision (Preferred Alternative)**

#### *Barataria Preserve*

Hydrologic concerns for marsh communities include altered water flow due to levees and canals, threats from sea level rise, subsidence, and wave erosion. Wildfire and prescribed fires could affect hydrology; if fires remove wetland vegetation, sheet flow would be altered until the vegetation recovered. Burning vegetation may also reduce resistance to sheet flow, and the existing hydrology could be temporarily altered depending on the timing and location of the fire. As vegetation recovers from the fire activity, hydrological conditions are likely to return to pre-fire conditions. Beneficial impacts could occur if prescribed burns within the Barataria Preserve result in enhanced accretion rates in the wetland, which would maintain and possibly improve the hydrologic conditions by elevating the marsh mat over many years.

#### *Chalmette Battlefield*

No impacts to hydrology at the Chalmette Battlefield would occur from fire management activities. A few small wetlands do occur within the battlefield; however, fire management activities would not change the hydrologic conditions that support the wetlands.

### *Cumulative Impacts*

The cumulative impacts to hydrology from other past, present, and reasonably foreseeable actions would be similar to those described for the No Action Alternative. Fire management activities under the Proposed Action would result in short-term cumulative impacts to hydrology by temporarily altering sheet flow where vegetation is burned. Long-term beneficial cumulative impacts would occur if prescribed burns in addition to the other planned activities within the Barataria Preserve result in enhanced accretion rates in the wetland, which would maintain and possibly improve the hydrologic conditions.

### *Conclusion*

Potential adverse impacts could occur to hydrologic conditions at the Barataria Preserve under the No Action Alternative if subsidence and erosion leads to permanent loss of portions of the wetland, which could change sheet flow patterns within the Barataria Preserve.

Beneficial impacts could occur if prescribed burns within the Barataria Preserve result in enhanced accretion rates in the wetland, which would maintain and possibly improve the hydrologic conditions by elevating the marsh mat over many years. Cumulative impacts would continue to result in degraded hydrologic conditions within the Barataria Preserve.

No impacts to hydrology at the Chalmette Battlefield are expected from the No Action Alternative or the Proposed Action because the FMU contains only a few small wetlands. These hydrologic conditions that support these wetlands would not be modified by either alternative.

## **Water Quality**

### **Alternative A: No Action**

#### *Barataria Preserve*

Potential adverse impacts could occur to water quality over the timespan of many years at the Barataria Preserve if salt water intrusion associated with sea level rise and storm events increases salinity within the freshwater marsh and swamp forests. Saltwater intrusion within the freshwater marsh is identified as a management concern by the park; however the Davis Pond Freshwater Diversion Project is helping to restore the inflow of freshwater from the Mississippi River (NPS 2015a).

#### *Chalmette Battlefield*

No impacts to water quality at the Chalmette Battlefield would occur from the No Action Alternative. There are a few small wetlands within the battlefield; however, no known adverse impacts to water quality have been identified as a result of current management.

### *Cumulative Impacts*

Other past, present, and reasonably foreseeable actions that may affect water quality include the park's canal reclamation program, the nutria reduction programs managed by the State of Louisiana and the NPS, the NPS's wild pig management program, navigation canal maintenance, compensatory wetland mitigation, and future land acquisitions at the Barataria Preserve.

The canal reclamation program is intended to improve water quality by reclaiming canals that would have beneficial impacts to the park. Backfilling and building check meanders partially restores pre-canal drainage patterns by slowing and spreading out flow, which is more similar to natural sheet flow, and water movement through natural shallow drainages (NPS 2009a). Important nutrient loads from natural flooding are disrupted by the channelized drainage caused by canals. Natural wetland drainage is slow, which allows nutrients to absorb in the marsh. Canals instead channel nutrient-rich water swiftly to receiving water bodies, denying

surrounding marsh area of nutrients and sediment (Turner 1987). Receiving water bodies in the park are often unable to process the nutrient loads, which creates problems with eutrophication (Taylor et al.1988).

Navigation canal maintenance contributes to the continual operation of large canals, which streamline the flow of saltwater inland, allowing for saltwater intrusion that destroys freshwater vegetation that is intolerant of salt, resulting in the loss of wetland habitat (Turner 1987). Canal spoilbanks prolong flooding and drying of interior wetlands, stressing marsh vegetation, and potentially creating more water area (NPS 2009a). This impoundment of water can also trap saltwater behind spoilbanks and can result in long-term increased soil pore water salinity.

Efforts by the State of Louisiana, the NPS, and others to remove non-native animal species, such as nutria and wild pigs, result in a beneficial impact to water quality. Nutria and wild pigs uproot large swaths of wetland vegetation, resulting in soil erosion and adverse water quality impacts.

Similar to the canal restoration program, compensatory wetland mitigation by the U.S. Army Corps of Engineers and Louisiana Coastal Protection and Restoration Authority would beneficially impact water quality by restoring more natural flow patterns that recharge wetlands with important nutrients and sediments.

Several tracts of land have been acquired by the park in recent years, and the park is authorized to continue acquiring land for the Barataria Preserve. These acquired tracts protect additional areas of wetland from development and adverse impacts that could occur under other management oversight, such as high nutrient levels from agricultural production and urban discharge that can lead to the eutrophication of park waters (NPS 2009a). The acquisition, protection, and conservation of additional wetland areas has beneficial impacts to water quality within the park.

## **Alternative B: FMP Revision (Preferred Alternative)**

### *Barataria Preserve*

Impacts to water quality from the Proposed Action include temporary release of nutrients during planned and unplanned ignitions and dispersal of small amounts of fuels used in ignition devices. Burning vegetation results in the release of nitrogen and other nutrients both in the project area and off-site in the form of ash that may be recirculated into plant biomass and cause a temporary increase in nutrient availability. Refer to Section 3.3 (Soils Resources) for the analysis related to the effects of fire on nutrient cycling. The result may have an adverse or beneficial effect on water quality depending on the water filtering capacity of the vegetation that remains or is adjacent to the burned area. The impacts of fire on nutrient cycling and water quality are expected to be short term.

The Proposed Action includes potential for wildland fire suppression in the marsh, but firefighters would use MIST to protect water resources during suppression activities. Water quality would be impacted by chemicals involved in fire management activities, especially if spills occur within or near open water. Drip torches used for ignition require a combination of diesel fuel, gasoline, and phosphates. Equipment, such as airboats, marsh masters, and other motorized vehicles may release small amounts of oil or other petroleum products. Fire management activities would not include the use of foam or retardant.

Adverse impacts to water quality would not occur from the Proposed Action because the goal of the FMP is to improve the resource conditions at the Barataria Preserve. Therefore, the park would establish strict operation parameters and mitigation, monitor and research the effects of fire, and closely re-evaluate the use of fire as a management tool if a pattern of adverse impacts developed as a result of fire management activities. If prescribed burns, implemented as directed by the FMP, improve and protect marsh conditions at the Barataria Preserve, water quality could improve as a result of improved filtering capacity and wetland functions.

### *Chalmette Battlefield*

No impacts to water quality at the Chalmette Battlefield would occur from fire management activities. There are no waterways within the FMU. A few small wetlands do occur within the battlefield; however, fire management activities would not change the water quality conditions within the wetlands.

### *Cumulative Impacts*

The cumulative impacts to water quality from other past, present, and reasonably foreseeable actions would be similar to those described for the No Action Alternative. Fire management activities under the Proposed Action would cumulatively contribute short-term adverse impacts to water quality due to potential spills and nutrient loading associated with prescribed burns in the Barataria Preserve. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial cumulative impacts to water quality would occur over the timespan of many years if prescribed burns within the Barataria Preserve result in improved wetland function within the park. This could occur through increased plant productivity, a mosaic of native vegetation communities, increased soil accretion rates, improved soil nutrient cycling, and improved hydrology. These wetland functions would cumulatively improve water quality within the Barataria Preserve.

### *Conclusion*

No impacts to water resources at the Chalmette Battlefield are expected from the Proposed Action due to the lack of waterways within the FMU. A few small wetlands do occur within the battlefield; however, fire management activities would not change the water quality conditions within the wetlands.

Fire management activities under the Proposed Action would result in short-term adverse impacts to water quality due to potential spills and nutrient loading associated with prescribed burns in the Barataria Preserve. The duration of the impact would coincide with the duration of prescribed burn activities. Similar and cumulative actions have been identified that would result in both beneficial and adverse impacts to hydrology and water quality. The Proposed Action provides the Park with the potential to better understand fire effects and apply that knowledge to benefit water resource management. Under the Proposed Action, research could investigate changes to hydrology, wetland filtering capacity, and wetland functions within the marsh ecosystem brought about by prescribed fire.

## **3.5 VEGETATION, INCLUDING NON-NATIVE SPECIES**

### **3.5.1 Affected Environment**

#### **Barataria Preserve**

Vegetative communities in the Barataria Preserve include terrestrial baldcypress-tupelo swamps, bottomland hardwood forests, marsh communities, and aquatic vegetation (Figure 5).

#### *Terrestrial Vegetation*

Forests within the Barataria Preserve are generally described as belonging to two broad classes: baldcypress-tupelo swamps and bottomland hardwood forests (Taylor 1988; Urbatsch 2009; White 1983). Bottomland hardwood forests within the preserve are primarily located on the natural levee of the abandoned Bayou des Famille Mississippi River distributary.

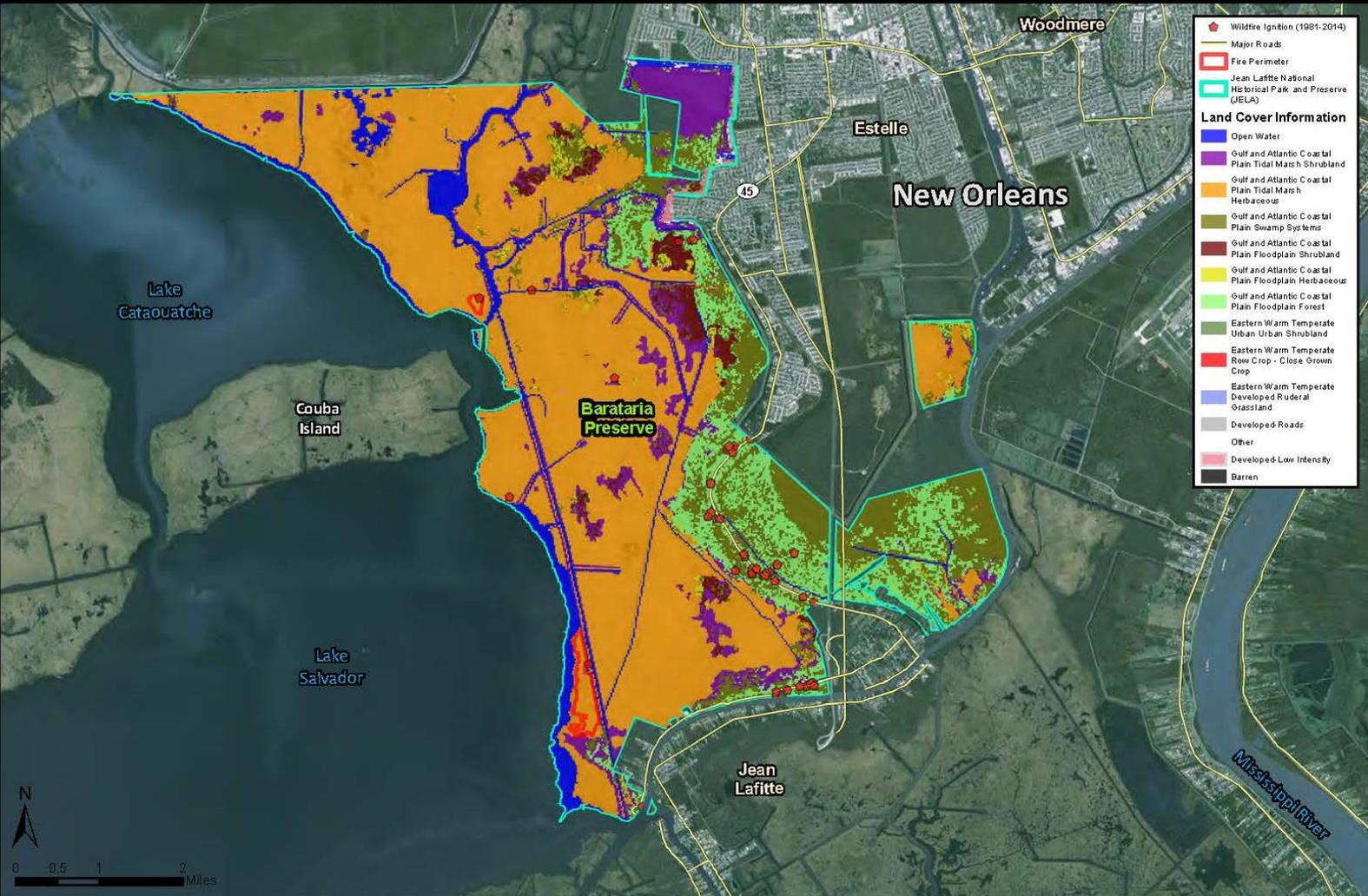
In the inventory of baldcypress-tupelo swamp, Urbatsch (2009) describes the community as being co-dominated by baldcypress (*Taxodium distichum* var. *distichum*) and water tupelo (*Nyssa aquatica*) and located in areas that are inundated most of the year. These areas are extensive throughout the Barataria Preserve, including locations east of Kenta Canal extending north and south through the preserve and in poorly drained

areas along Bayous des Familles. Urbatsch (2009) classifies bottomland hardwood forests in the park as Hackberry-American Elm-Green Ash Forest, Batture, Sweetgum-Water Oak Forest, Live Oak Natural Levee Forest, and disturbed spoilbank communities.

Several studies have described the threat that sea level rise and increased flood frequency pose to forest communities in the park and southern Louisiana (Conner and Brody 1989; Denslow and Battaglia 2002; Nelson et al. 2002; Taylor 1988; Wasilevich 2001). Increased inundation of forest communities in the park is believed to be primarily driven by subsidence, compaction of Holocene soils, reduced sediment loads, and anthropogenic sea level rise (NPS 2015a). As these various drivers act to increase inundation of forest communities, these changes will result in shifts in communities towards woody species more tolerant of inundation (Denslow and Battaglia 2002; Nelson et al. 2002) and an eventual loss of bottomland hardwood forests (Nelson et al. 2002). Denslow and Battaglia (2002) predict that the structure and composition of the forest will change with increased flooding though the patterns may not be straightforward to predict because of species and life-stage differences in inundation tolerance. Given these uncertainties, they recommend maintenance of small-scale topographic heterogeneity in bottomland forests to promote seedling establishment of a wide-variety of hardwood species.

**Vegetation Map for Barataria Preserve**  
 Revised Fire Management Plan for Jean Lafitte National Historical Park and Preserve

National Park Service  
 U.S. Department of the Interior



Produced by SWCA Environmental Consultants  
 Denver, Colorado

March 2015

World Imagery Source: Esri, DigitalGlobe  
 Layers: NHP, Landfire Data

Fire Management Plan (FMP)/Vegetation\_Map\_FMP\_JELA

**FIGURE 5. VEGETATION MAP FOR THE BARATARIA PRESERVE BASED ON LANDFIRE VEGETATION CLASSIFICATION DATA.**

## *Marsh Communities*

The Barataria Preserve's marshes generally occur at lower elevations than the swamps described above; where alluvial soils have subsided well below sea level.

Marsh habitats cover about 13,590 acres (61%) of the Barataria Preserve and consist of freshwater marsh, intermediate marsh, and scrub/shrub habitats (Nolfo-Clements 2006; Urbatsch 2009; White 1983). These highly productive systems support a variety of flora and fauna, and they include what is generally considered a globally rare floating marsh system regionally called flotant (NPS 1997; Nolfo-Clements 2006). Several vegetation surveys have been conducted in the freshwater marsh (Michot 1984; Nolfo-Clements 2006; Urbatsch 2009; White 1983, 1988). Freshwater marsh covers an extensive area in the Barataria Preserve from the shoreline of Lake Salvador eastward to the Kenta Canal (Urbatsch 2009). There are three types of floating communities—thin mat, thick mat, and wax-myrtle thicket, which are distinguished by the thickness of the floating mat and the dominant vegetation (Nolfo-Clements 2006; Urbatsch 2009). The entire floating mass—the mat—is divided into a mat root zone and an underlying mat peat zone (Sasser et al. 1996). The Barataria Preserve's flotant comprises part of the largest floating marsh complex in the world, which extends westward to the Atchafalaya Basin and is the only flotant marsh complex in the National Park System (NPS 2009a).

### *Freshwater Marsh*

The unique fresh flotant marsh system is composed of masses of intertwined living plant roots forming a relatively thick mat that is suspended above the water table. Bulltongue arrowhead (*Sagittaria lancifolia* ssp. *media*) is the dominant component of the freshwater marsh system within the Barataria Preserve (NPS 2015a). Other common fresh marsh species include floating marsh pennywort (*Hydrocotyle ranunculoides*), spikerush (*Eleocharis* spp.), saltmarsh morning glory (*Ipomoea sagittata*), broadleaf arrowhead (*Sagittaria latifolia*), cattail (*Typha* spp.), alligatorweed (*Alternanthera philoxeroides*), smooth beggartick (*Bidens laevis*), southern annual saltmarsh aster (*Symphotrichum divaricatum*), and southern amaranth (*Amaranthus australis*) (Urbatsch et al. 2007).

### *Intermediate Marsh*

The marshes of the Barataria Preserve transition from fresh to intermediate as they extend westward and southward toward the shoreline of Lake Salvador. Intermediate marsh makes up only a very small portion of the Barataria Preserve along the southern boundaries bordering Lake Salvador near the confluence of the Bayou Segnette Waterway and Bayou Barataria. This natural community includes plant species found in both fresh marsh and brackish marsh. The marsh is nearly devoid of woody species, except for wax myrtle and a recent invasion of Chinese tallow. Dominant marsh plant species include eastern baccharis (*Baccharis halimifolia*), wax myrtle, wiregrass (*Spartina patens*), common threesquare (*Schoenoplectus pungens*), pink redstem (*Ammannia latifolia*), spikerush, bristlegrass (*Setaria* spp.), cattail, and alligatorweed (Urbatsch et al. 2007).

### *Scrub/Shrub*

Scrub/Shrub communities are low, flat wetlands dominated by woody vegetation less than 20 feet high found in scattered patches throughout the interior marshes often occurring as flotant. This unique flotant scrub/shrub community is dominated by thickets of wax myrtle suspended upon mats of sphagnum (moss). Dominant species within scrub-shrub communities include Chinese tallow, black willow (*Salix nigra*), eastern baccharis, Drummond's maple (*Acer rubrum* var. *drummondii*), buttonbush (*Cephalanthus occidentalis*), yellow spikerush (*Eleocharis flavescens*), fern species, slender yellow-eyed grass (*Xyris torta*), chalky bluestem (*Andropogon virginicus* var. *glaucus*), pine barren goldenrod (*Solidago fistulosa*), beaksedge (*Rhynchospora* spp.), arrowhead (*Sagittaria* spp.), manyflower marshwort (*Hydrocotyle umbellata*), sawtooth blackberry (*Rubus argutus*), green flatsedge (*Cyperus virens*), pickerelweed (*Pontederia cordata*), herb of grace (*Bacopa monnieri*), smartweed (*Polygonum* spp.), turkey tangle fogfruit (*Phyla nodiflora*), giant cutgrass (*Zizaniopsis miliacea*), and rush (*Juncus* spp.) (Urbatsch et al. 2007).

The major threats to the marsh habitats with the Barataria Preserve include saltwater intrusion, invasive species, and relative sea level rise. Saltwater intrusion has been found to result in an overall expansion of intermediate marsh (Michot 1984; Taylor 1988), made up of more oligohaline species tolerant of the increased salinity (Visser et al. 2002).

### *Non-native Vegetation*

In addition to the diversity of native plants, the Barataria Preserve is plagued by a multitude of non-native plants.

The presence of non-native species, and in particular multiple species that have been documented as having moderate to severe impacts to native communities, are a management concern (NPS 2015a). Previous inventory efforts suggest that there are over 524 taxa in the Barataria Preserve FMU and 244 in the Chalmette Battlefield FMU. During a 2009 inventory effort (Urbatsch 2009), 350 of the species were identified, of these species, 17.7% were non-natives in the Barataria Preserve and 28.3% at the Chalmette Battlefield. The NPSpecies database reports a slightly different ratio of non-native/native vascular plants present in the park at with 106/250 (42.4%) classified as non-native (NPSpecies 2014).

In total, eight non-native species have been ranked as either high or medium threats to the park. Common non-native aquatic plants include water hyacinth (*Eichhornia crassipes*), common salvinia (*Salvinia minima*), and alligatorweed. Common terrestrial non-native plants and vines include Chinese tallow, Chinese privet (*Ligustrum sinense*), Japanese climbing fern (*Lygodium japonicum*), camphor tree (*Cinnamomum camphora*), and Japanese honeysuckle (*Lonicera japonica*). Giant salvinia (*Salvinia molesta*) is also a threat to the marsh (Fox, D. 2015a. Personal communication between David Fox [NPS] and SWCA, June 22, 2015).

Chinese tallow has been a species of particular concern and subject of previous research and management activities at the park (Battaglia et al. 2009; Harper 1995; White 1983). Chinese tallow is known for its ability to invade a wide variety of habitats including floating marshes, bottomland forest, and especially disturbed areas such as spoilbanks where it can form nearly pure stands (Battaglia et al. 2009; White 1983). Several authors have described a relationship between increased light availability in forest gaps and Chinese tallow invasion (Denslow and Battaglia 1998; Harper 1995; NPS 2015a).

### *State Listed Species*

#### *Floating Antler Fern*

Floating antler fern (*Ceratopteris pteridoides*) is a Louisiana state imperiled dimorphic fern that occurs in swamps, ditches, and canals. It is known to occur in the Pontchartrain, Barataria, Terrebonne, Atchafalaya, and Vermilion-Teche River Basins (Barataria-Terrebonne National Estuary Program and Louisiana Wildlife and Fisheries 2015a). The species is found on open water in slow moving waterways and swamps under conditions that are unlikely to carry fire.

#### *Golden Canna*

Golden canna is a Louisiana state rare large perennial species that occurs in freshwater marsh and open swamps. The current status of the species in Louisiana is not well known, though it is thought to occur in the Pearl, Ponchartrain, Barataria, Terrebonne, Vermilion-Teche, Mermentau, Calcasieu, and Sabine River Basins (Barataria-Terrebonne National Estuary Program and Louisiana Wildlife and Fisheries 2015b). Little is known of fire's effects on the species.

#### *Swamp Milkweed*

Swamp milkweed is a Louisiana state imperiled robust perennial milkweed that occurs in freshwater swamps and marshes throughout Louisiana. It is known to occur in the Pontchartrain, Barataria, and Terrebonne River Basins (Barataria-Terrebonne National Estuary Program and Louisiana Wildlife and Fisheries 2015c). Swamp milkweed is a component of prairie wetlands, so it has evolved with some fire exposure, although the species

is shallow rooted so it would be killed by high severity fires. The moist habitat of swamp milkweed would discourage most fire entry except during drought conditions (Pavek 1992).

### Western Umbrella Sedge

Western umbrella sedge is a Louisiana state imperiled perennial sedge that occurs in freshwater to intermediate marsh (Barataria-Terrabonne National Estuary Program and Louisiana Wildlife and Fisheries 2015d). Little is known of the effect of fire on the species.

### *Fire and Fuel Dynamics*

Prior to European colonists, fire was commonly used by Native Americans to increase game numbers and improve navigation through marshes. Following colonization, settlers reduced fire frequency up until a period around 1910 when fire was again used as a means to improve game numbers for trappers and hunters, improve wildlife habitat (Wade et al. 2000), and reduce fuel loads to prevent catastrophic fires (NPS 2015a). However, Nyman and Chabreck (1995) noted that fire may have negative impacts such as burning organic matter that may otherwise contribute to sediment accretion, potentially worsening the existing sediment deficit (Taylor 1988). In the decades following the establishment of the park, avoiding the use of anthropogenic fires has again become the predominant management strategy, seemingly in response to potential risks of burning reducing sediment accretion (Makweche et al. n.d.). It is also worth noting that natural (non-anthropogenic) fire is a rare event in Mississippi River deltaic plain swamps, occurring only during extreme drought events when lightning strikes set peat on fire (Watts 2012).

The area of scrub/shrub habitat in the park increased between 1958 and 2005, and this change has been well documented using National Wetlands Inventory mapping standards (Shirley and Battaglia 2006, Handley 2006). Increased cover of scrub/shrub habitat has been attributed to reduced fire frequency in the marsh (Handley 2006; Makweche et al. n.d.). The dominant shrub species in the freshwater marsh is wax myrtle. Wax myrtle dominated marshes appear to evolve from floating *Panicum* marshes in the absence of fire (Sasser et al. 1996). As wax myrtle shrubs increase in mass they weigh down and submerge the mat, which can kill native shrubs (Williamson and Barker 1984). With increasing shrub cover, abundance of the dominant mat-building herbaceous species, e.g., maidencane (*Panicum hemitomon*), declines and there is a compositional shift toward more shade-tolerant species (Battaglia et al. 2007). The rate of shrub encroachment and the long-term impacts of these aboveground shifts on the floating mat are unknown (Makweche et al. n.d.), but this is a research subject that the park wishes to pursue further. Chinese tallow is also frequently present in freshwater scrub/shrub habitat (Battaglia et al. 2009). Nyman and Chabreck (1995) recommended that burns be used to control woody shrubs in freshwater marsh, but on an infrequent basis in order to allow organic matter to accumulate in unburned years. Effects of fire on accretion rates and shrub cover are uncertain, but of interest to park managers, and research is needed in order to evaluate fire-use as a land management tool in the park.

### **Chalmette Battlefield**

Grass and herbaceous cover is maintained in the open area of the battlefield by regular mowing and bush hogging, which prevents natural succession to shrubland and forest. Woody vegetation is found in unmaintained areas (Figure 6). An inventory of the vascular flora of the Chalmette FMU found 244 species, of which 176 (72%) were native and 68 (28%) were invasive or deliberately planted. Among the 70 families and 180 genera found, there were four major herbaceous plant groups: composites (12%), grasses (9.5%), sedges (8%), and legumes (5%). About 19% of species were woody tree, shrub, and vine species (Urbatsch et al. 2007). The Chalmette Battlefield FMU includes some small patches of bottomland forest.

Grass in the maintained battlefield area is allowed to grow to a height of several feet between cuttings, and more regular mowing is carried out along the shoulders of the tour road for safety and visibility. Vegetation in the field includes a mix of native grasses, sedges, forbs, and early successional woody species. To the north of the tour road, a swampy, early successional woodland buffers the battlefield from the Norfolk Southern Railroad line and St. Bernard Highway. This area contains typical bottomland species, including hackberry

(*Celtis occidentalis*), black willow, elderberry (*Sambucus* spp.), rough leaf dogwood (*Cornus drummondii*), and groundsel tree (*Baccharis halimifolia*) (NPS 2011). Ponding of water occurs after heavy rainfall events on the south end of the battlefield along the American rampart, and these areas support native grasses, early successional species, and wet meadow species (NPS 2011). Several areas of the park have been planted and/or managed for vegetative buffers using lines of cypress trees.

Non-native species are managed throughout the park as a part of overall maintenance activities. A special project in 2007–2008 targeted all of the Chinese tallows growing at the unit (Jean Lafitte National Historical Park and Preserve 2011), and this was repeated in 2014.



FIGURE 6. VEGETATION MAP FOR THE CHALMETTE BATTLEFIELD BASED ON LANDFIRE VEGETATION CLASSIFICATION DATA.

## 3.5.2 Environmental Consequences

### Impact Analysis Method

The methodology for assessing impacts to vegetation communities included literature reviews to identify plant communities in the Barataria Preserve and the Chalmette Battlefield FMUs and professional judgment to determine the effects of implementing fire management activities of the FMP on the plant community structure, composition, and species distribution. Recent inventory data and publications reporting vegetation characteristics and conditions within the park used in this analysis included NPS (2015a), Urbatsh (2009), Denslow and Battaglia (2002), NatureServe (2009), Nolfo-Clemets (2006), Michot (1984), Handley (2006), Nelson et al. (2002), and Taylor (1988). The park consulted with the Louisiana Natural Heritage Program (LNHP) on April 22, 2015, regarding impacts to state listed species found in the park (personal email communication between Dusty Pate and Chris Reid, April 22, 2015, found in Appendix A).

### Alternative A: No Action

#### *Barataria Preserve*

Under this alternative, all wildfire would be suppressed immediately in the Barataria Preserve. There would be no prescribed fire applied in the marsh area and as a result encroachment by scrub/shrub species (Makweche et al. n.d.) and non-native species like Chinese tallow would continue. Direct impacts to wetland vegetation would be adverse and long term.

As described in the soil section above, it has been documented that wetlands within the Barataria Preserve are at risk of submergence due to sea level rise and subsidence (NPS 2015a). Naturally ignited wildfire is uncommon in the preserve (Watts 2012). Under drought conditions the likelihood, size and severity of fire in all vegetation communities within the Barataria Preserve is increased.

Under the No Action Alternative, there would be no prescribed burning to reduce the buildup of scrub/shrub or fine fuels, or the attendant preparation of fire lines and increased response coordination. If a wildfire ignition occurs under these conditions, there is potential that it would consume organic matter and peat, and result in damage to or loss of wetland vegetation communities. In the rare event that a fire burned during extreme drought the impact of increased organic matter consumption would be reduced accretion rates and therefore increase subsidence and submersion of wetland vegetation. Unplanned ignitions could also consume large areas of vegetation, remove seed banks, and damage soils and hydrological processes. Impacts to vegetation communities could be adverse and long term. The consumption of large areas of native vegetation could facilitate invasion by Chinese tallow, as the species has been found to respond positively to increased light availability following disturbance (Denslow and Battaglia 1998; Harper 1995). Chinese tallow invasion has also been linked to the presence of wax myrtle, which is associated with reduced fire frequency (Battaglia et al. 2009). Under this scenario, long-term impacts on vegetation would be adverse.

Mature cypress and oak witness trees are a wetland component that the park would like to see protected. Under normal conditions cypress trees would typically be able to survive fires with little damage, due to the significant soil moisture in these inundated ecosystems (Watts 2012). However, during drought, fire can consume the soil, damage root systems, and kill the trees. Suppression activities used in the event of a wildfire could have adverse impacts on vegetation communities. Removal of vegetation along containment lines would result in the direct loss of individual plants; however, the impact to plant populations as a whole would be short term. Some trampling of vegetation communities would occur during suppression activities from firefighters, and equipment and vehicles could crush or remove vegetation in localized areas. Suppression actions could also contribute to the spread of invasive non-native species through transport on firefighting apparatuses. Mitigation measures to wash and inspect all apparatuses would be implemented to mitigate this threat. MIST would be employed during a wildfire and would mitigate impacts to vegetation communities. As

a result of mitigation the effects of suppression actions on vegetation communities would be short term and adverse.

#### State Listed Species

Consultation with the LNHP concluded that floating antler fern would be found on open water in slow moving waterways and swamps under conditions unlikely to carry fire. Therefore, there would be no impacts to floating antler fern from unplanned ignitions under the No Action Alternative. The remaining three species—golden canna, swamp milkweed, and western umbrella grass—occur in the marsh ecosystem. Adverse impacts could occur to these species under the No Action alternative if unplanned ignitions occurred where these species occur. Additionally, these species would continue to decline as a result of wetland loss attributed to relative sea level rise and subsidence.

#### *Chalmette Battlefield*

Under this alternative, fire management would be limited to wildland fire suppression only. Existing park vegetation management actions would continue with an absence of prescribed fire and would have potential to cause continued impacts to vegetation. There would be no prescribed fire applied, and therefore existing vegetation management actions would be needed to maintain the grassland vegetation. These actions, that include mowing, currently cause rutting, compaction, and potential soil erosion, all of which potentially affect vegetation, for example increasing potential non-native species invasion. These impacts would continue unabated and would be long term and adverse.

A lack of prescribed fire use under this alternative could preclude any beneficial impacts to vegetation that may result from the addition of ash, organic matter, and nutrients to the soil since mowing and fire differ with respect to nutrient cycling (Kearney et al. 2004).

#### *Cumulative Impacts*

Other past, present, and reasonably foreseeable actions have affected or could affect vegetation in the Barataria Preserve.

Recent park acquisitions place additional acreage under NPS management and preservation, which has beneficial impacts on vegetation communities since these lands would then no longer be subject to human activities, drainage, or vegetation clearing. Additional acreage would also protect existing acres by providing additional buffer to disturbance and invasion by non-native species. Vegetation restoration programs for the management of invasive species and planting of natives provides long-term beneficial impacts to vegetation communities. Right-of-way-maintenance activities result in removal of individual plants on a localized level, creating only short-term impacts to the wider species populations. Cumulative impacts to vegetation would be short- and long-term adverse impacts and long-term beneficial impacts. Ongoing research activities in the Barataria Preserve may impact vegetation communities, but since activities are experimental and actions undergo individual environmental compliance, any adverse impacts are often short term and localized. The research, however, is intended to better inform managers regarding the management of natural resources in the park, often including vegetation, and therefore outcomes would be likely to result in beneficial long-term impacts.

Efforts by the State of Louisiana, the NPS, and others to remove non-native animal species, such as nutria and wild pigs, result in a beneficial impact to vegetation communities, as nutria and wild pigs negatively affect large swaths of wetland vegetation.

Compensatory wetland mitigation by the U.S. Army Corps of Engineers and Louisiana Coastal Protection and Restoration Authority would rebuild or enhance wetland areas within the Barataria Preserve using dredged sediment, borrow material, and spoilbank gaps. These activities would beneficially impact vegetation by reconstructing wetlands where they historically occurred and removing artificial impoundments caused by the spoilbanks.

Overall the cumulative impacts of these actions when added to the impacts of the No Action Alternative on the Barataria Preserve FMU would have adverse impacts on the vegetation of the FMU both during the duration of unplanned ignition and for many years post fire .

### *Conclusion*

Wetland vegetation communities in the Barataria Preserve FMU are currently threatened by encroachment from scrub/shrub species (Battaglia et al. 2007; Makweche et al. n.d.; Shirley and Battaglia 2006), invasion by non-native species, and submersion due to reduced rates of accretion and sea level rise. Coupled with the confounding impacts of climate change, continuing with the No Action Alternative is expected to result in continued degradation of vegetation communities.

Impacts to vegetation communities in the Chalmette Battlefield FMU under the No Action Alternative would be adverse due to rutting, compaction, and potential soil erosion.

## **Alternative B: FMP Revision (Preferred Alternative)**

### *Barataria Preserve*

If a wildfire does occur under extreme drought conditions, the peat found in cypress/tupelo swamps could ignite and smolder for many weeks, this could cause major adverse impacts to this vegetation community due to the consumption of cypress and tupelo roots (Cypert 1961; Taylor 1980). Furthermore, the thin bark of cypress trees provides little protection from surface fire should it occur, and most seedlings and saplings would be top-killed (Stanturf et al. 2002). If top killed, however, Cypress will often sprout from the stump (Wade et al. 1980) in response to the loss of apical dominance (Stanturf et al. 2002). Prescribed fire would not be applied in the swamp ecosystem; however, the ecotone between the marsh and swamp may be burned during prescribed fire if conditions are appropriate for burning; mitigation measures such as strict prescription windows and the use of MIST would be followed to prevent any adverse impacts to the swamp.

The introduction of managed prescribed fire into the Barataria Preserve could result in beneficial impacts to vegetation communities through maintaining ecological function and native species. Prescribed fire improves soil nutrient cycling and in turn promotes plant productivity (Neary et al. 1999). Prescribed fire helps to thin the encroaching scrub/shrub component thereby reducing competition for limited resources, and restoring the native vegetation structure and composition.

Prescribed fire could help in the control of non-native invasive species. A vascular plant inventory of the park by Urbatsch (2009) identifies eight species of invasive non-natives that were ranked as either high or medium threats in the park, three of which were present in a variety of terrestrial habitats—Chinese tallow, Japanese climbing fern, and alligatorweed. The control of these species through fire would help prevent the displacement of native plant populations.

Prescribed fire has been considered as a management tool for Chinese tallow; however, the impacts of fire on the species are the subject of debate and require additional research (Grace 1998). Prescribed fire could potentially invigorate tallow, as the species has a number of fire adaptations. As the individuals gain size they develop a thick bark that protects the cambium layer and above some minimum size, tallow appears to become resistant to being killed or top-killed by fire (Grace 1998). For smaller trees, or for large trees burned under a hot prescription, the response to being top-killed is a vigorous and rapid resprouting from the root base (Grace 1998). The species can also resprout via cloning at a distance from the affected individual, thereby increasing its spread. It can also be difficult to sustain a prescribed fire through a stand of tallow as the species does not carry fire well through its crowns and it competitively excludes species that could help to spread fire, which is critical when fire is used as a management tool. The species has been said to render an ecosystem nonflammable (Grace 1998), and therefore using fire as a tool to manage the spread of tallow may be ineffective. The FMP would guide research in this area and inform managers in appropriate tools for managing the species, potentially through the application of prescribed fire.

Prescribed fire could also contribute to the spread of invasive non-native species through transport on firefighting apparatuses. Mitigation measures to wash and inspect all apparatuses prior to a prescribed fire would be implemented to mitigate this threat.

It has been documented that wetland communities within the Barataria Preserve are at risk of submergence due to sea level rise and subsidence (NPS 2015a). Data from the NWLON for the Barataria Preserve area indicate a stable rate of sea level rise at 9.24 mm/year. Rates of subsidence within the park are not well known, as existing data from USGS sites are not yet sufficient to assess trends; however, park managers are concerned that the persistence of the swamp forests and freshwater marsh, including flotant marsh due to increased salinity. The impacts of marsh burning on accretion rates are not well understood; however, it has been postulated that burning that removes accumulated peat and organic matter would adversely impact accretion rates and risk the long-term persistence of marsh habitat (Nyman and Chabreck 1995). This would be most likely during drought conditions when wetland vegetation and peat become more available to burn. Furthermore, the presence of vertebrate herbivores can influence the impacts to vegetation from the use of prescribed fire (Ford and Grace 1998). Research by McFalls et al. (2010) and Ford and Grace (1998) indicate that using prescribed fire in the presence of high nutria population densities could result in heavy herbivory. The resulting vegetation loss within the burned area could lead to reduced accretion rates (McFalls et al. 2010). Conversely, some studies have suggested that burning could stimulate below ground production, which could help to increase accretion rates (Cahoon et al. 2010). The impacts of burning on accretion rates in the marsh area and subsequent impacts on vegetation communities is a research subject that the park wishes to explore further through its FMP. Under the Proposed Action, these research studies would be pursued, and therefore experimental measures to increase accretion for the protection of wetland vegetation and soils could be implemented. Because research advances would be made that improve the BMPs for wetland ecosystems, impacts to vegetation in the long term would be beneficial.

Under the Proposed Action, prescribed burning would help to reduce the buildup of scrub/shrub fuels. If a wildfire ignition occurs under these reduced fuel conditions, there would be fewer fuels to support a high intensity fire; therefore, the likelihood of direct consumption of organic matter and peat would be reduced. Under this scenario, impacts on vegetation would be adverse during the duration of the prescribed fire, but post treatment impacts from avoiding large-scale wildfire would be beneficial.

Mature cypress and oak witness trees are a component of the Barataria Preserve ecosystem that the park would like to see protected. Individual old mature trees would be avoided when implementing prescribed fire; the locations of these trees could be mapped and available during prescribed fire planning.

Prescribed fire can be used to reduce the overall fuel loading throughout the FMU, making the remaining vegetation community more resilient to unplanned ignitions, which could have more widespread, adverse impacts on the vegetation community, particularly the cypress swamp communities. In the event that there is a wildfire, the moderated fuel loading resulting from prescribed fire would make suppression of a wildfire more easily attainable with fewer damaging suppression tactics required. Although prescribed fire could result in the loss of individual plants, the wider impacts to the plant population and community composition would be long term and beneficial, due to beneficial impacts on nutrient cycling, plant productivity, reduced invasive species cover, and improved resilience to unplanned ignitions.

Suppression activities used in the event of a wildland fire (planned and unplanned ignitions), could have adverse impacts on vegetation communities. Removal of vegetation along containment lines would result in the direct loss of individual plants; however, the impact to plant populations as a whole would be short term. Some trampling of vegetation communities would occur during suppression activities from firefighters and equipment and vehicles could crush or remove vegetation in localized areas. Some pockets of denser vegetation may need to be removed in order to reduce fuel loads prior to prescribed fire activities, and this would result in a loss of individuals and impacts to species populations on a localized level. MIST would be employed during a wildfire or prescribed fire event, and these would mitigate impacts to vegetation

communities. As a result of mitigation, the adverse impacts of suppression actions on vegetation communities would last only during the duration of the prescribed fire or for 1-2 growing seasons post fire.

### *State Listed Species*

Consultation between the park and LNHP concluded that floating antler fern would be found on open water in slow-moving waterways and swamps under conditions unlikely to carry fire; therefore, there would be no impact to floating antler fern from prescribed fire under the Proposed Action. The remaining three species—golden canna, swamp milkweed, and western umbrella grass—occur in the marsh ecosystem. Under the Proposed Action these species could be consumed during prescribed fire; however, their locations could be documented during prescribed burn planning, and burn units or prescriptions adjusted to avoid long-term impacts to the species. If an unplanned ignition occurs or a prescribed fire spread into areas colonized by golden canna, swamp milkweed or western umbrella grass, the species may be consumed. The severity of impact would depend on the spatial extent of the fire and intensity. Swamp milkweed, for example, can re-colonize a burned area as long as there is an adjacent local seed source and suitable conditions for germination (Pavek 1992). If determined through research that prescribed burning improves wetland conditions due to increased accretion, these species would benefit in improved wetland condition.

### *Chalmette Battlefield*

The introduction of prescribed fire into the Chalmette Battlefield FMU could result in beneficial impacts to vegetation communities through maintaining ecological function and native communities. It is largely accepted that mowing reduces the amount of carbon present in the soil and roots because plants invest more energy in shoot growth in an attempt to cover from the effects of defoliation (Johnson and Matchett 2001; Kearney et al. 2004; Knapp et al. 1999). Further, spring burning typically prompts plants to invest more resources in root growth and maintenance (Johnson and Matchett 2001), while mowing negatively affects root growth resulting in lower below ground biomass (Kearney et al. 2004). Fire typically results in the loss of nitrogen through combustion, particularly in areas that undergo frequent burning (Ojima et al. 1994), whereas mowing preserves system nitrogen through retaining clippings; a study by Kearney et al. (2004) comparing burning and mowing effects on underground carbon and nitrogen on prairie soils found that the only significant difference between burning and mowing was the percent of carbon in the soil was greater following burning. Fire and mowing have also been found to have different impacts on plant productivity (Randa and Yunger 2001). Studies that compared mowing to fire in tall grass prairie report total biomass altered to be greater under a mowing regime and aboveground plant growth in the growing season post-fire to be stimulated by spring fire (Briggs et al. 1994; Hulbert and Wilson 1983), which could be attributed to increased light availability and solar radiation post burn. Many factors contribute to plant response following mowing and fire, so the magnitude to which mowing or fire contribute to plant response is difficult to determine.

By adhering to prescriptions outlined in the multi-year fuel plan, direct impacts to the native vegetation community of the Chalmette Battlefield FMU that evolved with frequent fire would be beneficial and long term.

Suppression activities used in the event of a wildfire or during prescribed fire could have adverse impacts on vegetation communities. Removal of vegetation along containment lines would result in the direct loss of individual plants; however, the impact to plant populations as a whole would be short term. Some trampling of vegetation communities would occur during suppression activities from firefighters and equipment and vehicles could crush or remove vegetation in localized areas. There is potential for the spread of invasive species transported into the FMU on firefighting equipment. This would be mitigated using BMPs such as the washing of equipment prior to its use for a prescribed burn action. MIST would be employed during a wildfire or prescribed fire event, and these would mitigate impacts to vegetation communities. As a result of mitigation, the effects of suppression actions on vegetation communities would be short term and adverse.

Prescribed fire can be used to reduce the overall fuel loading throughout the Chalmette Battlefield FMU making the remaining vegetation community more resilient to unplanned ignitions and promoting cover by

native species. Although prescribed fire could result in the loss of individual plants, causing an adverse impact, prescribed fire would benefit plants in the long term by contributing nutrients and organic debris to soils and maintaining the structure, composition, function, and complexity of the ecosystem. The wider impacts to the plant population and community composition would be beneficial.

### *Cumulative Impacts*

Other past, present, and reasonably foreseeable connected, similar, or cumulative actions have affected or could affect vegetation in the Barataria Preserve.

Nutria management programs by the State of Louisiana and the NPS would result in cumulative beneficial impacts to vegetation when considered collectively with fire management activities. McFalls et al. (2010) observed increased localized herbivory by nutria after prescribed fire was used in areas of high nutria abundance. Therefore, by reducing nutria populations within the park in conjunction with fire management activities, long-term beneficial impacts to vegetation communities would be expected to occur (Ford and Grace 1998).

Recent park acquisitions place additional acreage under NPS management and preservation that has beneficial impacts on vegetation communities since these lands would then no longer be subject to human activities, drainage, or vegetation clearing. Additional acreage would also protect existing park lands by providing additional buffers to disturbance and invasion by non-native species. Vegetation restoration programs for the management of invasive species and planting of natives provide long-term beneficial impacts to vegetation communities. Right-of-way-maintenance activities result in removal of individual plants on a localized level, creating only short-term impacts to the wider species populations. Therefore, cumulative effects to vegetation would be short-term adverse impacts and long-term beneficial impacts. Ongoing research activities in the park may impact vegetation communities, but since activities are experimental and actions undergo individual environmental compliance, any adverse impacts are often short term and localized. The research, however, is intended to better inform managers regarding the management of natural resources in the park, and therefore outcomes could result in beneficial long-term impacts on vegetation.

Overall the cumulative impacts of these actions when added to the impacts of the Proposed Action on the Barataria Preserve and the Chalmette FMUs would have adverse impacts for vegetation for the duration of the prescribed fire, but beneficial impacts on vegetation both for many years post fire as a result of improved ecosystem functioning.

### *Conclusion*

Native vegetation communities in the Barataria Preserve FMU are currently threatened by encroachment from scrub/shrub species, invasion by non-native species, and submersion due to land subsidence, reduced rates of accretion and relative sea level rise. Changes to salinity as a result of relative sea level rise may threaten the long-term persistence of vegetation communities. Under the Proposed Action, shrub encroachment could be reduced through the use of prescribed fire and some localized mechanical activities. Non-native invasive species could be controlled using prescribed fire; however, further research, facilitated through the Proposed Action, is needed to determine the effectiveness of that approach. Additional research would be conducted to determine if prescribed fire would improve the rates of accretion in the freshwater marsh or if suppression tactics are needed to prevent consumption of peat soils and organic matter to support additional accretion. Fire management actions related to the implementation of prescribed fire can be readily mitigated to reduce their impacts on vegetation. Although adoption of the Proposed Action would generate some adverse impacts to vegetation for the duration of the prescribed fire as a result of direct consumption of individuals, the knowledge gained in the management of coastal wetland ecosystems with fire as a result of implementing a research program at the park would provide beneficial impacts for vegetation.

Impacts to vegetation communities in the Chalmette Battlefield FMU under the Proposed Action would be adverse for the duration of the prescribed fire as a result of localized disturbance to plant communities and

suppression actions. Beneficial impacts due to the improved nutrient cycling associated with prescribed fire operations as compared to mowing, as well as reduced soil disturbance would last for many years post fire.

Cumulative impacts would be adverse for the duration of the prescribed fire but beneficial following treatment, with the Proposed Action adding only a slight adverse increment to overall cumulative impacts.

## 3.6 WILDLIFE

### 3.6.1 Affected Environment

The park harbors a rich and varied estuarine environment of coastal Louisiana. The park's complex terrestrial and aquatic habitats supports a diversity of resident and migrant wildlife.

#### Mammals

A comprehensive inventory of mammals was conducted at the park on both the Barataria Preserve and the Chalmette Battlefield from 2003 to 2006 and employed a variety of sampling methods (Hood 2006, 2012).

The more common mammals found in the park include swamp rabbit (*Sylvilagus aquaticus*), eastern gray squirrel (*Sciurus carolinensis*), opossum (*Didelphis virginiana*), gray fox (*Urocyon cinereoargenteus*), and nine-banded armadillo (*Dasypus novemcinctus*). Seven bat species have been documented in the park: eastern red bat (*Lasiurus borealis*), Rafinesque's big-eared bat (*Corynorhinus rafinesquii*), southeastern myotis (*Myotis austroriparius*), eastern pipistrelle (*Pipistrellus subflavus*), yellow bat (*Lasiurus intermedius*), evening bat (*Nycticeius humeralis*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). Other species that utilize the park habitat include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), mink (*Mustela vison*), and river otter (*Lutra canadensis*).

White-tailed deer were the most commonly captured mammal in both inventories (Hood 2006, 2012). The 10 most commonly detected terrestrial mammals comprised 99% of the total sample of captured animals in 2003-2006 (Hood 2006). Capture success for small mammals was greatest in marsh habitats and lower in hardwood forests and cypress-tupelo swamps, and the inverse relationship was found for large mammals (Hood 2006).

#### Non-native Mammal Species

Five mammal species not known to have their historical distribution include the park were reported from the 2003–2005 park mammal inventory (Hood 2006, 2012): nine banded armadillo (*Dasypus novemcinctus*), coyote, nutria, house mouse (*Mus musculus*), black rat (*Rattus rattus*), wild pig, and domestic cat (*Felis catus*).

Wild pigs were not found in the park in 2005 (Hood 2006), but were subsequently observed in the park in 2006 (Hood 2012). The majority of wild pigs in the park noted in Hood's second inventory were detected in hardwood/swamp habitat, although one marsh site with hog detections had the greatest number of detections of all survey locations. According to Hood (2012), a small number of wild pigs were hunted and extirpated from the park in the 1980s. Wild pigs cause damage to vegetation and wildlife habitat, and are predators of small animals and potential vectors of diseases to humans and wildlife (NPS 2009b). Pigs compete with native mammals for hard mast and other resources. In response to the seemingly recent explosion in population and these ecosystem pressures, the park began developing a wild pig and impact assessment program in 2013 (NPS 2015a). Since the discovery of the feral population, the park is actively in collaboration with the USGS to document movement patterns, effects on native habitat and wildlife, and aid in eradication efforts (Hartley et al. 2012). These efforts, in addition to development of protocols to assess pig damage by local universities, will help the park to better manage for this non-native species.

## Birds

The park's location along the Gulf of Mexico coastline and Mississippi Flyway makes it a potential critical stopover site for many species of migratory birds. Moreover, the Barataria Preserve is "part of one of the largest, most productive, and most imperiled estuaries in the country [Barataria-Terrebonne]." (Watson 2005). The park is located within the Mississippi Alluvial Valley, which supports the largest forested floodplain in North America and serves as important habitat for wintering waterfowl, wading birds, and migrating shorebirds (Watson 2005). The Barataria Preserve itself is located within the Barataria-Terrebonne National Estuary, and this region is designated as an Important Bird Area by the National Audubon Society (National Audubon Society 2013).

The park (particularly the Barataria Preserve FMU) contains a variety of avian habitats, including bottomland hardwood forest, baldcypress-tupelo swamp, fresh and intermediate marshes, and open water. One-day winter bird counts in both forested and marsh habitats were conducted in 2013 and 2014, and marsh birds were surveyed using the North American Marsh Bird Survey Protocol in 2014 (NPS 2015a). Information on breeding bird populations in the Barataria Preserve was collected for 14 years via the Breeding Bird Survey, a long-term monitoring program (USGS 2001), and systematic point-count surveys (NPS 2015a). More than 400 bird species are known to occur in Louisiana, and more than 240 of these use the park (personal communication D. Fox, June 2015). Northern Cardinal (*Cardinalis cardinalis*), Red-winged Blackbird (*Agelaius phoeniceus*), Boat-tailed Grackle (*Quiscalus major*), Barred Owl (*Strix varia*), and Carolina Chickadee (*Poecile carolinensis*) are some of the species that are abundant during all seasons in the park (NPS 2015a).

The Barataria Preserve is an important breeding habitat for many species of birds, including several of conservation concern. Land birds that breed in the park include Northern Parula (*Parula americana*), Carolina Chickadee, Carolina Wren (*Thryothorus ludovicianus*), Tufted Titmouse (*Baeolophus bicolor*), Blue-gray Gnatcatcher (*Poliophtila caerulea*), American Crow (*Corvus brachyrhynchos*), Orchard Oriole (*Icterus spurius*), Cooper's Hawk (*Accipiter cooperii*), and Blue Jay (*Cyanocitta cristata*) (NPS 2009). The Barataria Preserve's marshes and swamps, in combination with shallow mudflats, deep water lakes, bayous, and other wetlands, provide water birds, particularly wading birds, with prime habitat. Great Blue Heron (*Ardea herodias*), Great Egret (*A. alba*), ibis (*Eudocimus albus* and *Plegadis* spp.), Doublecrested Cormorant (*Phalacrocorax auritus*), Common Gallinule (*Gallinula chloropus*), Green Heron (*Butorides virescens*), and Black-necked Stilt (*Himantopus mexicanus*) use the Barataria Preserve marsh and wetlands for breeding grounds (NPS 2009). Marsh birds commonly detected at the Barataria Preserve include American Coot (*Fulica americana*), Common Gallinule, King Rail (*Rallus elegans*), and Sora (*Porzana carolina*) (NPS 2015a).

The majority of bird surveys and studies conducted in the park under-represent species present in marsh and open water habitats (combined, more than half of the park's available land cover (NPS 2015a). Thus, the use of these other habitat types by residents and migrants in the park is less well known. Surveys in marsh habitats following the Standardized North American Marsh Bird Monitoring Protocol (Conway 2009) begun by D. Fox in 2014 may help inform park knowledge of avian habitat use in marshes (NPS 2015a). Abundant shallow water ponds provide habitat for wintering waterfowl. Coastal Louisiana is an important over-wintering habitat for many waterfowl species. Black-bellied Whistling-ducks (*Dendrocygna autumnalis*), Blue-winged Teal (*Anas discors*), Green-winged Teal (*A. crecca*), and Mallard (*A. platyrhynchos*) are commonly seen using ponds in the Barataria Preserve to pair, bond, feed, and rest. Brown Pelicans (*Pelecanus occidentalis*) also use open water habitat in the colder months (NPS 2009).

Raptors that commonly inhabit the park include American Kestrel (*Falco sparverius*), Turkey Vulture (*Cathartes aura*), Northern Harrier (*Circus cyaneus*), Red-tailed Hawk (*Buteo jamaicensis*), Red-shouldered Hawk (*B. lineatus*), Osprey (*Pandion haliaetus*), and Black Vulture (*Coragyps atratus*) (NPS 2009). The 2005 the Barataria Preserve bird list identified 11 bird species considered to be rare in the preserve and adjacent lakes: White-winged Scoter (*Melanitta fusca*), Pomarine Jaeger (*Stercorarius pomarinus*), Bridled Tern (*Onychoprion anaethetus*), Buff-bellied Hummingbird (*Amazilia yucatanensis*), Western Kingbird (*Tyrannus*

*verticalis*), Scissor-tailed Flycatcher (*Tyrannus forficatus*), Nashville Warbler (*Vermivora ruficapilla*), Cape May Warbler (*Dendroica tigrina*), Mourning Warbler (*Oporornis philadelphia*), Western Tanager (*Piranga ludoviciana*), and Yellow-headed Blackbird (*Xanthocephalus xanthocephalus*) (NPS 2009).

## **Amphibians and Reptiles**

This coastal region was historically rich in herpetofauna and has potential for relatively high reptile and amphibian diversity; however, anthropogenic activities prior to the establishment of the park may have affected species richness, diversity, and demographic rates of herpetofauna inhabiting the park (NPS 2015a). Four inventories of the herpetofauna at the park have been conducted (Anderson and Seigel 2003; Rossman and Demastes 1989; Smalley 1982; Woodman 2013). From these combined efforts 50 species of herpetofauna have been reported in the park, including 13 frogs and toads, five salamanders/newts, five lizards, 17 snakes, nine turtles, and one alligator (NPS 2015a).

## **Freshwater Fish**

The Barataria Preserve incorporates a complex set of aquatic habitats. The waters of the Barataria Preserve are primarily fresh, with brackish influence at the southern end of the park (Schultz 2006). The park is bordered by two lakes (Cataouatche and Salvador), and these lakes and the preserve are contained within the Barataria - Terrebonne National Estuary, which has a more diverse fish community than any other estuary in Louisiana, with 186 species from 65 families (Conner and Day 1987). The park is ecologically tied to this estuarine habitat that provides important nursery grounds for the productive fisheries of the Gulf of Mexico (NPS 2015a), as well as the two lakes and the Mississippi River. Channelization of many of the natural aquatic features in the region likely also has a major influence on the fish habitat at the park.

The combination of aquatic habitats allows for the potential presence of a number of fish fauna, including seasonal migrants, and provides critical habitat for varying life stages of marine species from the Gulf of Mexico. Fish surveys and surveys of catch conducted within the waterways of the park have documented 32 to 66 species (Cooper et al. 2005; Schultz 2006; Swarzenski et al. 2004). Sampling efforts within and around the park have documented at least 47 species in the region around the park (Seale 1999). Sampling of fish populations in the park has been limited, which could explain its relatively low species richness. However, warm freshwater systems do not typically support a great diversity of fishes (Matthews 1998). Lastly, the fish communities are likely dynamic in nature, and surveys to date may not have captured the temporal variability in community composition. No state or federal threatened or endangered species have been reported from the park (NPS 2015a).

## **Invertebrates**

Aquatic invertebrates in the park are abundant and diverse (NPS 2009a). Invertebrates from 84 genera in 51 families were documented in a 2000 survey (NPS 2009). The majority of species documented in the park were freshwater species, but some brackish water and marine species were also found (Swarzenski et al. 2000). True flies (*Diptera*) were the most diverse order with 38 taxa. Crustaceans, especially those from the order Amphipoda, were most abundant. The most species-rich areas were floating rafts of aquatic plants that make up the floating marshes in the Preserve. Crawfish, crabs, shrimp, and other benthic invertebrates form the base of a food web in the coastal ecosystem, which supports many of the larger aquatic and terrestrial species inhabiting the park (NPS 2009a).

## **State Listed Species**

### *Big Brown Bat*

The big brown bat (*Eptesicus fuscus*) is a Louisiana state imperiled species that occurs in cities, semi-open habitats, and wooded areas, especially deciduous forests (Barataria-Terrebonne National Estuary Program and

Louisiana Wildlife and Fisheries 2015e). The species is known to occur in the Pontchartrain, Calcasieu, Sabine, Red and Ouachita River Basins. The big brown bat is likely to occur within the Barataria Preserve FMU.

### 3.6.2 Environmental Consequences

#### Impact Analysis Method

The methodology used for assessing impacts to wildlife included identifying changes to wildlife habitat caused by implementation of the alternatives, and qualitatively evaluating how these changes would affect wildlife using best professional judgment. The analysis recognizes that many wildlife species are mobile and can easily move beyond the area of temporary disturbance and beyond the park boundary, if necessary.

#### Alternative A: No Action

Under the No Action Alternative, fire management would continue to be limited to suppression activities only. Adverse impacts to wildlife would only occur in the event of an unplanned wildland fire, and under the existing FMP such fires would be suppressed. Since the park, in recent history, has not experienced a high fire frequency, it is expected that unplanned wildland fires would be rare. The typical nature of unplanned ignitions within the park is arson fires along roadways.

#### *Barataria Preserve*

The rich estuarine environment of coastal Louisiana supports an abundance and diversity of wildlife. The wetlands of the Barataria Preserve provide habitat for resident and migratory wildlife, including migratory birds.

Some areas of the Barataria Preserve may not be accessible for suppression activities, and many unplanned ignitions in the Barataria Preserve FMU area go undetected and unreported, with fires burning themselves out naturally. In the event that suppression activities do occur, impacts to wildlife species would be species specific. In the marsh, compression type firelines would most commonly be constructed for fire suppression activities and some limited use of mechanized equipment and vehicles would temporarily disturb wildlife, causing them to avoid the area during the disturbance. Due to the small scale of most fires in the Barataria Preserve FMU, impacts to habitat would be short term and vegetation would recover rapidly. Under the No Action Alternative, emergent wetland habitat loss could continue due to subsidence.

#### Mammals

Most medium-sized mammals, e.g., white-tailed deer, bobcat (*Lynx rufus*), coyote, raccoon, opossum, and non-native nutria and wild pigs, are mobile and can escape the heat and smoke of unplanned wildfire. Some juveniles or litters of mammal species may be killed by the fire, but breeding adults would likely survive to reproduce. Smaller mammals may not be able to escape the fire but many would escape and repopulate burned areas quickly. Most bat species, including the big brown bat, would be able to escape the fire. Some negative impacts may affect wildlife habitat, including loss of cover and forage. These impacts would be avoidable, because individuals could use neighboring unburned areas; new growth would improve forage quality and availability, creating beneficial impacts for species like white-tailed deer. However, new forage may increase local densities of nutria and wild pigs. The big brown bat is likely to occur in the park; however, the species is highly mobile and would be able to avoid unplanned ignitions (personal communication between Chris Reid [LNHP] and Dusty Pate [NPS], April 22, 2015 found in Appendix A).

#### Birds

Adult birds would easily escape fire through flight. Nestling and fledgling birds may be lost during the fire, but breeding adults would re-nest or breed again the following year. Foraging habitat may be lost or altered by a

wildfire, which may displace individuals, but due to the small scale of most fires in the FMUs, there would be available forage in other areas of the park. Some species that depend on early seral habitat stages would benefit from wildfire in the short term due to increased habitat availability; however, some species of birds prefer sites with robust emergent vegetation with greater cover and greater density of litter (i.e., secretive marsh birds, such as King Rail, Common Gallinule, Purple Gallinule [*Porphyrio martinica*], Least Bittern [*Ixobrychus exilis*], and American Coot) (Valente 2009), and habitat for those species may be lost for several seasons post burn, creating an adverse impact on these bird species in burned areas. Continued habitat loss as a result of subsidence would continue to adversely impact secretive marsh bird species that are dependent upon wetland habitat (Valente 2009).

### Amphibians and Reptiles

Most amphibians and reptiles have species-specific adaptations that allow them to avoid impacts from fire, including burrowing and selection of wetter habitats that are less prone to wildfire. Many amphibians and reptiles (for example, salamander species) depend on coarse woody debris in bottomland hardwood forests (Lower Mississippi Valley Joint Venture Forest Resource Conservation Working Group 2007) and understory herbaceous vegetation to provide cover. Some species may depend on herbaceous cover to attract prey. Unplanned ignitions may result in the consumption of this important habitat component for a number of growing seasons, causing adverse impacts to closed habitat specialists (Rochester et al. 2010). Fire would increase areas of early seral vegetation, which would benefit some amphibian and reptile species that select for more open and disturbed habitat (Rochester et al. 2010). Suppression activities in the event of a wildfire may cause trampling and crushing of individuals. Impacts to amphibians and reptiles would be adverse for the duration of the unplanned ignition and for 1-2 growing seasons post fire depending on individual habitat preferences.

### Freshwater Fish

Freshwater fish occur in the freshwater marsh areas, waterways, canals, and ponds where they can withstand lower temperature fires without mortality. Removal of vegetation cover may cause some habitat loss due to increased water temperatures, increased suspended sediment and decreased dissolved oxygen, which would cause some displacement of individuals to unburned areas. The small scale of most fires in the Barataria Preserve FMU, would mean that impacts to fish species would be localized and last only the duration of the unplanned ignition.

### Invertebrates

Aquatic invertebrates occur in the freshwater marsh areas, waterways, canals, and ponds where they can withstand lower temperature fires without mortality. Some terrestrial invertebrates would be lost during fire, but due to the small scale of most fires in the Barataria Preserve FMU, losses would be localized and the areas would be quickly repopulated post-fire. Impacts to invertebrates would be localized and last only the duration of the unplanned ignition.

### Chalmette Battlefield

Wildlife diversity within the Chalmette Battlefield FMU is limited by a lack of habitat diversity. Species utilizing the unit are tolerant of human presence and activities. Bird species are the most abundant wildlife, with migrant, wintering, and breeding species occurring in the FMU (NPS 2011).

The Chalmette Battlefield FMU is readily accessible to local fire departments, so unplanned ignitions are responded to quickly and fires remain small. Suppression activities used in the event of an unplanned ignition could temporarily displace wildlife due to disturbance associated with mechanized equipment or vehicles. Impacts would be temporary and most species of wildlife would be able to avoid the area during the disturbance. Through the application of MIST, the adverse effects of suppression actions would be mitigated, and effects on wildlife would last only the duration of the unplanned ignition or for 1-2 growing seasons post fire.

Given the rare nature of fires in the Chalmette Battlefield FMU and the immediate suppression actions taken under the No Action Alternative, any ignitions that do occur would remain small. Most wildlife species present in the unit are mobile and easily able to escape a wildfire. Species in less mobile life stages (juvenile or nestling) and less mobile species (small mammals, invertebrates, reptiles) would be most impacted by fire. Since fires in the Chalmette Battlefield FMU remain small, impacts to habitat would be minimal and burned areas would quickly recover. Adverse impacts to wildlife as a result of the No Action Alternative would last only the duration of the unplanned ignition or for 1-2 growing seasons post fire.

### *Cumulative Impacts*

Other past, present, and reasonably foreseeable actions that may affect wildlife include the park's canal reclamation program, the nutria reduction programs managed by the State of Louisiana and the NPS, the NPS's wild pig management program, navigation canal maintenance, vegetation restoration programs, and future land acquisitions at the Barataria Preserve.

The canal reclamation program involves approximately 20 miles of non-historic canals that are being partially filled to attempt to restore the freshwater marsh ecosystem where it previously existed. This activity is intended to improve freshwater habitat quality, which would have benefits for marsh species, but would adversely impact some forest-dependent species due to a reduction in forest habitat.

Navigation canal maintenance contributes to the continual operation of canals, which streamline the flow of saltwater inland, allowing for saltwater intrusion that destroys freshwater vegetation that is intolerant of salt, resulting in the loss of wetland habitat (Turner 1987). Canal spoilbanks prolong flooding and drying of interior wetlands, stressing marsh vegetation, and potential creating more open water area (NPS 2009a). This impoundment of water can also trap saltwater behind spoilbanks and can result in long-term increased soil pore water salinity.

Vegetation restoration programs would restore native habitat and have lasting positive impacts for wildlife by improving habitat quality.

Efforts by the State of Louisiana, the NPS, and others to remove non-native animal species, such as nutria and wild pigs, would result in a beneficial impact to wildlife through reduced competition for resources. Nutria adversely impact large swaths of wetland vegetation and outcompete native aquatic mammals such as beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), and mink (*Neovison vison*) (NPS 2015a). Wild pigs also compete for food with native mammals, including deer and small rodents (NPS 2015a). Wild pigs may also prey directly on small mammals (Seward et al. 2004) and bird and alligator eggs (Elsey et al. 2012). Hunting of native game species, like white-tailed deer, waterfowl, swamp rabbit, and eastern gray squirrel, is carefully managed, so adverse impacts to wildlife populations would be minimal and reduced competition for habitat resources would generally result in benefits to native wildlife populations.

Several tracts of land have been acquired by the park in recent years, and the park is authorized to continue acquiring land for the Barataria Preserve. These acquired tracts protect additional areas of wetland from development and increase habitat availability and protection of native wildlife. The acquisition of additional wetland areas has beneficial impacts for wildlife.

Compensatory wetland mitigation by the U.S. Army Corps of Engineers and Louisiana Coastal Protection and Restoration Authority would build wetland areas within the Barataria Preserve using dredged sediment and borrow material. Spoilbanks would also be modified to improve hydrology. These activities would beneficially impact wildlife by expanding wetland habitat through the reconstruction of wetlands where they historically occurred and removing artificial impoundments caused by the spoilbanks.

## *Conclusion*

Fire suppression activities including vehicle traffic and noise, disturbance of habitat due to fireline construction, and hose laying may cause temporary impacts; however, most large mammal and avian species can easily move away from impact sources. Species in less mobile life stages (juvenile or nestling) and less mobile species (amphibians and reptiles) would be most impacted by fire. Wildlife species may experience habitat loss from wildfire, but most species evolved in the presence of fire and have behavioral and other adaptations that make their populations resilient to fire. Foraging opportunities may increase following fire. A lack of prescribed fire use under this alternative would preclude any beneficial impacts to wildlife that may result from increased plant productivity and enhancement of wetland habitat. The current trend of subsidence within the Barataria Preserve FMU would continue, threatening the long-term availability of habitat for wetland-dependent species, such as secretive marsh birds. The No Action Alternative would result in adverse impacts to wildlife during the unplanned ignition and for many years post fire as habitat regenerates.

## **Alternative B: FMP Revision (Preferred Alternative)**

### *Barataria Preserve*

The effects of fire suppression actions on wildlife under the Proposed Action would be the same as described for the No Action Alternative.

The impacts of prescribed fire on wildlife of the Barataria Preserve FMU would be species specific. Beneficial impacts to wildlife species would result from maintaining ecological function and native vegetation communities and making the remaining vegetation community more resilient to disturbance by invasive species, insects, disease, and drought. Prescribed fire improves soil nutrient cycling, promotes plant productivity, and in turn increases available forage. Under alternative B, less mobile species and species that depend on habitat with greater cover and increased litter densities would be adversely affected.

Prescribed fire would cause temporary displacement of species during and after the burn. Mitigation measures would be used to minimize adverse effects of burning on wildlife, including the development of site-specific prescribed burn plans and the involvement of park wildlife specialists in fire management activities. The presence of crews and equipment during the burn would cause some direct impacts on wildlife, but mobile species would be able to avoid the area during burning. Species in less mobile life stages (juvenile or nestling) and less mobile species (amphibians and reptiles) would be most impacted by a burn. Post-fire conditions would be beneficial for some species by improving forage availability, increasing prey, and creating more diverse habitat structure.

### *Mammals*

Similar to the effects described under the No Action Alternative, fire management activities under the Proposed Action would have short-term adverse impacts on some mammal species, but due to their mobile nature most mammals could avoid both unplanned and planned ignitions. Some juveniles or litters of mammal species may be lost in the fire but breeding parents would likely survive to reproduce. Smaller mammals may not be able to escape the fire, but many would escape and repopulate burned areas quickly, thriving on newly established herbaceous cover. Some small mammal species that favor dense litter and herbaceous cover may be displaced until vegetation cover is reestablished, therefore creating short-term adverse impacts. Densities of species that favor open disturbed areas may increase in burned areas and this population increase would benefit predators like hawks, foxes, and coyotes. The Barataria Preserve FMU is used by many bat species, most of which would be able to escape the fire. Some temporary impacts may occur to wildlife habitat, including loss of cover and forage. Species that utilize wax myrtle for cover, and would be adversely impacted by prescribed fire actions that target areas of shrub encroachment. These impacts would be short term and avoidable if prescribed burns are small and patchy, because species can utilize neighboring unburned areas. New growth would improve forage availability over time creating beneficial long-term impacts for species like white-tailed deer and other mammals that select for disturbed areas. However, new forage may increase local densities of nutria and wild pigs. The big brown bat is likely to occur in the park; however, the species is highly mobile

and would be able to avoid both prescribed fire and unplanned ignitions (personal communication between Chris Reid [LNHP] and Dusty Pate [NPS] April 22, 2015 found in Appendix A). Adverse impacts to mammal species, including the big brown bat, would last only the duration of the planned ignition or for 1-2 growing seasons post fire. Multiple-entry prescribed fire would provide varied habitat structure that would suit a diverse wildlife assemblage and provide benefits to many mammal species.

### Birds

Similar to the effects described under the No Action Alternative, fire management activities under the Proposed Action would have short-term adverse impacts on bird species due to loss of nests; however, adult birds would easily escape unplanned ignitions and prescribed fire through flight. Foraging and nesting habitat may be lost or altered by both wildfire and prescribed fire, which may displace individuals, but forage would be available in other areas of the park, and prescribed fire would be managed to create a mosaic of seral stages that would provide long-term benefit to many species. Some scavenger bird species may feed on small mammals and reptiles that perish during wildfire, and predatory birds could locate prey more easily due to lack of cover. Invertebrate prey that increases following a fire often attracts many bird species (Nyman and Chabreck 1995). Due to the small scale of most unplanned ignitions in the FMU and mitigation actions to minimize the severity of prescribed fire, including the development of site-specific prescribed burn plans and the involvement of park wildlife specialists in fire management activities, adverse impacts to bird species would be short term. Some bird species (e.g., secretive marsh birds) could benefit in the long term from improved wetland habitat created through the use of prescribed fire (Mitchell et al. 2006; Valente 2009). Prescribed fire has been reported to improve wintering waterfowl habitat by maintaining a mixture of open water and vegetative cover for resting and breeding waterfowl (Nyman and Chabreck 1995), removing dead and decadent vegetative matter of little nutritional value to waterfowl (Lynch 1941), and stimulating growth and seed production of food plants for birds and other wildlife (Mitchell et al. 2006). Prescribed fire may also offset the trend of subsidence and sea level rise through increasing accretion rates within the marsh, thereby preserving emergent wetland habitat. Impacts of prescribed fire on accretion would be the focus of research pursued by the park under the revised FMP.

Some bird species may utilize the encroaching shrub habitat for cover, foraging, and nesting; however, little data are available on the wildlife associations within the habitat type. Therefore, prescribed fire could have adverse impacts for species utilizing shrub habitat.

The varied habitat structure created through multiple-entry prescribed fire would provide varied habitat structure that would suit a diverse wildlife assemblage and provide benefits to many bird species.

### Amphibians and Reptiles

Similar to the effects described under the No Action Alternative, fire management activities under the Proposed Action would have adverse impacts on amphibians and reptiles during the duration of the planned ignitions due to direct mortality to individuals as a result of fire, trampling, and crushing, as well as a temporary loss of cover and forage. However, most species have species-specific adaptations that allow them to avoid impacts from fire, including burrowing and selection of wetter habitats that are less prone to wildfire. Prescribed fire would be managed in a way to create a mosaic of habitat, which would benefit many amphibian and reptile species in the long term, particularly for aquatic species through improved water quality and aquatic habitat (Russell et al. 1999). Due to the small scale of most unplanned ignitions in the FMU and mitigation actions to minimize the severity of prescribed fire, including the development of site-specific prescribed burn plans and the involvement of park wildlife specialists in fire management activities, adverse impacts to amphibians and reptiles would last only the duration of the planned ignition or for 1-2 growing seasons post fire. Multiple-entry prescribed fire would provide varied habitat structure that would suit a diverse wildlife assemblage and provide benefits to many amphibian and reptile species.

### Freshwater Fish

Similar to the effects described under the No Action Alternative, fire management activities under the Proposed Action would have adverse indirect impacts on freshwater fish during the duration of the planned

ignitions, due to changes in the hydrologic regime and increases in suspended sediment (Novak and White 1989). Removal of vegetation cover may cause some habitat loss due to increased water temperatures and decreased dissolved oxygen, which would cause some displacement of individuals to unburned areas, but displacement of individuals would be temporary and many species can withstand lower temperature fires without mortality (Rinne and Jacoby 2005). Prescribed fire would be initiated within strict prescription windows so that burn severity and adverse impacts to marsh habitat would be minimized. In the long term, freshwater fish would benefit from improvement to overall freshwater habitat, particularly as a result of improved water quality. Due to the small scale of most unplanned ignitions in the FMU and mitigation actions to minimize the severity of prescribed fire, adverse impacts to fish species would be localized and last only the duration of the planned ignition or for 1-2 growing seasons post fire.

### Invertebrates

Similar to the effects described under the No Action, fire management activities under the Proposed Action would have adverse impacts on terrestrial invertebrates during the duration of the planned ignitions, due to loss of individuals, but post fire benefits due to improved wetland habitat. Most aquatic invertebrates can withstand lower temperature fires without mortality. Some species that depend on greater density of litter and increased vegetative cover would be adversely impacted by prescribed fire, at least in the short term. Other species that favor more open disturbed habitat would experience benefits post fire as early seral habitat availability increases. Multiple-entry prescribed fire would provide varied habitat structure that would suit a diverse invertebrate assemblage and provide benefits to many invertebrate species. Benefits to invertebrates under the Proposed Action would be greater than those described under the No Action Alternative.

### *Chalmette Battlefield*

The effects of fire suppression actions on wildlife under the Proposed Action would be the same as described under the No Action Alternative.

The introduction of prescribed fire into the Chalmette Battlefield FMU could result in beneficial impacts to wildlife species by improving ecological function and increasing the diversity of the vegetation community (Knapp et al. 2009). Prescribed fire would make the vegetation community more resilient to disturbance by invasive species, insects, disease, and drought. Prescribed fire improves soil nutrient cycling, promotes plant productivity, and in turn increases available forage. Some less mobile species may experience injury or direct mortality due to fire, trampling, or crushing, but these impacts would be localized and prescribed burns would have short residence times.

### *Cumulative Impacts*

The cumulative impacts to wildlife from other past, present, and reasonably foreseeable actions would be similar as those described for the No Action Alternative. Fire management activities under the Proposed Action would cumulatively contribute adverse impacts to wildlife during the duration of the planned ignitions at both the Barataria Preserve and Chalmette Battlefield FMUs through temporary displacement of wildlife. Beneficial cumulative impacts to wildlife would occur if prescribed burns within the Barataria Preserve result in conservation of the marsh, which would improve habitat conditions. Beneficial cumulative impacts to wildlife would occur at the Chalmette Battlefield FMU due to improved habitat quality and productivity.

### *Conclusion*

Fire management activities under the Proposed Action would be managed in a way to optimize benefits to wildlife and their habitats and minimize adverse impacts. Under the Proposed Action there would be adverse impacts to many species during the duration of the planned ignitions, resulting from temporary human disturbance, direct mortality due to fire, crushing, trampling, and loss of forage and cover, but in the long term improved habitat quality and structure would provide benefits to most species, particularly species dependent on emergent wetland habitat and species that select for more open early seral habitat. Some species that depend on greater litter density and increased cover may be adversely impacted, at least until vegetation cover is

restored. Many species would benefit from the more diverse overall habitat structure that is associated with multiple-entry prescribed fire. Cumulative impacts from fire management activities that reduce invasion by non-native species, coupled with efforts to remove non-native wildlife, would result in habitat improvement and benefits to native wildlife species.

## **3.7 ARCHEOLOGICAL RESOURCES**

### **3.7.1 Affected Environment**

The 1995 amendment to the park's General Management Plan identifies more than 100 archeological sites, the majority of which are within the Barataria Preserve FMU. This fertile estuarine system has provided a rich matrix for humans throughout its short geologic existence. Within the unit, prehistoric sites represent a nearly complete chronology of habitation with the Mississippi Delta dating back more than 2,000 years. Recorded sites within the unit include major midden complexes (Bayou Coquille, Isle Bonne, Cheniere Grand Coquille), an eighteenth century Canary Islanders village, and properties associated with nineteenth century agriculture. Many of the archeological sites are contributing elements of the Barataria Historic District, listed on the National Register of Historic places.

The Chalmette FMU represents a portion of the site on which the Battle of New Orleans was fought between American and British forces on January 8, 1815. During the battle, the victorious American cause was aided by Jean Lafitte's men, who offered their services in return for pardons for their past smuggling activities. The battle brought fame to General Andrew Jackson and helped give a fledgling nation permanency.

Portions of the American defense line and the fields of the Chalmette Plantation are located within the park's boundary. Also located on the battlefield is the Malus-Beauregard House, built as a country home approximately 18 years after the battle. The site is listed on the National Register of Historic Places.

The Chalmette FMU also was home to a small African-American community called Fazendeville. In 1857, Jean- Pierre Fazende, a free person of color, had inherited a slice of the original Chalmette property that falls between the Malus-Beauregard House and the National Cemetery properties (Risk 1999:18). Fazende's property was passed down to his son, who, after the Civil War, subdivided it into plots that were sold to recently freed slaves. Established in 1867, Fazendeville grew and prospered until the 1960s when the last of the families were forced out and the remaining houses removed (Cornelison and Cooper 2012).

### **3.7.2 Environmental Consequences**

#### **Impact Analysis Method**

Available resource reports were used to characterize and assess the potential impacts to archaeological resources within the FMUs. Professional judgment was used to qualitatively describe the potential impacts to archeological sites from the alternatives.

#### **Alternative A: No Action**

##### *Barataria Preserve*

Under the No Action Alternative, archeological resources would not be directly impacted by planned fire management activities because they would not occur within the FMU. Archeological sites would continue to be at risk to unplanned ignitions that could result in loss or damage to sites, either directly by wildfire and related effects or by firefighting activities. The 1997 RMP identifies erosion and subsidence as a potential

threat to archeological sites within the Barataria Preserve. One of the goals of the revised FMP is use prescribed fire as a tool to reduce and possibly reverse the loss of wetlands to subsidence. Under the No Action Alternative, this proactive research would not occur, thereby potentially causing adverse impacts to archeological sites due to passive management of the wetland ecosystem.

### *Chalmette Battlefield*

Under the No Action Alternative, archeological resources would not be directly impacted because planned fire management activities would not occur within the FMU. Unplanned ignitions at the Chalmette Battlefield are rare and easily suppressed; therefore, the likelihood for adverse impacts to archeological sites under the No Action Alternative would be low.

### *Cumulative Impact*

Past, present, or reasonably foreseeable future projects at the Barataria Preserve and Chalmette Battlefield FMUs would undergo evaluation under Section 106 of the National Historic Preservation Act. Through this process, impacts to cultural resources would either be avoided or mitigated. Unanticipated discoveries during proposed activities typically results in work ceasing in the area and a qualified NPS staff member visiting the site to assess conditions and recommending a course of action in consultation with the Louisiana SHPO. Therefore, there would be no cumulative adverse impacts to archeological sites at the Barataria Preserve and Chalmette Battlefield FMUs under the No Action Alternative from planned actions by NPS and other entities.

### *Conclusion*

Adverse impacts to archeological sites could occur under the No Action Alternative as a result of unplanned ignitions that could result in loss or damage to sites, either directly by wildfire and related effects or by firefighting activities. These impacts would be most likely to occur at the Barataria Preserve because unplanned ignitions are rare and easily suppressed at the Chalmette Battlefield. Indirect impacts to archeological sites could occur under the No Action Alternative at the Barataria Preserve as subsidence and erosion continues to sink or expose archeological sites. No cumulative adverse impacts to archeological sites would occur under the No Action Alternative from planned actions by NPS and other entities.

## **Alternative B: FMP Revision (Preferred Alternative)**

### *Barataria Preserve*

The park contains an estimated 109 archeological sites, the majority of which are located in the Barataria Preserve (NPS 1997). Unplanned ignitions have the potential to adversely affect both recorded and unrecorded archeological sites within the FMU. Surface disturbance within archeological sites could occur from the use of firefighting equipment. It is difficult to know where unplanned ignitions could occur, and defense of archeological sites within the path of an unplanned ignition may pose too large of a threat to firefighter safety, depending on fire conditions. There are no documented cases of unplanned ignitions causing damage to archeological sites within the park. The revised FMP would identify updated mitigation measures and communication protocols between fire management personnel and cultural resources specialists, thereby supporting informed cultural resource management in the event of an unplanned ignition within the FMU.

Prior to initiating a planned ignition, the NPS would develop a prescribed burn plan, which would include advanced coordination with cultural resource staff to identify sensitive cultural locations and protocols for burning near archeological sites. Close monitoring of the prescribed burn would be conducted to avoid adverse impacts to recorded archeological sites. Surface disturbance within unrecorded archeological sites could result from the use of fire management equipment; however, monitoring associated with the prescribed burns would minimize this potential adverse impact.

The 1997 RMP identifies erosion and subsidence as a potential threat to archeological sites within the Barataria Preserve. One of the goals of the revised FMP is to understand whether or not park managers could use prescribed fire as a tool to possibly reduce the loss of the marsh to subsidence. Under Alternative B, these research studies would be pursued, and therefore experimental measures to combat subsidence for the protection of marsh and associated archeological sites could occur. Since research advances would be made that refine the BMPs for marsh ecosystems, impacts to archaeological sites would be beneficial if marsh subsidence rates were slowed.

### *Chalmette Battlefield*

Under Alternative B, prescribed fire would be used as a management tool to offset the amount of mowing used to maintain the grass vegetation on the battlefield. Potential impacts to archeological sites from planned ignitions would be unlikely due to the controlled nature of prescribed burns within the homogeneous grassland vegetation type in the FMU. The archeological sites that could be impacted, due to their proximity to the FMU, would include the Rodriguez Canal and the rampart. In addition, there may be archeological sites within the FMU associated with the historic Fazendeville community (NPS 1997). The impact of fire on archeological sites has been studied by the NPS (Ryan et al. 2012). This study demonstrated that fast-moving grass fires may heat the soil to only 140 degrees Fahrenheit, thereby reducing the threat to buried artifacts. In grassy areas typical of the FMU, the impact of properly managed prescribed burns on archeological resources would be beneficial as the less frequent use of machinery (mowers) would reduce the potential for damage to archeological resources from mechanical vegetation management.

### *Cumulative Impacts*

As discussed under the No Action Alternative, there would be no cumulative adverse impacts to archeological sites from planned actions by NPS and other entities.

### *Conclusion*

Under the Proposed Action, adverse impacts to archeological sites within the Barataria Preserve FMU could occur from unplanned ignitions, either through direct consumption by fire or by firefighting equipment. Prescribed burn plans would include protective measures to avoid impacts to known archeological sites within the Chalmette Battlefield and the Barataria Preserve FMUs. Beneficial impacts to archeological sites within the Barataria Preserve would occur if research studies lead to BMPs that reduce subsidence rates within the wetland. No cumulative impacts to archeological sites would occur under the Proposed Action.

## **3.8 RECREATION AND VISITOR EXPERIENCE**

### **3.8.1 Affected Environment**

Both the Barataria Preserve and Chalmette Battlefield FMUs offer many opportunities for public recreation. Annual visitation at the park has fluctuated around a mean of 650,000, as recorded between 1978 and 2013 (NPS 2015a). Generally, visitation is highest during the summer months and is also influenced by holidays and park events such as memorial dedications (NPS 2015a).

The Chalmette Battlefield FMU offers a visitor center, talks, and tours for people who want to learn more about the Battle of New Orleans and the Chalmette National Cemetery. Every year, in early January, the anniversary of the Battle of New Orleans is commemorated with demonstrations and special events. The Chalmette Battlefield FMU is also the termination point for a daily paddlewheel steamboat tour from New Orleans to the park. The “Chalmette Battlefield Cruise” operates under a concessionaire permit issued by the NPS. The low volume road within the Chalmette Battlefield FMU also serves a day-use recreational path for local residents who use the road for walking, biking, running, and other pedestrian activities.

Recreation and visitor experiences at the Barataria Preserve include hiking, wildlife viewing, photography, canoeing, fishing, and hunting (NPS 2009a). Ranger-guided walks, canoe trips, summer camps, and environmental education programs are available year-round. About 10 miles of walking trails provide the Barataria Preserve visitors with an avenue to explore the forests, swamps, and marshes of the preserve (Figure 7). Ten miles of non-motorized (canoe) trails plus 20 miles of natural bayous, canals, and waterways are available for recreational boating and fishing, though waterways are often closed due to their condition, especially the canoe trails. The park also maintains three canoe launches located at Twin Canals, Kenta Canal, and Bayou des Familles.

A visitor center provides interpretation of the Barataria Preserve's diverse resources and complex history. A number of privately owned fishing camps are also located on private lands within the preserve. They are mostly concentrated along the Whiskey Canal between the Outer Cataouatche Canal and Lake Cataouatche and the northern end of the land cut of the Bayou Segnette Waterway between Lake Cataouatche and Lake Salvador.

There is a commercial swamp tour boat company that operates in some of the canals in Bayou aux Carpes area of the preserve. The company is located immediately adjacent to the preserve, and its boats are stored and operated in canals owned by the United States that are proposed for reclamation. The tour boat company operates as a park concessionaire under the terms of a commercial use authorization.

The majority of recreational activities enjoyed by the public at the Barataria Preserve are compatible with each other. However, to prevent confrontation among user groups, the park restricts public use and access in certain areas. For example, where bank fishing and canoeing are popular along Twin Canals, motorized boats are prohibited. Individuals wanting to hunt and trap are required to apply for a (free) permit and are restricted to designated hunting zones (see Figure 7). Hunting is prohibited within a minimum of 500 feet from a roadway, trail, waterway, or structure to ensure visitor safety and to prevent user conflicts. Hunters are required to follow daily check-in procedures at designated stations within the Barataria Preserve.

**Fire Management Units**  
 Revised Fire Management Plan for Jean Lafitte National Historical Park and Preserve

National Park Service  
 U.S. Department of the Interior



Produced by SWCA Environmental Consultants  
 Denver, Colorado

March 2015

World Imagery Source: Esri, DigitalGlobe  
 Layers: NHP

Fire Management Plan (FMP)/Barataria Preserve\_8x11\_FMP\_JELA

**FIGURE 7. RECREATION OPPORTUNITIES WITHIN THE BARATARIA PRESERVE.**

## 3.8.2 Environmental Consequences

### Impact Analysis Method

The methodology used for assessing recreation and visitor experience impacts included identifying changes to recreation and visitor experiences caused by implementation of the alternatives, and qualitatively evaluating how these changes would affect visitor use and experience using best professional judgment.

#### Alternative A: No Action

##### *Barataria Preserves*

Under the No Action Alternative, fire management would be limited to suppression activities as directed by the 2004 FMP. Prescribed fire would not be used. Encroachment of shrubs and small trees, including non-native species such as Chinese tallow, would continue in the Barataria Preserve marshes, incrementally changing the hunting habitat within the preserve. Increased woody vegetation could improve hunting habitat for some species, which would beneficially impact hunting opportunities. The loss of herbaceous vegetation due to invasive woody vegetation encroachment would reduce the available habitat for other wildlife species. This could adversely impact bird watching and wildlife viewing opportunities. Slow loss of hunting habitat and the available recreational area for bird watchers and others would continue, as subsidence and erosion eliminates portions of the wetland, which would adversely impact recreation and visitor experience at the Barataria Preserve. Permitted hunters would also be impacted by unplanned ignitions, if those fires resulted in loss of hunting stands.

##### *Chalmette Battlefield*

Under the No Action Alternative, the grass cover on the battlefield would be maintained by frequent mowing. Rutting and uniform lawn stripes would continue to impact the cultural landscape. These effects of mechanical vegetation maintenance would adversely impact the visitor experience at the Chalmette Battlefield.

##### *Cumulative Impacts*

Other past, present, and reasonably foreseeable actions that may affect recreation and visitor experience include the park's canal reclamation program within the Barataria Preserve, the vegetation restoration program, the NPS hunting program, the various state and federal nutria and wild pig management programs, future land acquisitions at the Barataria Preserve, the Passage to Unity Memorial at the Chalmette Battlefield, the rampart repair project at the Chalmette Battlefield, and the repair of the entrance gate to the Chalmette Battlefield. The canal reclamation program involves approximately 20 miles of non-historic canals that are being filled and shaped to attempt to restore the wetland ecosystem where it previously existed. This activity would benefit recreation and visitor experience by restoring freshwater marsh and improving both the visual landscape and wildlife habitat associated with visitor activities (canoeing, bird watching, hunting, etc.) that occur within the Barataria Preserve. Vegetation restoration, which includes the removal of invasive non-native species, such as Chinese tallow, would also beneficially impact recreation and visitor experience.

Efforts by the State of Louisiana, the NPS, and others to remove non-native animal species, such as nutria and wild pigs, result in a beneficial impact to recreation and visitor experience. First, hunters and trappers are provided a recreational opportunity to take the non-native animals. Second, the visual landscape and wildlife habitat within the Barataria Preserve are beneficially impacted by the reduced nutria and wild pig populations. Nutria and wild pigs destroy large swaths of wetland vegetation, resulting in a degraded visitor experience.

Several tracts of land have been acquired by the park in recent years, and the park is authorized to continue acquiring land for the Barataria Preserve. These acquired tracts protect additional areas of wetland from development and the adverse impacts that could occur under other management oversight. The acquisition of

additional wetland areas has beneficial impacts to recreation and visitor experience because more protected land would be available to future visitors for their enjoyment.

At the Chalmette Battlefield, the Passage to Unity Memorial would provide an enhanced visitor experience due to the additional interpretation of the historic site, as well as improved locations for visitors to walk and contemplate the unit's significance. Associated vegetation treatments would enhance the appearance of the battlefield and forested area on the north side of the battlefield. Similarly, the repair of the entrance gate to the battlefield and rampart maintenance would provide cumulative beneficial impacts to visitor experience within the Chalmette Battlefield FMU.

### *Conclusion*

The No Action Alternative would result in adverse impacts to recreation and visitor experience at both FMUs. Research would not provide the necessary tools to manage encroachment of non-native species, and wetland subsidence would not be as well understood at the Barataria Preserve. The wetland environment, specifically the rooted marsh, would continue to gradually change and be lost to future generations of visitors. At the Chalmette Battlefield, the use of mowing as the only vegetation control method would continue to place evidence of modern landscape management on a historic, cultural landscape.

### **Alternative B: FMP Revision (Preferred Alternative)**

The Proposed Action could disturb visitors during implementation activities due to reduced access within portions of the Barataria Preserve and closures at the Chalmette Battlefield. The visitor experience would be impacted, including hunting activities at the Barataria Preserve FMU and touring activities in both units. Temporary recreational area closures, smoke, and increased noise may result from the Proposed Action.

#### *Barataria Preserve*

Planned fire management activities could result in temporary disruption of access and use in certain areas of the Barataria Preserve, specifically in those areas used to access or view the wetland. Smoke may temporarily impact scenic views from the Marsh Overlook Trail and Visitor Center Trail during fire management activities.

Non-permitted recreation activities such as canoeing, kayaking, and bird watching would be temporarily restricted during fire management activities. Tours under permits could be restricted, depending on the location and conditions during the fire management activities. Advance notification of planned ignitions would be provided to the concessionaires through the annual permitting process and pre-burn coordination. Temporary park closures would be an adverse impact to recreation and visitor experience, although the closures would be limited to the least amount of time necessary to conduct the fire management activity.

Prescribed fire and wildfires may occur during hunting and trapping season, thereby temporarily closing some hunting and trapping areas within the marsh during fire management activities. Impacts to hunting and trapping may continue after the fire activity is completed due to change in vegetation composition, which could change game movement patterns within the marsh and alter hunting and trapping opportunities within the park. Permitted hunters would also be impacted by unplanned ignitions. Per the mitigation measures identified as part of the Proposed Action, permitted hunters and trappers would be notified of any planned ignitions in advance of the fire management activity through the permitting process and daily check-ins required by the park. In the event of an unplanned ignition, notices would be posted at boat docks and the Barataria Preserve visitor center to notify the general public. Hunters and trappers would be contacted through the daily check-in procedures required by the park.

#### *Chalmette Battlefield*

Fire management activities at the Chalmette Battlefield FMU would result in potential temporary closures of the battlefield, national cemetery, and visitor center. Temporary park closures would be a short-term adverse

impact to recreation and visitor experience at the Chalmette Battlefield and National Cemetery. The paddlewheel steamboat tour concessionaire would be impacted by the temporary park closures associated with fire management activities at the battlefield because the tourists would not be allowed to disembark to visit the battlefield when the park is closed. The park would notify the boat tour company of the potential for fire management related closures during the annual permitting process, and would notify them of closures in the lead up to a prescribed burn. The duration of the impact would coincide with the duration of prescribed burn activities or unplanned ignition event.

Beneficial impacts to recreation and visitor experience would occur from the Proposed Action because prescribed fire would provide a less-intensive vegetation management tool for the battlefield vegetation. By alternating planned ignitions with mechanical mowing, the visual impacts to the battlefield (rutting, lawn stripes) would be reduced, thereby improving the visitor experience at the historic location. However, the appearance of the battlefield would also be temporarily altered after burning.

### *Cumulative Impacts*

The cumulative impacts to recreation and visitor experience from other past, present, and reasonably foreseeable actions would be similar as those described for the No Action Alternative. Fire management activities under the Proposed Action would cumulatively contribute short-term adverse impacts to recreation and visitor experience at both the Barataria Preserve and the Chalmette Battlefield through the contribution of smoke to the atmosphere and potential short-term park closures. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial cumulative impacts to recreation and visitor experience would occur if research on prescribed burns within the Barataria Preserve results in improved conservation of the freshwater marsh, which would improve hunting conditions, wildlife viewing, and other recreation-related visitor activities. Beneficial cumulative impacts to recreation and visitor experience would occur at the Chalmette Battlefield due to a reduction in visual impacts from mechanical mowing within the historic setting.

### *Conclusion*

Short-term adverse impacts to recreation and visitor experience would result from public closures during fire management activities within both FMUs. The duration of the impact would coincide with the duration of prescribed burn activities. Beneficial impacts would result from improved and increased resiliency of game habitat for hunters and the removal of non-native species within the Barataria Preserve. Beneficial impacts would result at the Chalmette Battlefield as a result of reducing mowing and a more historically accurate appearance of the battlefield.

## **3.9 ENERGY RESOURCES AND COMMUNICATION INFRASTRUCTURE**

### **3.9.1 Affected Environment**

Several electric transmission lines and communication sites are located within the Barataria Preserve (Figure 2). Oil and gas pipelines also cross the FMU. This infrastructure is important to both the local communities and the region to deliver and provide energy and communication services. Scoping comments received from one of the transmission line operators requested potential impacts to power line infrastructure be considered in the EA. Concerns expressed by the electrical transmission line company include impacts to transmission line infrastructure by planned ignitions such as:

- Lack of coordination between the NPS and the transmission line companies that result in power outages to customers;
- Ash and debris from wildland fire could cause power lines to short out and power outages to occur; and

- Wildland fire could cause damage to wood and metal power poles that accelerates loss and necessary replacement of poles.

## **3.9.2 Environmental Consequences**

### **Impacts Analysis Method**

Park staff met with Entergy representatives on February 20, 2015, to discuss the potential impacts from fire management activities within the Barataria Preserve and identified several mitigation measures to prevent damage to power lines and avoid power outages. The mitigation measures are described in Section 2: Alternatives Considered.

### **Alternative A: No Action**

#### *Barataria Preserve*

Under the No Action Alternative, a written process for communicating with owners of energy infrastructure in the event of a wildfire would not be in place. Therefore, protection measures and coordination with infrastructure owners and operators to reduce the threat of unplanned ignitions within the wetland could be delayed or otherwise adversely affected under the No Action Alternative.

#### *Chalmette Battlefield*

No transmission lines or communication sites occur within the Chalmette Battlefield FMU. No impacts to energy resources would occur from the No Action Alternative.

#### *Cumulative Impacts*

Ongoing and future maintenance of the infrastructure and rights-of-way associated with the pipelines, transmission lines, and communication sites would result in a cumulative beneficial impact to energy infrastructure within the park.

#### *Conclusion*

Under the No Action Alternative, there would be no direct impact to energy infrastructure within the park. However, there would be an adverse indirect impact to relationships and communication protocols with the energy infrastructures owners and operators because no such protocol exists in the 2004 FMP.

### **Alternative B: FMP Revision (Preferred Alternative)**

#### *Barataria Preserve*

Multiple oil and gas pipelines, overhead electric transmission lines, and communication sites are located within the Barataria Preserve wetland. Prior to initiating a planned ignition, the NPS would develop a prescribed burn plan, which would include advanced notification of planned ignitions to all power line, pipeline, and communication site companies. The prescribed burn plan would include locations and protocols for burning near infrastructure, and transmission line outage requests would be filed as directed by the appropriate company. Close monitoring of the prescribed burn would be conducted by the park, other NPS staff, and the affected company, as necessary. Mitigation is expected to result in the avoidance of adverse impacts to energy infrastructure from planned fire management activities. Overall, the implementation of the FMP would result in beneficial impacts to this infrastructure because the planned ignitions would include protection measures and coordination with infrastructure owners and operators, and would reduce the threat of unplanned ignitions

within the wetland. Furthermore, the establishment of control lines, reduced shrub cover, and other fuels management could improve access to transmission line rights-of-way.

Unplanned ignitions could potentially adversely impact power lines and communication sites, and to a lesser extent buried pipelines, within the Barataria Preserve FMU. It is difficult to know where unplanned ignitions could occur and defense of the infrastructure may pose too large of a threat to firefighter safety, depending on fire conditions. There are no documented cases of unplanned ignitions causing damage to energy and communication infrastructure within the park. The revised FMP would outline training opportunities and communication protocols with infrastructure owners, thereby facilitating improved communication processes in the event of an unplanned ignition within the park. Fuels management and preparation of the FMU for prescribed burning could also improve the effectiveness of a response to unplanned ignitions.

### *Chalmette Battlefield*

No transmission lines or communication sites occur within the Chalmette Battlefield FMU. No impacts to energy resources would occur from the Proposed Action.

### *Cumulative Impacts*

Ongoing and future maintenance of the rights-of-way associated with the pipelines, transmission lines, and communication sites would result in a beneficial impact to energy infrastructure within the park. Considered cumulatively with the Proposed Action, improved relationships and potential partnering opportunities between the park and energy infrastructure owners and operators would be more likely to occur with clear and responsive communication protocols in place.

### *Conclusion*

Under the Proposed Action, the implementation of the FMP would result in beneficial impacts to pipelines, transmission lines, and communication sites because the planned ignitions would include protection measures and coordination with infrastructure owners and operators and reduce the threat of unplanned ignitions within the wetland. Modern training opportunities and communication protocols with infrastructure owners would result in improved communication processes.

## 4 CONSULTATION AND COORDINATION

Letters were sent to Native American tribes on February 3, 2015, to inform them of the revised FMP/EA and to inquire whether affiliated tribes wanted to be involved in the environmental compliance process. The tribes and governments that received letters are listed in Table 4.

**TABLE 4. LIST OF CONSULTED NATIVE AMERICAN TRIBES FOR THE PROPOSED FIRE MANAGEMENT PLAN**

Seminole Tribe of Florida	Tunica-Biloxi Tribe of Louisiana
Jena Band of Choctaw	Coushatta Tribe of Louisiana
Seminole Nation of Oklahoma	Quapaw Tribe of Oklahoma
Mississippi Band of Choctaw Indians	Chitimacha Tribe of Louisiana
Caddo Nation of Oklahoma	Choctaw Nation of Oklahoma
Alabama Coushatta Tribe of Texas	

Two responses from tribes were received for the project. The Choctaw Nation of Oklahoma responded on March 5, 2015, requesting to be a consulting party on the proposed project. The Seminole Tribe of Florida responded on March 27, 2015, requesting a copy of the EA and updated FMP upon completion of the environmental compliance process.

The park has also notified various state and federal agencies of the proposed FMP revision and EA. Table 5 lists the agencies notified of the proposed project during the scoping period.

**TABLE 5. LIST OF CONSULTED AGENCIES FOR THE PROPOSED FIRE MANAGEMENT PLAN**

Agency	Consultation Requirement
<b>Federal</b>	
USFWS Louisiana Ecological Services Office	Endangered Species Act, Section 7
National Marine Fisheries Service	Endangered Species Act, Section 7
EPA Region 6 Marine and Coastal Section	Clean Water Act, Section 404(c)
USFWS Gulf Zone Inventory and Monitoring Network	Courtesy notification due to ongoing partnership between the park and the USFWS
USGS National Wetlands Research Center	Courtesy notification due to ongoing partnership between the park and the USGS
<b>State</b>	
Louisiana Department of Natural Resources Office of Coastal Management	Review required for consistency with Louisiana's Coastal Management Program
Louisiana SHPO	National Historic Preservation Act, Section 106
LNHP	NPS Management Policies 2006, Section 4.4.2.3

The National Historic Preservation Act requires the consideration of impacts on cultural resources, either listed or eligible to be listed in the National Register of Historic Places. Park staff sent a letter to the Louisiana SHPO on February 2, 2015, to solicit input on issues of concern. A response was received from the SHPO on May 29, 2015 stating no concerns for the revision of the FMP (Appendix A).

The park also sent a letter to the USFWS and the National Marine Fisheries Service to initiate consultation under Section 7 of the Endangered Species Act. The USFWS Louisiana Ecological Services Office responded with a no effect determination for federally listed species on February 27, 2015 (Appendix A). No response was received from the National Marine Fisheries Service.

Other agencies notified of the proposed project include EPA Region 6, the USFWS Gulf Zone Monitoring and Inventory Network, and the Louisiana Office of Coastal Management. The park also notified the LNHP of the proposed project in order to identify any potential impacts to state listed species. No adverse impacts to state

listed species were identified during consultation (personal communication between Chris Reid [LNHP] and Dusty Pate [NPS], April 22, 2015, found in Appendix A).

## 4.1 LIST OF PREPARERS AND CONTRIBUTORS

**TABLE 6. PREPARERS**

<b>National Park Service</b>	
Jennifer Adams	Southeast Region, Fire Planner (acting)
Jesse Burton	Natchez Trace Parkway, Fire Ecologist
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David Fox	Jean Lafitte National Historical Park and Preserve, Biological Sciences Technician
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## **APPENDIX A. AGENCY CONSULTATION**

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Louisiana Ecological Services Office
ESA Technical Assistance Form

2/10/2015

General Information

Name: National Park Service/Jean Lafitte NHP & Preserve

Point of Contact: Dusty Pate

Address: 419 Decatur Street

City: New Orleans

State: Louisiana

Zip Code: 70130

Phone Number 1: 5045893882x119

Phone Number 2: 5043824937

Email Address: haigler\_pate@nps.gov

Proposed Project Information

Project Reference ID: 4311

Project Latitude: 29.8089008 Project Longitude: -90.1361304

Project Parish(es): Jefferson, Saint Bernard

Project Description: Fire Management Plan Update

The information provided indicates that: (1) your project occurs in a parish where one or more federally listed species and/or their critical habitat may occur; and (2) may involve disturbance or clearing of previously undisturbed areas or may involve new construction activities that may negatively impact surrounding potential habitat.

Based on these factors, this project requires further review. You may submit your project information and a request for review via fax or mail to the Louisiana Ecological Services Office at the one of the addresses below in order to complete coordination under Section 7(a)(2) of the Endangered Species Act of 1973 (Act).

Please include the following project information in your submission:

- Full Project description of work to be completed
• Project Contact name and number
• Project Location in latitude and longitude, including staging areas
• Approximate date for project to begin and end
• A copy of this pre-development coordination report
• Any other information that may be helpful for our review process

This project has been reviewed for effects to Federal trust resource under our jurisdiction and currently protected by the Endangered Species Act of 1973 (Act). The project, as proposed,
[X] Will have no effect on those resources
( ) is not likely to adversely affect those resources.
This finding fulfills the requirements under Section 7(a)(2) of the Act
[Signature]
Acting Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service
Date: Feb 27, 2015

Please keep a copy of this pre-development coordination for your records.

Mailing Address: 646 Cajundome Blvd., Suite 400, Lafayette, LA 70506 Attn: Biological Science Technician
Email: Lafayette@fws.gov
Fax: 337/291-3139

If you have additional questions, please contact Louisiana ES Office Biological Science Technician at 337/291-3100 for further assistance.

**Coleman Burnett**

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**From:** Pate, Dusty <haigler\_pate@nps.gov>  
**Sent:** Wednesday, April 22, 2015 4:36 PM  
**To:** Victoria Amato; Coleman Burnett; Darrell Schulte  
**Subject:** JELA FMP Update - Chris Reid

Howdy,

I spoke with Chris Reid this afternoon about the following state-listed species from our Natural Heritage Program report:

big brown bat  
floating antler fern  
golden canna  
swamp milkweed  
western umbrella grass

Big brown bats are highly mobile, and should be able to avoid negative effects from fires.

Floating antler fern would be found on open water in slow moving waterways and swamps under conditions that are unlikely to carry fire.

The remaining species are marsh species, so might be burned, but Chris expects that they would respond positively to fire.

So, we have no concerns on this score, and likely something to monitor at a minimum. The statement about supporting special status species on page three of the Alts/Consequences Summary is supported! :)

Thanks,

Dusty

--  
Haigler "Dusty" Pate  
Natural Resource Program Manager  
Jean Lafitte National Historical Park and Preserve  
504 382-4937 cell



JAY DARDENNE  
LIEUTENANT GOVERNOR

**State of Louisiana**  
OFFICE OF THE LIEUTENANT GOVERNOR  
DEPARTMENT OF CULTURE, RECREATION & TOURISM  
OFFICE OF CULTURAL DEVELOPMENT

CHARLES R. DAVIS  
DEPUTY SECRETARY

PAM BREAUX  
ASSISTANT SECRETARY

29 May 2015

Lance Hatten  
Superintendent  
Jean Lafitte National Historical Park and Preserve  
419 Decatur Street  
New Orleans, LA 70130-1035

Re: Fire Management Plan Update

Dear Mr. Hatten:

We acknowledge receipt of your letter dated 2 February 2015 concerning the revision of the existing 2004 Fire Management Plan to incorporate the approximately 3,000 acres of land acquired at the Barataria Preserve in 2009. We apologize for the lateness of our response.

Our office has no concerns for the revision of the Fire Management Plan.

If you have any questions, please contact Chip McGimsey in the Division of Archaeology by email at [cmcgimsey@crt.la.gov](mailto:cmcgimsey@crt.la.gov) or by phone at 225-219-4598.

Sincerely,

A handwritten signature in blue ink that reads "Pam Breaux".

Pam Breaux  
State Historic Preservation Officer

PB:crm