

FIRE MANAGEMENT PLAN
for
GULF ISLANDS NATIONAL SEASHORE
Florida and Mississippi

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TABLE OF CONTENTS

1.0 <u>INTRODUCTION</u>	1
1.1 Reason for Development of Fire Management Plan	1
1.2 Collaborative Processes.....	1
1.3 Implementation of Fire Management Policy.....	1
1.3.1 2001 Federal Fire Policy.....	2
1.3.2 Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems—A Cohesive Strategy	2
1.3.3 A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan	3
1.4 Environmental Compliance.....	4
1.5 Authorities for Implementing Fire Management Plan	4
2.0 <u>RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY</u>	4
2.1 Federal Fire Management Policy	4
2.2 Establishment of Gulf Islands National Seashore	4
2.3 Statement for Management (SM) Objectives.....	6
2.4 Resource Management Plan (RMP) Objectives.....	7
2.5 Wilderness Management Plan (WMP) Objectives.....	7
2.5.1 Application of “Minimum Requirement” Process.....	8
2.5.2 Fire Management within the Gulf Islands Wilderness	8
2.6 How Fire Management Plan Supports SM, RMP and WMP Objectives.....	8
3.0 <u>WILDLAND FIRE MANAGEMENT STRATEGIES</u>	9
3.1 General Management Considerations	9
3.2 Wildland Fire Management Goals	9
3.3 Scope of Wildland Fire Management Elements to be Implemented.....	10
3.3.1 Wildland Fire Suppression.....	11
3.3.2 Prescribed Fire	11
3.3.3 Non-Fire Applications	11
3.4 Seashore Description.....	11
3.4.1 Physical and Biotic Characteristics.....	11
3.4.1.1 Real Property.....	11
3.4.1.2 Soils.....	12
3.4.1.3 Air Quality	12
3.4.1.4 Water Quality	12
3.4.1.5 Vegetation	13
3.4.1.6 Wildlife	18
3.4.1.7 Threatened and Endangered Species, and Designated Critical Habitat.....	19
3.4.1.8 Cultural and Historic Resources.....	21
3.4.1.9 Wilderness.....	22
3.4.2 Management Considerations.....	23
3.4.3 Past Role of Fire	22
3.4.4 Wildland Fire Management Situation.....	25
3.4.4.1 Historical Weather Analysis.....	25
3.4.4.2 Fire Season	25

3.4.4.3	Fuel Characteristics and Fire Behavior	25
3.4.4.4	Fire Regime Alteration.....	30
3.4.4.5	Control Problems and Dominant Topographic Features.....	31
3.4.5	Fire Management Units (FMUs).....	31
3.4.5.1	FMU #1: Davis Bayou Unit	32
3.4.5.1.1	Fire Management Objectives for FMU #1.....	32
3.4.5.1.2	Fire History	33
3.4.5.1.3	Fuel Characteristics/Fire Behavior	33
3.4.5.2	FMU #2: Cat Island Unit.....	34
3.4.5.2.1	Fire Management Objectives for FMU #2.....	34
3.4.5.2.2	Fire History	35
3.4.5.2.3	Fuel Characteristics/Fire Behavior	35
3.4.5.3	FMU #3: West Ship Island Unit.....	35
3.4.5.3.1	Fire Management Objectives for FMU #3.....	35
3.4.5.3.2	Fire History	36
3.4.5.3.3	Fuel Characteristics/Fire Behavior	36
3.4.5.4	FMU #4: East Ship Island Unit.....	36
3.4.5.4.1	Fire Management Objective for FMU #4	36
3.4.5.4.2	Fire History	36
3.4.5.4.3	Fuel Characteristics/Fire Behavior	37
3.4.5.5	FMU #5: Horn Island Unit.....	37
3.4.5.5.1	Fire Management Objectives for FMU #5.....	37
3.4.5.5.2	Fire History	37
3.4.5.5.3	Fuel Characteristics/Fire Behavior	38
3.4.5.6	FMU #6: Petit Bois Island Unit.....	38
3.4.5.6.1	Fire Management Objectives for FMU #6.....	38
3.4.5.6.2	Fire History	38
3.4.5.6.3	Fuel Characteristics/Fire Behavior	38
3.4.5.7	FMU #7: Fort Barrancas Unit	39
3.4.5.7.1	Fire Management Objectives for FMU #7.....	39
3.4.5.7.2	Fire History	39
3.4.5.7.3	Fuel Characteristics/Fire Behavior	39
3.4.5.8	FMU #8: Naval Lives Oaks Unit	40
3.4.5.8.1	Fire Management Objectives for FMU #8.....	40
3.4.5.8.2	Fire History	41
3.4.5.8.3	Fuel Characteristics/Fire Behavior	41
3.4.5.9	FMU #9: Perdido Key Unit.....	42
3.4.5.9.1	Fire Management Objectives for FMU #9.....	42
3.4.5.9.2	Fire History	43
3.4.5.9.3	Fuel Characteristics/Fire Behavior	43
3.4.5.10	FMU #10: Fort Pickens Unit.....	43
3.4.5.10.1	Fire Management Objectives for FMU #10.....	44
3.4.5.10.2	Fire History	44
3.4.5.10.3	Fuel Characteristics/Fire Behavior	44
3.4.5.11	FMU #11: Santa Rosa Unit	44
3.4.5.11.1	Fire Management Objectives for FMU #11.....	45
3.4.5.11.2	Fire History	45
3.4.5.11.3	Fuel Characteristics/Fire Behavior	45
3.4.5.12	FMU #12: Okaloosa Unit.....	45
3.4.5.12.1	Fire Management Objectives for FMU #12.....	45
3.4.5.12.2	Fire History	46

3.4.5.12.3 Fuel Characteristics/Fire Behavior	46
3.4.6 Values to Protect, Manage, or at Risk	46
4.0 <u>WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS</u>	47
4.1 General Implementation Procedures	47
4.2 Wildland Fire Suppression	48
4.2.1 Range of Potential Fire Behavior.....	48
4.2.2 Preparedness Actions.....	48
4.2.2.1 Fire Prevention Activities.....	49
4.2.2.2 Annual Training Needs of Fire Staff.....	50
4.2.2.3 Annual Equipment and Supply Readiness Procedures.....	50
4.2.2.4 Fire Weather and Fire Danger.....	51
4.2.2.4.1 Weather Station	51
4.2.2.4.2 National Fire Danger Rating System.....	51
4.2.2.4.2.1 Burning Index.....	51
4.2.2.4.2.2 Keetch-Byram Drought Index (KBDI).....	51
4.2.2.5 Step-Up Staffing Plan	51
4.2.3 Pre-Attack Plan.....	53
4.2.4 Initial Attack.....	53
4.2.4.1 Information Used to Set Initial Attack Priorities.....	54
4.2.4.2 Criteria for Appropriate Initial Attack Response	54
4.2.4.3 Confinement as an Initial Attack Suppression Strategy	55
4.2.4.4 Typical Fire Response Time	55
4.2.4.5 Restrictions and Special Concerns	56
4.2.4.6 Work/Rest Guidelines, Rest and Recuperation	56
4.2.5 Extended Attack and Large Fire Suppression.....	56
4.2.5.1 Determination of Extended Attack Needs.....	56
4.2.5.2 Implementation Plan Requirements—WFSA Development.....	56
4.2.5.3 Complexity Decision Process from Initial to Extended Attack.....	57
4.2.5.4 Incident Commander Delegation of Authority.....	57
4.2.6 Exceeding Existing WFIP, Selecting New Strategy	57
4.2.7 Minimum Impact Suppression Tactics	57
4.2.8 Rehabilitation Guidelines and Procedures.....	58
4.2.9 Reporting and Documentation.....	58
4.3 Prescribed Fire.....	59
4.3.1 Planning and Documentation.....	60
4.3.1.1 Long-Term Prescribed Fire Strategy.....	60
4.3.1.2 Personnel requirements for Program Implementation.....	60
4.3.1.3 Prescribed Fire Monitoring	60
4.3.1.4 Prescribed Fire Project Critique	61
4.3.1.5 Reporting and Documentation Requirements for Accomplishments and escaped Fires	61
4.3.1.6 Prescribed Fire Plan	61
4.3.2 Exceeding Existing Prescribed Fire Plan.....	62
4.3.3 Air Quality and Smoke management	62
4.4 Debris Burns.....	63
4.5 Non-Fire Treatment Applications	63
4.5.1 Equipment and Seasonal Use Restrictions by FMU	64
4.5.2 Effects Monitoring.....	64
4.5.3 Project Critiques	64

4.5.4 Cost Accounting	64
4.5.5 Reporting and Documentation	64
4.5.6 Annual Planned Project List	64
4.6 Emergency Rehabilitation and restoration	65
5.0 <u>ORGANIZATIONAL AND BUDGETARY PARAMETERS</u>	65
5.1 Fire Management Team Member Responsibilities.....	65
5.2 FIREPRO Funding	68
5.3 Interagency Coordination	68
5.4 Interagency Contacts	68
5.5 Fire-Related Agreements.....	69
6.0 <u>MONITORING</u>	69
6.1 NPS Fire Monitoring Handbook	69
6.2 Recommended Standard Monitoring Levels	69
6.3 Wildland and Prescribed Fire Monitoring.....	70
7.0 <u>FIRE RESEARCH/PROGRAM NEEDS</u>	70
8.0 <u>FIREFIGHTER AND PUBLIC SAFETY</u>	71
8.1 Firefighter Safety and Related Training, Qualifications, and Fitness Standards.....	71
8.2 Public Safety Issues/Concerns, and Mitigation Procedures	72
9.0 <u>PUBLIC INFORMATION AND EDUCATION</u>	73
10.0 <u>PROTECTION OF SENSITIVE RESOURCES</u>	73
10.1 Archeological/Cultural/Historic Resources.....	73
10.2 Natural Resources	74
10.3 Development/Infrastructure.....	75
11.0 <u>FIRE CRITIQUES AND ANNUAL PLAN REVIEW</u>	75
11.1 Critiques	75
11.2 Annual Plan Review.....	76
12.0 <u>CONSULTATION AND COORDINATION</u>	76
13.0 <u>APPENDICES</u>	
13.01 References Consulted or Cited	
13.02 Definitions of Terms, as they Pertain to Fire Management	
13.03 Seashore Species Lists	
13.04 NEPA Compliance	
13.05 Fire Call-Up List	
13.06 Preparedness Inventory	
13.07 Memoranda of Understanding	
13.08 Limited Delegation of Authority	
13.09 GUIS Minimum Requirement Method	

- 13.10 Five-Year Fuels Treatment Plan
- 13.11 GUIS Fire Effects Monitoring Plan
- 13.12 Seashore ASMIS List and LCS
- 13.13 Summary of Major Vegetative Communities/Habitats in the Davis Bayou Unit, and Fire Management Recommendations, as Per the Report Entitled *Wetland Delineation and Hydrologic/Community Survey of the Davis Bayou Area of Gulf Islands National Seashore* (MSU 2002)
- 13.14 Natural Fire Return Intervals and Fire Effects Regarding Specific Vegetation Species at GUIS

LIST OF TABLES

Table 1: Federally- and State-Listed Species Identified at GUIS	19
Table 2: Historic Fire Weather Parameters for GUIS Fire Season, MS District	27
Table 3: Historic Fire Weather Parameters for GUIS Fire Season, FL District	27
Table 4: Potential Fire Behavior under Average and Extreme Conditions, MS District	28
Table 5: Potential Fire Behavior under Average and Extreme Conditions, FL District	28
Table 6: Flame Length Interpretations	29
Table 7: Critical Weather Parameters Resulting in Need for Indirect Attack	29
Table 8: Staffing Class Levels and Step-Up Actions	51
Table 9: Appropriate Initial Attack Response	54
Table 10: Seashore Fire Management-Related Reporting and Documentation	57
Table 11: Management Strategies and Recommended Standard (RS) Monitoring Levels	68

LIST OF FIGURES

Figure 1: Seashore Map	5
Figure 2: Seashore, Mississippi District	5
Figure 3: Seashore, Florida District	6
Figure 4: NFDERS Fuel Models, FMU #1 (Davis Bayou Unit)	26
Figure 5: NFDERS Fuel Models, FMU #8 (Naval Live Oaks Unit)	27
Figure 6: FMU #1	31
Figure 7: FMUs #2, #3, #4, #5, and #6	33
Figure 8: FMU #7	38
Figure 9: FMU #8	39
Figure 10: FMU #9	41
Figure 11: FMU #10	42

1.0 INTRODUCTION

1.1 Reason for Development of Fire Management Plan

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

A GUIS Fire Management Plan was completed and approved in 1998, and supported by National Environmental Policy Act (NEPA) compliance. This FMP is a revision that incorporates all changes that have occurred since that time.

1.2 Collaborative Processes

In addition to administering GUIS, the NPS collaborates with the U.S. Fish and Wildlife Service, the U.S. Forest Service, the Environmental Protection Agency, the U.S. Coast Guard, the U.S. Army Corps of Engineers, the U.S. Air Force, the U.S. Navy, the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, the Florida and Mississippi State Historic Preservation Offices, the Florida Fish and Wildlife Conservation Commission, the Walter Anderson Museum, the George Ohr Museum, the Memphis School of Art, the Ocean Springs Art Association, community and business leaders, and seashore neighbors.

Collaborative opportunities pertaining to fire management at GUIS include coordination with the U.S. Fish and Wildlife Service, the Mississippi Forestry Commission, the Florida Division of Forestry, area fire departments and local law enforcement.

1.3 Implementation of Fire Management Policy

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

1.3.1 2001 Federal Fire Policy

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

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

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

The *Cohesive Strategy* was developed by the USDA National Forest Service, the US Department of the Interior, and the National Association of State Foresters. It provides an overall framework for implementing fire management and forest health programs, and is based upon the following operating principles:

- ❖ **Firefighting Readiness:** Increase firefighting capability and capacity for initial attack, extended attack, and large fire support that will reduce the number of small fires becoming large, to better protect natural resources, to reduce the threat to adjacent communities, and reduce the cost of large fire suppression.
- ❖ **Prevention through Education:** Assist state and local partners to take actions to reduce fire risk to homes and private property through programs such as FIREWISE.
- ❖ **Rehabilitation:** Focus rehabilitation efforts on restoring watershed function, including the protection of basic soil, water resources, biological communities, and prevention of invasive species.
- ❖ **Hazardous Fuel Reduction:** Assign highest priority for hazardous fuels reduction to communities at risk, readily accessible municipal watersheds, threatened and endangered species habitat, and other important local features, where conditions favor uncharacteristically intense fires.

- ❖ **Restoration:** Restore healthy, diverse, and resilient ecological systems to minimize uncharacteristically intense fires on a priority watershed basis. Methods will include removal of excessive vegetation and dead fuels through thinning, prescribed fire, and other treatment methods.
- ❖ **Collaborative Stewardship:** Focus on achieving the desired future condition on the land in collaboration with communities, interest groups, and state and federal agencies. Streamline process, maximize effectiveness, use an ecologically conservative approach, and minimize controversy in accomplishing restoration projects.
- ❖ **Monitoring:** Monitor to evaluate the effectiveness of various treatments to reduce unnaturally intense fires while restoring forest ecosystem health and watershed function.
- ❖ **Jobs:** Encourage new stewardship industries and collaborate with local people, volunteers, Youth Conservation Corps members, service organizations, and Forest Service work crews, as appropriate.
- ❖ **Applied Research and Technology Transfer:** Focus research on the long-term effectiveness of different restoration and rehabilitation methods to determine those methods most effective in protecting and restoring watershed function and forest health. Seek new uses and markets for byproducts of restoration.

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

In August, 2001, the Secretaries of Agriculture and the Interior joined the Western Governor's Association, National Association of State Foresters, National Association of Counties, and the Intertribal Timber Council to endorse *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy*. The four goals of the *10-Year Comprehensive Strategy* are:

1. Improve fire prevention and suppression
2. Reduce hazardous fuels
3. Restore fire-adapted ecosystems
4. Promote community assistance

Its three guiding principles are:

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

1.4 Environmental Compliance

In association with this plan, an Environmental Assessment that meets the requirements of the National Environmental Policy Act, including compliance with Section 106 of the National Historic Preservation Act and with Section 7 of the Endangered Species Act, is included as Appendix 13.04.

1.5 Authorities for Implementing Fire Management Plan

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

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

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

2.0 RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

2.1 Federal Fire Management Policy

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

2.2 Establishment of Gulf Islands National Seashore

Gulf Islands National Seashore was authorized by Congress in the Act of January 8, 1971 (Public Law 91-660, 84 Stat. 1967, 16 U.S.C. 459th) "in order to preserve for public use and enjoyment certain areas possessing outstanding natural, historic, and recreational values..." The seashore comprises barrier islands, coastal mainland tracts, and their adjacent waters, stretching 160 miles from Cat Island in Mississippi to the eastern tip of Santa Rosa Island in Florida. Resources within the seashore include remote wilderness islands with limited visitation, remnant marsh and

woodland communities abutted by dense urban development, and readily-accessible recreational beaches and historic sites visited by several million people each year.

Maintained in a relatively undeveloped state, the barrier islands of GUIS are among the last surviving portions of a natural ecological continuum that once extended from Cape Cod to Mexico. The protected and undeveloped areas of the seashore provide an enclave for complex plant and animal communities, both terrestrial and aquatic, which characterize the northern Gulf Coast, and fully exemplify the natural processes which shape this unique area.

Figure 1: Seashore Map

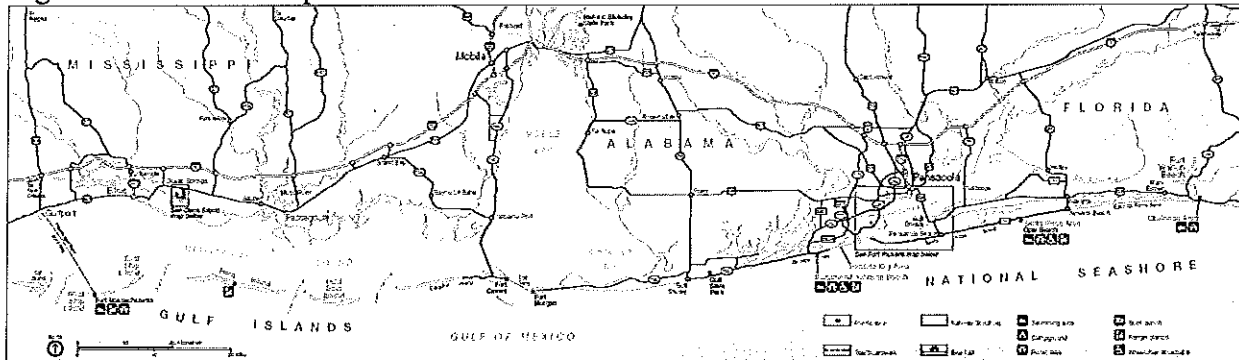


Figure 2: Seashore, Mississippi District

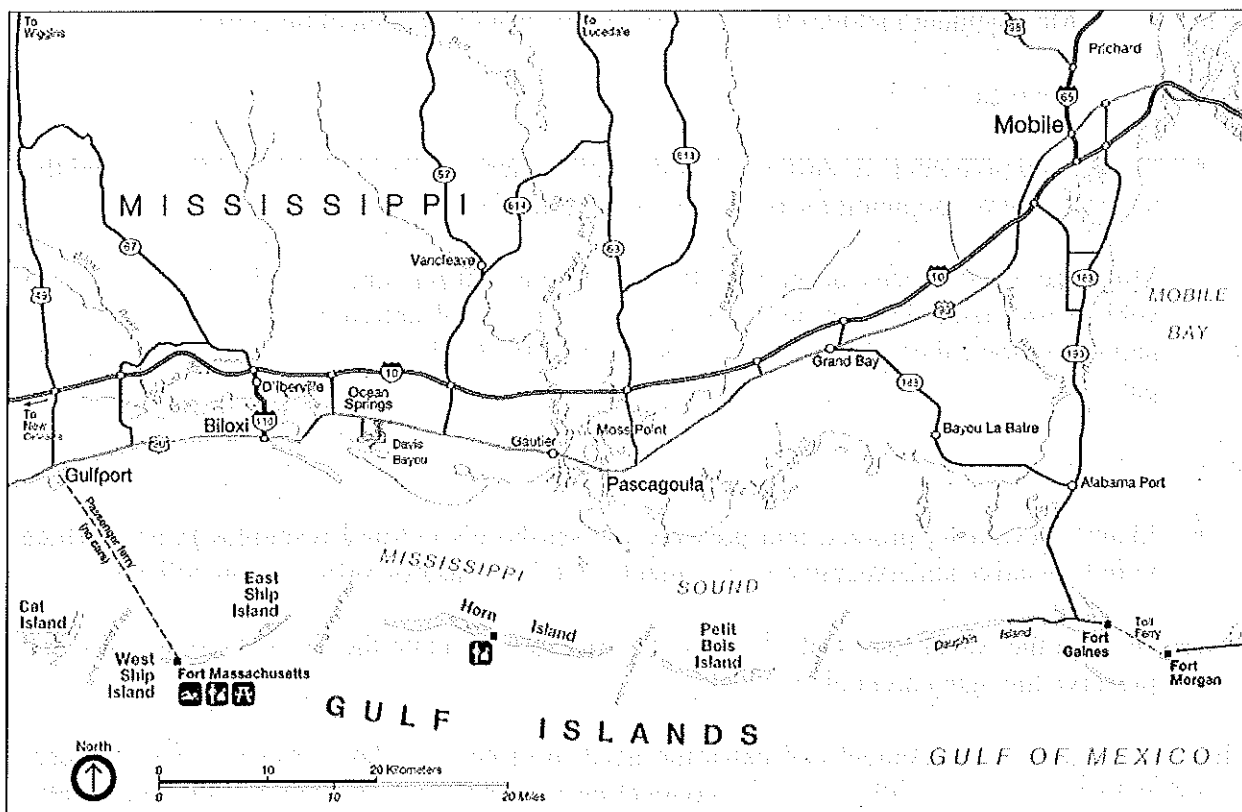
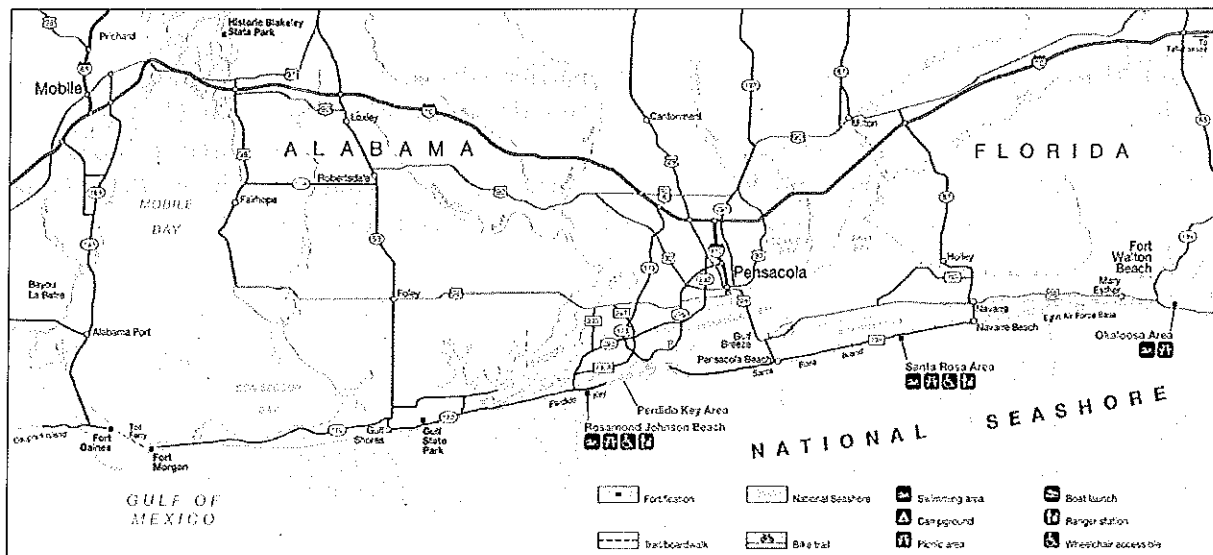


Figure 3: GUIS, Florida District



2.3 Statement for Management Objectives

The seashore's 1978 General Management Plan (GMP) no longer adequately addresses the issues facing GUIN. A new GMP is currently under development. The seashore's 1991 Statement for Management includes the following long-term management objectives:

❖ Natural Resources

- Protect and perpetuate a portion of the coastal barrier system of the United States, and the natural features, populations, processes, and values found therein.
- Minimize disturbances to natural landforms, vegetation, and wildlife habitat due to vehicle use, park development, and public recreational activities at GUIN and restore natural ecological conditions to lands adversely affected by such uses and activities in the past.

❖ Cultural Resources

- Identify, evaluate, protect, and preserve the seashore's cultural resources in accordance with legislative and executive requirements, and NPS historic preservation policies.
- Manage the Naval Live Oaks Historic District to perpetuate the live oak community and preserve the many archeological sites.

The Statement for Management addresses the need to protect seashore resources and adjacent land development from wildland fire by conducting a hazard fuels reduction program. It also addresses the role of fire in ecosystem sustainability at GUIN, stating that, "The National Park

Service recognizes the significance of fire in the perpetuation of natural systems. All current knowledge indicates that within the ecotypes encompassed by Gulf Islands, fire has played a significant role in shaping and maintaining the biota.”

2.4 Resource Management Plan Objectives

The seashore’s 1998 Resource Management Plan (RMP) includes the following goals:

- ❖ Preserve the indigenous natural resources.
- ❖ Preserve the historic coastal fortification system, lighthouse, live oak reservation and associated historical and prehistorical resources.
- ❖ Comply with generic federal legislation.

In its discussion of natural resources, the RMP notes that:

Species-specific monitoring of the gopher tortoise (*Gopherus polyphemus*) population indicated that the species is being adversely affected by the exclusion of fire in park natural areas. Fire has been excluded from most park areas for over fifty years. As such, suitable tortoise habitat is no longer available inside the park. Other impacts of fire exclusion have been the gradual loss of fire-dependent communities such as pine savanna wetlands and longleaf pine/wiregrass habitat and a change in structure and function of remaining communities. As a result of these findings, the park has developed a fire management plan [1998] to re-establish fire as a natural component of the park ecosystem.

2.5 Wilderness Management Plan Objectives

In 1978, Horn Island and Petit Bois Island were designated as wilderness areas. All land on Horn Island (3,650 acres) is wilderness or potential wilderness. The potential wilderness is property that is partially owned by private individuals, and a seven-acre enclave with NPS administrative facilities. Negotiations to acquire non-federal interests in land on Horn Island are underway. All land on Petit Bois Island (1,466 acres) is wilderness, with no enclaves or inholdings.

As per the seashore’s 2004 Wilderness Management Plan (WMP), the seashore will manage its wilderness in such a way as to “ensure the protection, preservation, restoration, appreciation, and enjoyment of this wilderness for future generations in an unimpaired condition.” The WMP’s objectives are:

- ❖ To manage with a minimum of intrusion.
- ❖ To provide for solitude and primitive, unconfined recreation.
- ❖ To preserve the character of the wilderness.
- ❖ To control nonconforming use and to prevent unnecessary or undue reduction of wilderness values.

2.5.1 Application of “Minimum Requirement” Concept

The WMP states that all activities conducted in the Gulf Islands Wilderness will follow a decision process, and the process recorded and archived in the seashore’s administrative record. This will serve to meet a desired future condition of a wilderness unaffected by the works and acts of humankind; and to provide a permanent record of decisions. Projects will be assessed first for their suitability within the Gulf Islands Wilderness and, for projects determined to be suitable, the selection of the minimum tool or technique to use in the completion of the project will be made based on this process. When necessary, the minimum decision process will be accompanied by appropriate environmental documentation.

GUIS will use the decision process displayed on the flow chart provided in Appendix 13.09 to determine the minimum requirements for a specific management activity in the Gulf Islands Wilderness. All proposed management actions will be evaluated using this process. The seashore superintendent will approve final management decisions.

2.5.2 Fire Management within the Gulf Islands Wilderness

As per the WMP, minimum impact suppression tactics will be used in managing all fires that may occur in the Gulf Islands Wilderness. Horn and Petit Bois islands will be zoned into fire management blocks. Wildland fires will be managed by indirect attack in those blocks. Natural fire breaks will be utilized first.

On Horn and Petit Bois islands, chainsaws and portable pumps may be used only with the approval of the seashore superintendent or designee, except when necessary for the protection of human life, structures, and/or sensitive natural or cultural resources. No other mechanized equipment will be used except in life-threatening situations or with the approval of the seashore superintendent or designee.

2.6 How Fire Management Plan Supports Statement for Management, Resource Management Plan, and Wilderness Management Plan Objectives

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

- ❖ Wildland fire suppression will serve to protect human life, property, and natural and cultural resources from the adverse effects of unwanted fire.
- ❖ Prescribed fire will serve to promote ecosystem sustainability at GUIS. The plant communities here are largely fire-dependent or fire-adapted. Fire plays an essential role in maintaining serial stages of succession. Lack of fire favors fire-intolerant species over fire-dependent ones. The interruption of natural burn cycles also results in abnormal fuel loading

and unnaturally severe fires when ignitions do occur. Prescribed fire will also serve to improve habitat for seashore wildlife, such as the gopher tortoise.

- ❖ Prescribed fire and non-fire applications will serve to reduce hazard fuels accumulations. Reducing hazard fuels accumulations creates fuel conditions that support low-intensity fires, thereby reducing the threat of catastrophic wildland fire, and reducing the risk of negative impacts to natural and cultural resources, seashore infrastructure, and adjacent property in the event of a wildland fire. It also improves conditions for firefighter and public safety.
- ❖ Wilderness values will be protected during fire management activities by adhering to the objectives and guidance provided by the seashore's 2004 Wilderness Management Plan. Minimum impact suppression tactics will be used in managing all fires that occur in the wilderness, and all fire management activities will be evaluated using the decision process displayed on the flow chart provided in Appendix 13.09. The seashore superintendent will approve final management decisions.
- ❖ Maintaining existing defensible space around seashore structures will serve to protect them in the event of a wildland fire.
- ❖ Creating and/or maintaining hazard fuels breaks along sections of the seashore perimeter will help prevent the spread of fire to and from adjacent non-agency land.

3.0 WILDLAND FIRE MANAGEMENT STRATEGIES

3.1 General Management Considerations

The seashore's fire management goals, which follow, incorporate GUI's overall management objectives as well as previously-discussed federal fire management policy principles and goals, including firefighter and public safety, collaboration, and accountability.

3.2 Wildland Fire Management Goals

Fire management goals at GUI are:

- ❖ Suppress all wildland fire in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Use prescribed fire to:
 - Promote ecosystem sustainability.
 - Reduce hazard fuels accumulations, which in turn:
 - Initiate nutrient recycling for healthy soil conditions.

- ❖ Use non-fire applications to:
 - Promote ecosystem sustainability and reduce hazard fuels accumulations in areas where conditions preclude the safe implementation of prescribed fire.
 - Maintain existing defensible space around seashore structures.
 - Create and/or maintain hazard fuels breaks along sections of the seashore perimeter.
- ❖ Provide seashore employees with fire operations training and experience so as to develop and maintain fully-qualified personnel.
- ❖ Manage all wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics, and maximizing efficiency via interagency coordination and cooperation.
- ❖ Maintain coordination with federal, state, and local fire management agencies in order to continue close working relationships and mutual cooperation regarding fire management activities, and to manage natural fire regimes across administrative boundaries.
- ❖ Conduct a monitoring program that facilitates the identification of short- and long-term fire effects, and use the information gained to continually evaluate and improve the fire management program.
- ❖ Integrate knowledge gained through natural resource research into future fire management decisions and actions.
- ❖ Foster a greater public awareness of fire ecology and sound fire management.
- ❖ Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective fire management program.
- ❖ Plan and conduct all fire management activities in accordance with all applicable laws, policies and regulations.
- ❖ Incorporate the minimum impact tactics policy into all fire management activities, to the greatest extent feasible and appropriate.
- ❖ Protect wilderness values during all fire management activities by adhering to the objectives and guidance provided by the seashore's 2004 Wilderness Management Plan.

3.3 Scope of Wildland Fire Management Elements to be Implemented

GUIS will implement a combination of wildland fire suppression, prescribed fire, and non-fire applications.

3.3.1 Wildland Fire Suppression

A wildland fire is defined as any nonstructural fire, other than prescribed fire, that occurs in the wildland. All wildland fires at GUIS, regardless of origin, will be suppressed. Wildland fire use for resource benefits will not occur at the seashore.

3.3.2 Prescribed Fire

GUIS will use prescribed fire primarily to promote ecosystem sustainability and to reduce hazard fuels accumulations. Seashore planning documents will guide the use of prescribed fire.

Wild Fire Use (WFU), or the approach of monitoring fires caused by natural ignition (eg. lightning strike) to proceed without suppression, is currently not desired, nor condoned in the park. Review of historic fire frequency on the wilderness islands may afford the future use of WFU in the park, but a determination is forthcoming. This can be addressed again in future FMP's.

3.3.3 Non-Fire Applications

Non-fire fuels treatment at GUIS will include general grounds-care operations such as mowing and weedeating open areas during the growing season; reducing hazard fuels accumulations and promoting ecosystem sustainability in areas where conditions preclude the safe implementation of prescribed fire; maintaining existing defensible space around seashore structures; maintaining existing firebreaks (including refurbishing existing holding lines around prescribed fire units prior to burning them); and creating and/or maintaining hazard fuels breaks along sections of the seashore perimeter to help prevent the spread of fire to and from adjacent non-agency land.

3.4 Seashore Description

3.4.1 Physical and Biotic Characteristics

3.4.1.1 Real Property

Gulf Islands National Seashore is located in the northeastern portion of the Gulf of Mexico, and includes a widely spaced chain of barrier islands extending nearly 160 miles from Cat Island in Mississippi to the eastern tip of Santa Rosa Island in Florida. Other islands in the seashore include Horn, Petit Bois, and East Ship and West Ship islands in Mississippi, and a section of Perdido Key in Florida. GUIS also includes mainland tracts at Pensacola Forts and Naval Live Oaks Reservation near Pensacola, Florida; and Davis Bayou, adjacent to Ocean Springs, Mississippi. The seashore contains 139,775.46 acres within the authorized boundary, excluding Cat Island (only a portion has been acquired as of this date). Of this total acreage, 19,445.46 acres are fastlands (above water) and 119,730 acres are submerged lands (source for acreages The National Parks: Index 2001-2003). The seashore is divided into the Mississippi and Florida districts.

Because of the fragmented distribution of the seashore's holdings, each of its 12 areas is designated as a discrete fire management unit (FMU) to facilitate the achievement of fire management objectives.

3.4.1.2 Soils

Most of the seashore soils have been naturally formed by materials deposited or reworked by wind or water. Except in tidal marsh areas and in the Davis Bayou unit, soils are almost exclusively sands (NPS 1978b).

The Mississippi coast, where Davis Bayou is located, is generally classified as an alluvial coast or a terraced deltaic plain (NPS 1976). The soil characteristics this unit consist of coastal plain hills (well-drained sandy soils), coastal flatwood (poorly drained), sandy and clayey land (prone to excessive runoff and erosion due to the preponderance of clay), swamps (frequently flooded with standing water for 6 to 9 months a year), and tidal marsh (located in inundated coastal areas; water levels and flows are a result of tides).

3.4.1.3 Air Quality

GUIS is designated as a Class II airshed. This designation was established by Congress to facilitate the implementation of air quality provisions of the Clean Air Act and allows a moderate increase in certain air pollutants. The Clean Air Act requires that the NPS comply with all federal, state, and local air pollution control laws (section 118). The U.S. Fish and Wildlife Service manages Breton Islands National Refuge/National Wilderness Area, located 40 miles south of East Ship and West Ship islands. Breton Islands is a Class I airshed.

3.4.1.4 Water Quality

- ❖ Mississippi District: Because the islands in the seashore's Mississippi District are between 6 and 14 miles offshore and are undeveloped, water quality has not been substantially impacted by human activities. The primary pollution sources include mainland urban storm water and agricultural runoff, recreational boating, and commercial shipping in the Intracoastal Waterway and navigational channels in the passes. There are over 20 marinas along the Mississippi Sound in Jackson and Harrison counties.
- ❖ Florida District: The waters surrounding the Florida District at GUIS have been impacted by numerous non-point and point source pollution resulting in a reduction of natural biodiversity and productivity. Non-point sources include urban storm water runoff, agricultural runoff, marinas, boat traffic, the drainage of wetlands, and seepage of contaminated groundwater into surface waters. Point sources include effluent from two sewer outlets near Pensacola, septic systems on Gulf Breeze peninsula, a chemical plant and coal-fired electric power plant on the Escambia River, a paper mill on the Perdido River, the American Creosote Works superfund site, the port of Pensacola, and Pensacola Naval Air Station, which contains a number of superfund sites.

3.4.1.5 Vegetation

As per the draft *Gulf Islands National Seashore Fire Effects Monitoring Plan*, fire is an important ecological process that contributes to the structure and composition of natural vegetative communities at GUIs. The seashore is located in the heart of the East Gulf Coastal Plain, with a climate that produces the highest frequency of lightning activity throughout the nation. Historically, lightning-ignited fires occurred frequently across the landscape. The communities that compose GUIs are therefore fire-dependent or fire-adapted.

The majority of the terrestrial portion of the seashore is dominated by pine forest, which is one of the forest types in the southeastern U.S. that is naturally maintained by frequent low-intensity fires. Many of the plant species associated with the pine forest (longleaf and slash) of GUIs are not killed by fire, but rather have characteristics that allow the plant to regenerate either vegetatively or reproductively following fire. In the presence of frequent fire, these pine forest areas develop into an open pine stand with little to no midstory trees or shrubs present and a rich diverse layer of grasses and herbs in the understory. In the absence of fire, shrubs and small trees begin to invade these stands and can have a significant shading impact on native herbaceous vegetation in as little as three years, thus significantly reducing native plant diversity. As heavy fuels build up in fire-excluded areas, the potential for higher intensity fire behavior increases.

The above-mentioned *Monitoring Plan* identifies the following vegetative communities at GUIs: pine flatwoods, wet pine savanna, sand pine-scrub, scrub, xeric sandhills, live oak hammock, coastal grassland, palustrine marsh, palustrine shrub, estuarine marsh, estuarine shrub, and beach dune. Discussion of each follows, as per that document.

- ❖ Pine flatwoods: The overstory of this community consists primarily of slash pine, but may also include scattered sweetgum, cabbage palm, Virginia live oak and other oaks. Frequently burned sites have very few midstory species; however, less frequently burned sites may include regenerating overstory species as well as red maple, common persimmon, fetterbush, sweetbay, wax myrtle, red bay, dwarf live oak, myrtle oak, water oak, and sparkleberry. The understory includes regenerating overstory and midstory species, as well as huckleberry, St. John's-wort, gallberry, winged sumac, dewberry species, greenbrier species, eastern poison ivy, Darrow's blueberry, and shiny blueberry.

Under natural conditions with frequent fire frequency (once every 3 to 5 years) this community is characterized by an open to closed canopy of pine trees with little to no midstory, or an understory of either continuous saw palmetto or a rich grass and herb ground cover. In fire suppressed sites, this community will have a dense hardwood component, including significant height growth of palmetto in the midstory and understory, and a loss of native herbs and grasses in the ground cover.

Frequent, low-intensity surface fires are essential to preserving and restoring this community. Frequent fire promotes the dominance of native ground cover and decreases the encroachment of woody vegetation into the midstory. In the absence of fire, open pine flatwoods are quickly invaded by hardwoods and shrubs that shade out and out-compete

native species in the understory. Further, the increased presence of hardwoods and shrubs in the midstory changes the behavior and intensity of fires as they burn through the stand. Increased woody vegetation in the midstory results in greater amounts of vertical fuels present and can lead to torching and crowning up into the canopy, creating more intense fire behavior and a higher potential for catastrophic fires.

Pine flatwoods at GUIs are best represented by NFDRS fuel model D, except in cases where the shrub understory is particularly dense and tall. Fuel models are discussed in section 3.4.4.3.

- ❖ Wet pine savanna: The overstory of this community includes scattered slash pine and/or longleaf pine, but may also include large bay trees, sweetgum, gum trees, red maple, or cypress. Frequently burned sites have few midstory species; however, less frequently burned sites may include regenerating overstory species as well as wax myrtle, persimmon, and gallberry. The understory includes regenerating overstory and midstory species as well as huckleberry, St. John's-wort, gallberry, winged sumac, dewberry species, greenbrier species, eastern poison ivy, Darrow's blueberry, and shiny blueberry.

Under natural conditions with frequent fire frequency (once every 2 to 5 years), this community is characterized by a very open canopy of scattered pine trees to treeless plain with a dense, diverse herbaceous ground cover in the understory. There is little to no midstory component in frequently burned sites. In fire suppressed sites, a dense understory and midstory layer of shrubs and hardwoods will develop over time. A well-developed midstory will shade out herbaceous species resulting in little diversity in the ground cover.

Frequent, low-intensity surface fires are essential to preserving and restoring this community. Frequent fire promotes the dominance of native ground cover and decreases the encroachment of woody vegetation into the midstory. In the absence of fire, wet pine savannas are quickly invaded by hardwoods and shrubs that shade out and out-compete native species in the understory. Further, the increased presence of hardwoods and shrubs in the midstory changes the behavior and intensity of fires as they burn through the stand. Increased woody vegetation in the midstory results in greater amounts of vertical fuels present and can lead to torching and crowning up into the canopy, creating more intense fire behavior and a higher potential for catastrophic fires.

Wet pine savanna at GUIs is best represented by NFDRS fuel model D, except in cases where the shrub understory is particularly dense and tall.

- ❖ Sand pine-scrub: The overstory in this community is dominated by sand pine, with the occasional slash pine. The midstory varies with fire history. Less frequently burned sites may include Florida rosemary, rusty staggerbush, scrub oak species, and saw palmetto. More frequently burned sites will not have a well-developed shrub layer. The understory includes regenerating midstory species as well as false rosemary, saw greenbrier, Darrow's blueberry, shiny blueberry, and yucca.

This community is considered both woodland and shrubland, depending on the fire history of the site. In a more mature stand that has had no recent fire in the past 30 or more years, the

community takes on more of a woodland appearance as the scrub oaks and sand pine enter into the canopy. In more recently burned sites where there is no canopy layer of scrub oak trees, the community appears as a shrubland. At this stage, dense thickets of younger scrub oaks and scrub shrubs dominate the midstory and understory layers with little ground cover.

Fire is an important ecological process of this community, with natural fire frequency estimated to be once every 20 to 80+ years. Because frequent surface fires are not prevalent in this system, fires are stand-replacement (i.e., consuming and killing most vegetation), with the vegetation species exhibiting adaptations to such. Serotinous species such as sand pine, for example, will open their cones and release seeds only under high heat conditions. Other plants have underground root systems that allow the plant to re-sprout immediately following fire. Fire thus begins a regeneration process in this community.

Sand pine-scrub at GUIS is best represented by NFDRS fuel model O.

- ❖ Scrub: There are typically no overstory species in this community, although an occasional slash pine tree may be present. The midstory is a well-developed tall shrubland in less frequently burned sites and may include Florida rosemary, rusty staggerbush, scrub oak species, and saw palmetto. More frequently burned sites will not have a well-developed shrub layer. The understory includes regenerating midstory species and may also include false rosemary, earleaf greenbrier, Darrow's blueberry, shiny blueberry, and yucca.

Fire is an important ecological process of this community, with natural fire frequency estimated to be once every 20 to 80+ years. Because frequent surface fires are not prevalent in this system, fires are stand-replacement (i.e., consuming and killing most vegetation), with the vegetation species exhibiting adaptations to such. Serotinous species such as sand pine, for example, will open their cones and release seeds only under high heat conditions. Other plants have underground root systems that allow the plant to re-sprout immediately following fire. Fire thus begins a regeneration process in this community.

Scrub at GUIS is best represented by NFDRS fuel model O.

- ❖ Xeric sandhills: Dominant species include longleaf pine, with various large oaks present in the canopy in fire suppressed sites. Depending on the fire history of a site, xeric sandhills may develop a dense midstory of regenerating canopy species including sweetgum, yaupon, sand post oak, sparkleberry, persimmon, and sumac. A dense understory of regenerating canopy and midstory species is present in areas that are fire suppressed. Additional species present may include saw palmetto, American holly, and huckleberry.

In mature forests, this community appears as a fairly open canopied forest with widely spaced trees. There is little to no midstory in frequently burned sites. The understory is sparse and composed of deciduous oaks. A fairly dense ground cover of grasses and herbs can be present.

Fire is a dominant factor in the ecology of this community. Sandhill communities are dependent on frequent ground fires to reduce hardwoods and promote pines and grasses. It is

estimated that this community type burned once every 2 to 5 years, under lightning ignitions. In the absence of frequent fire, xeric sandhills can develop into live oak hammocks or turkey oak woodlands.

Xeric sandhills at GUIS are best represented by NFDRS fuel model D, except in cases where the shrub understory is particularly dense and tall.

- ❖ Live oak hammock: The dominant overstory species in this community is live oak. The midstory is sparse and includes regenerating live oaks as well as American beautyberry, common persimmon, hollies, southern magnolia, and other oaks. The understory may include regenerating midstory species, false rosemary, saw palmetto, and blueberry.

This community is considered to be a late successional stage of scrub vegetation, and develops in the absence of fire for more than 30 years. In general, it is fire resistant, with natural fire frequency estimated to be once every 30+ years. The dominance of live oak trees and other hardwoods in the canopy and midstory of the hammock produce poor fuel conditions due to the incombustible oak leaf litter. However, under drought conditions, the palmetto understory may promote the spread of fire throughout a site. In general, fires that do burn through this community are stand-replacement, consuming and killing most vegetation within the hammock.

Live oak hammock at GUIS is best represented by NFDRS fuel model R under average fire weather parameters. Under extreme fire weather parameters, live oak hammock is better represented by NFDRS fuel model D.

- ❖ Coastal grassland: This community is characterized as an open, treeless grassland, with a sparse to dense ground cover of grasses, prostrate vines, and herbaceous species that are exposed to beach and coastline conditions. On more established sites, small clusters of pine trees or shrubs may occur.

Frequent fire may play an important role in this community by reducing woody growth and maintaining a grass-dominated ground cover. While fires probably ignite in adjacent pine flatwoods, the fine fuels of this community promote the spread of fire. Natural fire frequency in this community is probably once every 3 to 5 years.

Coastal grassland at GUIS is best represented by NFDRS fuel model L.

- ❖ Palustrine marsh: This community is characterized as an open, treeless grassland that has standing water in it a good portion of the year. The vegetation is composed mainly of herbaceous species of emergent wetland species that form a continuous ground cover. Where vegetation includes woody shrubs and small trees the community is considered a palustrine shrub class.

Fire may play an important ecological role in palustrine marsh; periodic surface and ground fires are common. Natural fire frequency for this community is estimated to be once every 1 to 3 years. Frequent fires reduce the invasion of shrubs and woody growth, and promote the

presence of a grass-dominated ecosystem. In frequently burned sites where soils are saturated, fine fuels of grass and dead grass litter promote fire spread. Under drier conditions when soils are not saturated, a ground fire can occur where the organic peat layer ignites and can continue to burn underground for long periods of time.

Palustrine marsh at GUIIS is best represented by NFDRS fuel model N.

- ❖ Palustrine shrub: Palustrine shrub is ecologically similar to palustrine marsh. This is a water-dependent community where the vegetation is composed of wetland-dependent species. Overstory species may include red maple, sweetbay, sourgum, red bay, Carolina willow, and baldcypress. The midstory can be a thicket of tall shrubs, including red maple, buttonbush, buckwheat tree, titi, huckleberry, hollies, corkwood, sweetbay, wax myrtle, red bay, swamp bay, sourgum, and Carolina willow. In addition to midstory species, the understory can include peppervine, St. John's-wort, and dewberry.

Fire may influence the abundance, composition, and structure of palustrine shrub vegetation. This community is more resistant to frequent fire than palustrine marsh. The fuels are poor, and mostly composed of incombustible materials. Natural fire frequency is probably once every 5 to 10 years. Under drier conditions, fires can carry across this community, consuming and killing all vegetation present. However, re-sprouting occurs immediately following fire. Although fire is currently used as a management tool to reduce woody growth in this community, the effects of different seasons of burn are unclear.

Palustrine shrub at GUIIS is best represented by NFDRS fuel model O.

- ❖ Estuarine marsh: This grassland community has few overstory species present, although cabbage palms may occur infrequently throughout a site. The midstory is sparse, but may include falsewillow, marshelder, and wax myrtle, which make up the majority of tall shrubs if present. In addition to occasional midstory species, the understory may include amaranth, saltbush, rosemallow, saltmarsh mallow, and common reeds. The ground cover may include saltwort, sedges, Jamaica swamp sawgrass, saltgrasses, rushes, and cordgrasses.

Estuarine marshes are, by definition, exposed to tidal influence at least once daily. The natural fire frequency and importance of natural fire to this community are not well understood. Current management of estuarine marshes includes fire use to produce young plant shoots as a food source for migrating waterfowl and shorebirds. Fire also reduces woody growth into open salt marshes and maintains a grass and herb ground cover. Fire is promoted in areas as frequently as once a year to once every 3 years.

Estuarine marsh at GUIIS is best represented by NFDRS fuel model N.

- ❖ Estuarine shrub: Although similar in ecology to estuarine marsh vegetation, this community is characterized as a shrubland. The overstory is similar to estuarine marsh, with cabbage palm occurring occasionally. The midstory is more prominent in this community, and is composed of a thicket of shrubs including saltwater falsewillow, marshelder, and wax myrtle. The understory is similar to estuarine marsh species, and includes amaranth, saltbush,

rosemallow, saltmarsh mallow, and common reeds. The ground cover is similar to that of estuarine marsh.

This community is considered a more mature area of estuarine marsh where thickets of salt-tolerant shrubs have invaded higher elevation areas that may not be exposed to tidal influence. The natural fire frequency and importance of natural fire to this community are not well understood. Current management of estuarine shrub includes fire use to reduce woody growth, so as to develop more open salt marshes and maintain a grass and herb ground cover. Fire is promoted in areas as frequently as once a year to once every 3 years.

Estuarine shrub at GUIS is best represented by NFD RS fuel model O.

- ❖ Beach dune: This community occurs on the foredune or first dune parallel to the shore. Very few species occur in the overstory, but they may include red cedar, slash pine, or cabbage palm. The midstory is not prominent, and may include isolated individuals of saltwater falsewillow, marshelder, and regenerating overstory species. The understory may include saltbush, and juveniles of midstory species. The ground cover is mostly barren.

Fire does not play a significant role in the structure or composition of this community. Fires will occasionally burn into beach vegetation, but due to its sparse nature it generally does not promote fire spread.

The report entitled *Wetland Delineation and Hydrologic/Community Survey of the Davis Bayou Area of Gulf Islands National Seashore* (MSU 2002) provides detailed discussion of vegetative communities/habitats that occur within the Davis Bayou unit of GUIS, as well as fire management recommendations for these areas. See Appendix 13.13 for a summary of this information.

3.4.1.6 Wildlife

A wide variety of wildlife species inhabit the seashore, many in numbers not found outside of seashore boundaries. The faunal community includes permanent resident species, as well as species present only on a seasonal or transitory basis. Twenty-three of the faunal species identified at GUIS are federally- and/or state-listed (see section 3.4.1.7).

Website <http://www.nps.gov/guis/extended/site%20bulletins/Animal.pdf> provides a checklist for mammals, reptiles, and amphibians observed on the offshore islands, the mainland, and in the waters of the Florida District of GUIS. As per the checklist, the following mammals, reptiles and amphibians occur at the seashore (see Appendix 13.03 for information regarding abundance and habitat for each species).

- ❖ Mammals: Virginia opossum, eastern mole, little brown myotis (bat), nine-banded armadillo, eastern cottontail (rabbit), American beaver, house mouse, eastern woodrat, marsh rice rat, cotton mouse, Santa Rosa beach mouse, Perdido Key beach mouse, black rat, eastern gray squirrel, hispid cotton rat, coyote, common gray fox, red fox, black bear, common raccoon, striped skunk, northern river otter, manatee, bottle-nosed dolphin.

- ❖ Reptiles: loggerhead sea turtle, green sea turtle, snapping turtle, leatherback sea turtle, gopher tortoise, eastern mud turtle, Kemp's ridley sea turtle, common cooter, eastern box turtle, slider, American alligator, green anole, six-lined racerunner, mole skink, broadhead skink, eastern glass lizard, southern fence lizard, ground skink, cottonmouth, scarlet snake, southern black racer, eastern diamondback rattlesnake, corn snake, southern hognose snake, coachwhip, eastern coral snake, plainbelly water snake, southern water snake, banded water snake, Florida green water snake, brown water snake, rough green snake, pigmy rattlesnake, redbelly snake, southeastern crowned snake, eastern ribbon snake, common garter snake.
- ❖ Amphibians: southern cricket frog, green treefrog, pine woods treefrog, barking treefrog, squirrel treefrog, ornate chorus frog, pig frog, southern leopard frog, two-toed amphiuma, eastern newt, slimy salamander, oak toad, southern toad, eastern narrowmouth toad.
- ❖ Birds: More than 280 species of birds use the seashore for loafing, nesting, feeding, wintering, or migratory rest stops. They include songbirds, waterfowl, wading birds, birds of prey, marine birds, and shorebirds, with numbers varying according to the season. Common species include the common loon, pied-bill grebe, double-crested cormorant, blue-winged teal, lesser scaup, red-breasted merganser, clapper rail, black-bellied plover, American coot, killdeer, willet, ruddy turnstone, sanderling, spotted sandpiper, dunlin, laughing gull, common nighthawk, chuck-will's widow, red-bellied woodpecker, least tern, pine warbler, common yellowthroat, cattle egret, green heron, yellow-crowned night-heron, royal tern, mourning dove, eastern screech owl, northern flicker, great crested flycatcher, eastern kingbird, purple martin, marsh wren, eastern towhee, broad-winged hawk, western sandpiper, yellow warbler, white-eyed vireo, common goldeneye, bufflehead, downy woodpecker, blue jay, tufted titmouse, brown-headed nuthatch, and brown thrasher.
- ❖ Fish and Aquatic Invertebrates: More than 200 species of fish occur within seashore waters, with numbers varying according to the season. Common species include anchovy, bluefish, cobia, croaker, grouper, pompano, sea trout, snapper, saltwater mullet, flounder, red fish, king mackerel, channel bass, kingfish, jack, tarpon, and several species of sharks and rays.

Several species of shellfish that are of commercial, recreational, and ecological importance occur at GUIs, including blue crabs, stone crabs, and shrimp. Water bottoms around the seashore in the Mississippi and Florida districts are important nursery areas for most species of shellfish.

3.4.1.7 Threatened and Endangered Species, and Designated Critical Habitat

The seashore is a permanent or seasonal home to 29 federally- and/or state-listed species, as follow:

Table 1: Federally- and State-Listed Species Identified at GUIs (NPS 2004)

Common Name	Scientific Name	Federal Status	FL Status	MS Status
Marine Mammals				
Florida (West Indian) manatee	<i>Trichechus manatus latirostris</i>	E	E	SZ

Terrestrial Mammals				
Perdido Key beach mouse	<i>Peromyscus polionotus trissyllepsis</i>	E	E	-
Santa Rosa beach mouse	<i>Peromyscus polionotus leucocephalus</i>	-	SC	-
Louisiana black bear	<i>Ursus americanus luteolus</i>	T		
Aquatic Reptiles				
American alligator	<i>Alligator mississippiensis</i>	T (S/A)	SC	-
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E	E	SZN
Atlantic green turtle	<i>Chelonia mydas mydas</i>	E	E	SZN
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	E	E	S1N
Atlantic loggerhead sea turtle	<i>Caretta caretta</i>	T	T	S1B, SZN
Alligator snapping turtle	<i>Macrochelys temorincki</i>	-	SC	-
Alabama red-bellied turtle	<i>Pseudemys alabamensis</i>	E		
Terrestrial Reptiles				
Gopher tortoise	<i>Gopherus polyphemus</i>	T (MS)	SC	S2
Fish				
Gulf sturgeon	<i>Acipenser oxyrinchus desotoi</i>	T	SC	S1
Saltmarsh topminnow	<i>Fundulus jenkinsi</i>	-	SC	-
Birds				
Brown pelican	<i>Pelecanus occidentalis</i>	E (MS)	SC	S1N
American bald eagle	<i>Haliaeetus leucocephalus</i>	Delisted	T	S1B, S2N
Piping plover	<i>Charadrius melodus</i>	T	T	SZN
Peregrine falcon	<i>Falco peregrinus</i>	Delisted	E	SZN
Southeastern snowy plover	<i>Charadrius alexandrinus tenuirostris</i>	-	T	S2B, SZN
Least tern	<i>Sterna antillarum</i>	-	T	S3B
Southeastern American kestrel	<i>Falco sparverius paulus</i>	-	T	-
Black skimmer	<i>Rynchops niger</i>	-	SC	S3
Reddish egret	<i>Egretta rufescens</i>	-	SC	-
Little blue heron	<i>Egretta caerulea</i>	-	SC	-
Snowy egret	<i>Egretta thula</i>	-	SC	-
Mississippi Sandhill Crane	<i>Grus canadensis pulla</i>	E		
Terrestrial Plants				
White-top pitcher plant	<i>Sarracenia leucophylla</i>	-	E	S2S3
Cruise's golden aster	<i>Chrysopsis gossypina ssp. cruiseana</i>	-	E	-
Godfrey's golden aster	<i>Chrysopsis godfreyi</i>	-	E	-
Gulf Coast lupine	<i>Lupinus westianus</i>	-	T	-
Curtiss' sandgrass	<i>Calamovilfa curtissii</i>	-	T	-
Large-leaved jointweed	<i>Polygonella macrophylla</i>	-	T	-

Keys to table: E = endangered; SC = species of special concern; T = threatened; T (S/A) = similar appearance to a threatened taxon; S1 = critically imperiled in MS because of extreme rarity or because of some factor(s) of its biology making it especially vulnerable to extirpation; S2 = imperiled in MS because of rarity or because of some factor(s) demonstrably making it very vulnerable to extirpation; S3 = rare or uncommon in MS; SZ = zero occurrences in MS, not of practical conservation concern in the state, because there are no definable occurrences, although the taxon is native and appears regularly in the state; B = breeding status; N = non-breeding status

Designated Critical Habitat

- ❖ Perdido Key Beach Mouse: Within the Florida District of GUIs, the Perdido Key area of the seashore is designated critical habitat for the Perdido Key beach mouse.
- ❖ Gulf Sturgeon: Within the Mississippi District of GUIs, designated critical habitat includes areas within one nautical mile offshore of the barrier islands of the Mississippi Sound, as

well as the passes (Ship Island Pass, Dog Keys Pass, Horn Island Pass and Petit Bois Pass). Within the Florida District of GUIIS, nearshore waters within one nautical mile of the mainland from Pensacola Pass to Apachicola Bay and the Perdido Key area, and the area north of Santa Rosa Island are designated as critical habitat.

- ❖ Piping Plover: Within the Mississippi District of GUIIS, critical habitat for wintering piping plovers has been designated on the barrier islands. No critical habitat has been designated within the Florida District of GUIIS; however, according to the U.S. Fish and Wildlife Service, any place that GUIIS staff observe wintering piping plovers within the seashore will be treated the same as critical habitat (NPS 2004).

3.4.1.8 Cultural and Historic Resources

The GUIIS vicinity has experienced over 2,500 years of human habitation. The variety of prehistoric middens within seashore boundaries and the known history of the Gulf Coast sites indicate an established American Indian culture until first contact, 1590. By first historic settlement, 1599, local Indian populations were reduced to the point of near extirpation through epidemic diseases introduced by Europeans and attacks by aggressive tribes located in the Mobile Bay area. Early Spanish mission establishment in the early 1600s was followed by invasion of British and Creek Indian forces in the 1700s. The Creeks, later known as the Seminoles, occupied areas previously inhabited by the Spanish and various Indian tribes (NPS 2004).

During the historic period, different countries influenced this section of the Gulf Coast. The first development on East Ship and West Ship islands dates from the late 1600s French Louisiana period when Biloxi was the regional capital. When the Spanish ceded the lands that would become the state of Florida in 1819, the United States gained one of the best deep-water harbors on the Gulf Coast. Andrew Jackson served as the first governor for the new Florida Territory in 1821 (FDHR n.d.). In the 1830s, the United States began building a critical system of military defensive works. The fortification system, including Fort Pickens, Fort McRee, Fort Barrancas, and the Advanced Redoubt, was designed to protect the Pensacola Navy Yard. Seashore waters contain many shipwrecks, some dating from the Spanish exploration period.

The seashore has about 170 known archeological sites (NPS 2004). Sites include prehistoric shell middens and mounds; historic cemeteries, shipwrecks, lighthouse complexes, and coastal defense fortifications spanning more than two centuries of military activity. Appendix 13.12 includes the Archeological Sites Management Information System (ASMIS) list for GUIIS, provided by the NPS Southeast Archeological Center.

Cultural resources at GUIIS that are listed in the National Register of Historic Places include:

- ❖ Fort Barrancas Historic District (#66000263); the fort is also a National Historic Landmark
- ❖ Fort Massachusetts (#71000067)
- ❖ Fort Pickens (#72000096)
- ❖ Naval Live Oaks Historic District (#78003528)
- ❖ Perdido Key Historic District (#80000404)

- ❖ French Warehouse Site (#91001768)
- ❖ Butcherpen Mound (#98001165)
- ❖ Big Heart West (#98001167)
- ❖ First American Road in Florida (#98001168)
- ❖ Naval Live Oaks Reservation (#98001169)
- ❖ Third Gulf Breeze (#98001164)

All GUIS collections, including all accessioned museum objects, are currently stored off site among three different facilities: 1.) Pensacola Naval Air Station storage building in cooperation with the U.S. Navy; 2.) multi-park repository at TIMU in Jacksonville, FL; 3.) the Southeast Archeological Center in Tallahassee, FL. Collections include prehistoric and historic objects, biological specimens, and archival materials.

3.4.1.9 Wilderness

In 1978, Horn Island and Petit Bois Island were designated as wilderness areas. All land on Horn Island (3,650 acres) is wilderness or potential wilderness. The potential wilderness is property that is partially owned by private individuals, and a seven-acre enclave with NPS administrative facilities. Negotiations to acquire non-federal interests in land on Horn Island are underway. All land on Petit Bois Island (1,466 acres) is wilderness, with no enclaves or inholdings.

As per the seashore's 2004 Wilderness Management Plan (WMP), the seashore will manage its wilderness in such a way as to "ensure the protection, preservation, restoration, appreciation, and enjoyment of this wilderness for future generations in an unimpaired condition."

The WMP states that all activities conducted in the Gulf Islands Wilderness will follow a decision process, and the process recorded and archived in the seashore's administrative record. This will serve to meet a desired future condition of a wilderness unaffected by the works and acts of humankind; and to provide a permanent record of decisions. When necessary, the minimum decision process will be accompanied by appropriate environmental documentation.

As per the WMP, minimum impact suppression tactics will be used in managing all fires that may occur in the Gulf Islands Wilderness. Wildland fires will be managed by indirect attack in wilderness areas. Natural fire breaks will be utilized where possible.

GUIS will use the decision process displayed on the flow chart provided in Appendix 13.09 to determine the minimum requirements for a specific management activity in the Gulf Islands Wilderness. All proposed management actions will be evaluated using this process. The seashore superintendent will approve final management decisions.

On Horn and Petit Bois islands, chainsaws and portable pumps may be used only with the approval of the seashore superintendent or designee, except when necessary for the protection of human life, structures, and/or sensitive natural or cultural resources. No other mechanized equipment will be used except in life-threatening situations or with the approval of the seashore superintendent or designee.

Wild Fire Use (WFU) currently is not desired in the park. Review of historic fire frequency on the wilderness islands may afford the future use of WFU in the park, but a determination is forthcoming. Current research indicates hurricanes play an important role in island ecology, and fire plays a historic role as well, but current stressors from recent hurricanes of 2004 and 2005 are not fully understood, and warrant more research to determine if fire can be utilized on the islands, including those with wilderness. This issue can be addressed again in future FMP's after further research is completed.

3.4.2 Management Considerations

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

3.4.3 Past Role of Fire

Ecological and meteorological evidence indicates that lightning-caused fires were a major environmental force shaping the vegetation of North America for millions of years prior to human habitation (Van Lear and Waldrop 1989). Fire-adapted ecosystems developed, as did individual plant species dependent upon or adapted to wildland fire. According to fire ecologist

Dr. Cecil Frost (1998), "...fire once played a role in shaping all but the wettest, the most arid, or the most fire-sheltered plant communities of the United States."

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

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

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

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

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

The annual occurrence of wildland fires at GUIS is low, with a 32-year average of two fires per year. Between 1974 and the present, 64 documented wildland fires have occurred on seashore lands, burning a total of 2,247 acres. Of these, 25 (~39%) of the wildland fires were of size class A (0.1 to 0.25 acres), 26 (~41%) were of size class B (0.26 to 9.9 acres), six (~9%) were of size

class C (10.0 to 99.9 acres), four (~6%) were of size class D (100 to 299.9 acres), and three (~5%) were of size class E (300 to 999.9 acres). Seashore firefighters have provided suppression assistance on wildland fires on adjacent properties, including a 3,500-acre fire of unknown cause that occurred on March 19, 1981, in the vicinity of the Davis Bayou unit.

3.4.4 Wildland Fire Management Situation

3.4.4.1 Historical Weather Analysis

The climate of the East Gulf Coastal Plain is affected by the adjacent Gulf of Mexico and is characterized as a moderate climate with long, warm growing seasons and mild winters. Average summer temperatures for June, July, and August hover around 80° F, while winter temperatures for December, January and February fall to 55° F. The last freeze date for spring is around February 1, and the first freeze date for fall is around December 21, giving approximately 320 days of potential growing season for the area. Precipitation in this region follows two rain periods: summer rains from June to September, and winter rains from December through April. Late spring and early summer are usually the driest periods. Total average rainfall is about 56 inches per year.

Summer along the Gulf Coast is characterized by afternoon thunderstorms caused by the moist, unstable air produced from the surrounding Gulf of Mexico waters. Thunderstorms are generally intense and occur over a short period of time during 2-4 days per week. In general, these thunderstorms produce little significant rainfall but occasionally can produce 2 to 3 inches of rain in less than 2 hours. Humidity is high in this region as a result of adjacent Gulf of Mexico waters. Humidity falls to 60-70% during mid-afternoons of summer and recovers to 85% during the night until dawn.

Prevailing winds are generally from the north in the winter and south in the summer with an average wind speed of about 7 mph. Sea breezes and 180-degree wind shifts are common due to the warming of the land throughout the day and subsequent cooling into the night time.

The hurricane season in the area extends from June to October, with the greatest frequency of storms occurring from August through October. Extensive rains associated with hurricanes can produce local flooding.

3.4.4.2 Fire Season

Fire season at GUIS is from October 1st through May 31st, as determined by a 2004 interagency Personal Computer Historical Analysis of past fire occurrence on the seashore, the DeSoto National Forest (DeSoto and Chickasawhay ranger districts), and the Mississippi Sandhill Crane National Wildlife Refuge.

3.4.4.3 Fuel Characteristics and Fire Behavior

The primary fuel types represented at GUIS have been classified according to the National Fire Danger Rating System (NFDRS) and the Northern Forest Fire Laboratory Fire Behavior

Prediction System (FBPS) (Deeming et al 1978:30, Anderson 1982). Figures 4 and 5 delineate fuel model boundaries within the Davis Bayou and Naval Live Oaks units, respectively.

- ❖ NFDRS Fuel Model D (FBPS Fuel Model 7): This model is specifically for the palmetto-gallberry understory/pine overstory association of the southeastern coastal plains. It can also be used for the so-called "low pocosins" where fuel model O might be too severe. This model should only be used in the Southeast because of a high moisture of extinction.

At GUIS, fuel model D best represents pine flatwoods, wet pine savanna, and xeric sandhills, all with an understory shrub component. If the understory shrub component is particularly dense and tall, these areas are better represented by fuel model O (FBPS fuel model 4).

- ❖ NFDRS Fuel Model L (FBPS Fuel Model 1): This model is meant to represent western grasslands vegetated by perennial grasses. The principal species are coarser and heavier than those represented by fuel model A. Otherwise the situations are very similar; shrubs and trees occupy less than one-third of the area.

At GUIS, fuel model L best represents coastal grassland and beach dune vegetation.

- ❖ NFDRS Fuel Model N (FBPS Fuel Model 3): This model was constructed specifically for the sawgrass prairies of south Florida. It may be useful in other marsh situations where the fuel is coarse and reed-like. This model assumes that one-third of the aerial portion of the plants are dead. Fast-spreading, intense fires can occur even over standing water.

At GUIS, fuel model N best represents palustrine marsh and estuarine marsh.

- ❖ NFDRS Fuel Model O (FBPS Fuel Model 4): This model applies to dense, brush-like fuels of the Southeast. O fuels, except for the deep litter layer, are almost entirely living. The foliage burns readily except during the active growing season. The plants are typically over six feet tall and are often found under open pine. If the plants do not reach the six-foot criteria, fuel model D should be used.

At GUIS, fuel model O best represents sand pine-scrub, scrub, palustrine shrub, and estuarine shrub.

- ❖ NFDRS Fuel Model R (FBPS Fuel Model 8): This model represents hardwood areas after the canopies leaf out in the spring. It is provided as the off-season substitute for E. It should be used during the summer in all hardwoods and mixed conifer-hardwood stands where more than half of the overstory is deciduous.

At GUIS, fuel model R best represents live oak hammock under average fire weather parameters. Under extreme fire weather parameters, live oak hammock is better represented by NFDRS fuel model D (FBPS fuel model 7).

Figure 4: NFDRS Fuel Models, FMU #1 (Davis Bayou Unit)

Map based upon a vegetative communities map provided in the report entitled *Wetland Delineation and Hydrologic/Community Survey of the Davis Bayou Area of Gulf Islands National Seashore* (MSU 2002)

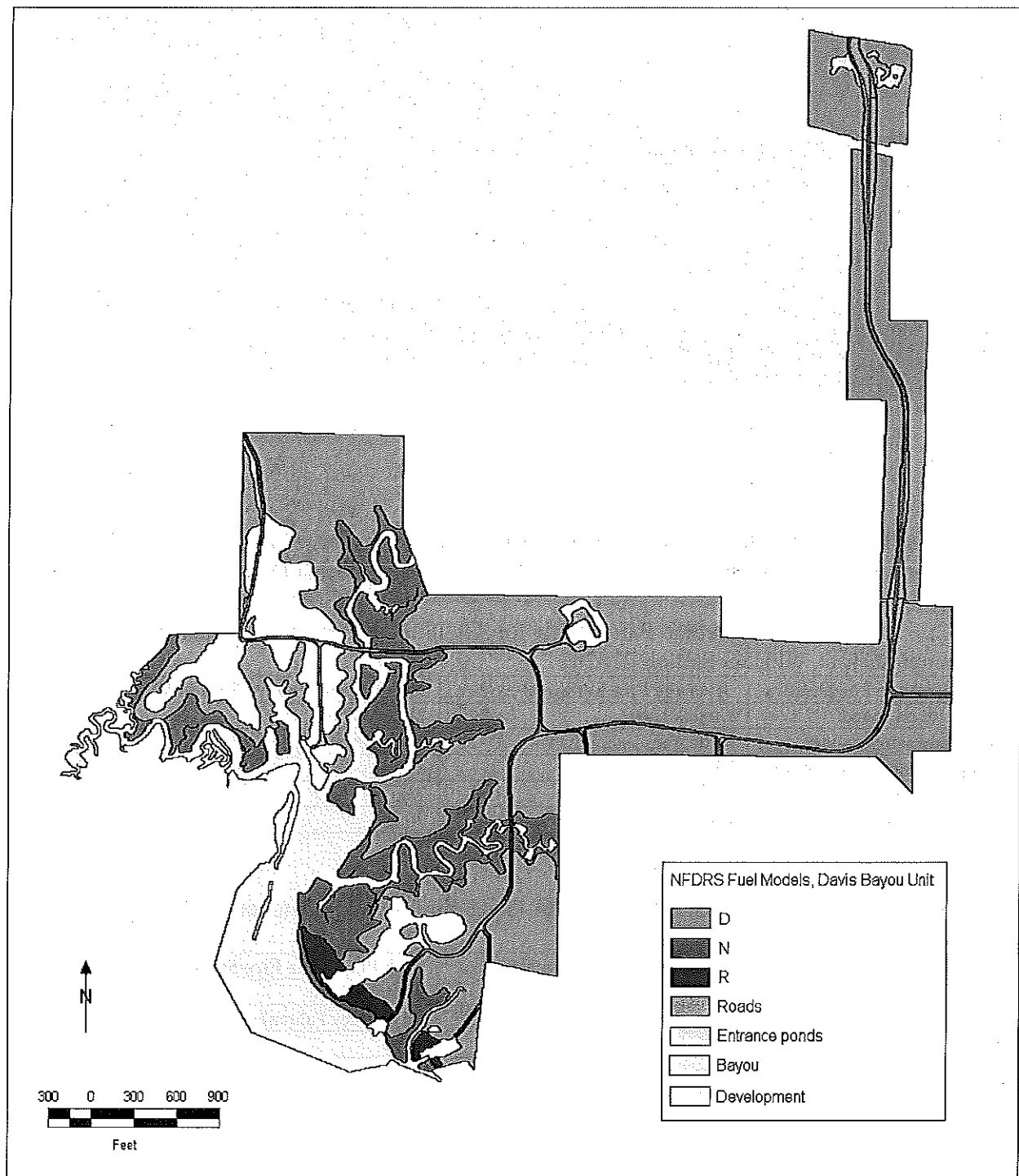
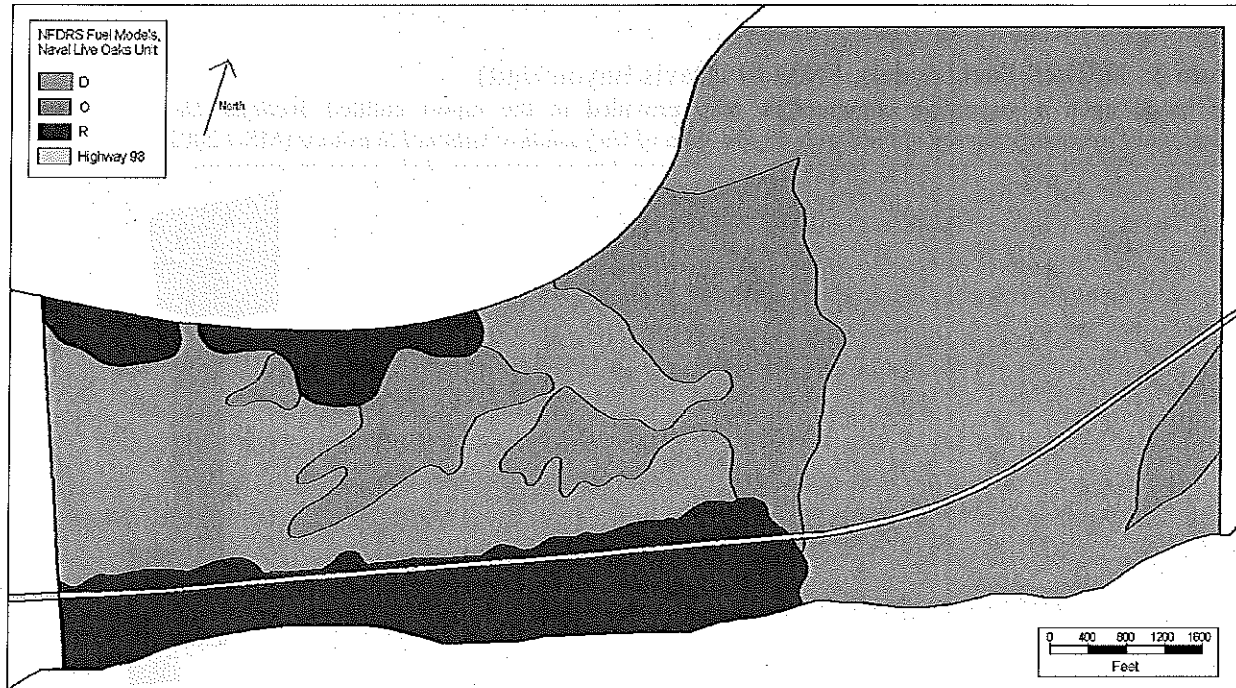


Figure 5: NFDRS Fuel Models, FMU #8 (Naval Live Oaks Unit)

Map based upon a vegetative communities map provided in the GUIS Final Environmental Statement, General Management Plan/Development Concept Plan: Santa Rosa Unit, Naval Live Oaks Reservation Unit, Davis Bayou Unit (1978b). Vegetative community boundaries have undoubtedly shifted since 1978, but this provides a baseline until re-mapping of vegetation within the Naval Live Oaks unit, currently underway, is completed.



Tables 2 and 3 illustrate historic fire weather parameters at “average” and “extreme” levels for the seashore fire season within the Mississippi District and the Florida District, respectively.

Table 2: Historic Fire Weather Parameters for GUIS Fire Season (October 1 – May 31), Mississippi District, NFDRS Station 228202

Fire Weather Parameters	Average Fire Season Weather	97th Percentile Fire Season Weather
20-foot wind speed	7 miles/hour	11 miles/hour
Maximum temperature	75 degrees Fahrenheit	88 degrees Fahrenheit
Minimum relative humidity	50%	22%
1-hour fuel moisture	12%	7%
Live woody fuel moisture	150%	70%

Table 3: Historic Fire Weather Parameters for GUIS Fire Season (October 1 – May 31), Florida District, NFDRS Station 080202

Fire Weather Parameters	Average Fire Season Weather	97th Percentile Fire Season Weather
20-foot wind speed	7 miles/hour	11 miles/hour
Maximum temperature	74 degrees Fahrenheit	88 degrees Fahrenheit
Minimum relative humidity	54%	23%
1-hour fuel moisture	11%	5%
Live woody fuel moisture	130%	70%

Tables 4 and 5 demonstrate anticipated fire behavior at GUIS (within the Mississippi District and the Florida District, respectively) under these average and extreme conditions, as well as critical threshold values influencing fire controllability. The values were calculated using the BEHAVE (Andrews 1986) fire behavior prediction model utilizing weather inputs from the U.S. Fish and Wildlife Service RAWs station at Mississippi Sandhill Crane National Wildlife Refuge (NFDRS 228202) to represent the Mississippi District, and the seashore RAWs station at Naval Live Oaks (080202) to represent the Florida District. The weather data utilized for the Mississippi District cover the 13-year period from 1993-2005, and the weather data utilized for the Florida District cover the 11-year period from 1995-2005. The weather indices were calculated using the FireFamily Plus (Bradshaw 2004) software package. It should be recognized that the table values are based upon models rather than direct observation of fire behavior in these fuel types. As GUIS managers have the opportunity to observe and monitor fire behavior, these values may be refined and the model calibrated to better reflect local fuel and weather conditions.

Table 4: Potential Fire Behavior under Average and Extreme Conditions, Mississippi District

NFDRS Model	FBPS Model	Fire Behavior; Average Conditions		Fire Behavior; Extreme Conditions	
		Flame Length	Rate of Spread	Flame Length	Rate of Spread
D	7	4 ft	14 chains/hr	6 ft	24 chains/hr
L	1	*0 ft	*0 chains/hr	4 ft	57 chains/hr
N	3	**8 ft	45 chain/hr	**11 ft	83 chains/hr
O	4	**15 ft	42 chains/hr	**19 ft	70 chains/hr
R	8	1 ft	1 chain/hr	1 ft	1 chain/hr

Average conditions = 1993-2005 NFDRS station 228202 mean fire season weather conditions

Extreme conditions = 1993-2005 NFDRS station 228202 97% percentile fire season weather conditions

*Due to moisture of extinction under average conditions

**Exceeds direct attack capabilities, i.e., flame lengths greater than 8 feet

Table 5: Potential Fire Behavior under Average and Extreme Conditions, Florida District

NFDRS Model	FBPS Model	Fire Behavior; Average Conditions		Fire Behavior; Extreme Conditions	
		Flame Length	Rate of Spread	Flame Length	Rate of Spread
D	7	4 ft	14 chains/hr	6 ft	26 chains/hr
L	1	1 ft	12 chains/hr	4 ft	65 chains/hr
N	3	**8 ft	47 chain/hr	**13 ft	97 chains/hr
O	4	**15 ft	43 chains/hr	**20 ft	75 chains/hr
R	8	1 ft	1 chain/hr	1 ft	2 chains/hr

Average conditions = 1995-2005 NFDRS station 080202 mean fire season weather conditions

Extreme conditions = 1995-2005 NFDRS station 080202 97% percentile fire season weather conditions

**Exceeds direct attack capabilities, i.e., flame lengths greater than 8 feet

In regard to flame length, the USDA Forest Service research paper entitled *Help in Making Fuel Management Decisions* (1975) provides the following interpretations:

Table 6: Flame Length Interpretations

Flame Length (ft)	Interpretations
0-4	Fires can generally be attacked at the head or flanks by persons using hand tools. Handline should hold the fire.
4-8	Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to hold fire. Equipment such as dozers, engines, and retardant aircraft can be effective.
8-11	Fires may present serious control problems—torching out, crowning, and spotting. Control efforts at the head of the fire will probably be ineffective.
11+	Crowning, spotting, and major runs are common. Control efforts at the head of the fire are ineffective.

Table 7 outlines potential critical weather parameters that would result in fire behavior exceeding direct attack capabilities (flame lengths greater than eight feet). These values were calculated using the RX Window Module of the BEHAVE program (Andrews 1986). Such values are useful both for facilitating recognition of potential extreme fire behavior conditions, as well as for assisting in prescription development for the prescribed fire program. It should be noted that generally two or three weather parameters must be aligned in order for extreme conditions to result. It should also be noted that these are modeled values and should serve only as guidelines. As the opportunity arises, fire monitoring data collection on both wildland fires and prescribed fires will facilitate refinement of these values as well as development of critical values for additional parameters. Last, it should be noted that while the values listed will potentially result in flame lengths greater than eight feet, this does not necessarily indicate a sustained, uncontrollable wildland fire. Rather, they indicate that direct attack is not a safe strategy at the head of the fire. Furthermore, these conditions, particularly wind speed, can vary greatly within a short time period and be fleeting in nature.

Table 7: Critical Weather Parameters Resulting in Need for Indirect Attack, Mississippi District

NFDRS Model	FBPS Model	Moisture of Extinction	Critical Weather Parameters Resulting in Fire Behavior Exceeding Direct Attack Capabilities
D	7	40%	Live fuel moisture <100% and 1-hr fuel moisture <12% and eye-level wind speed >9 mph
L	1	12%	1-hr fuel moisture <5% and eye-level wind speed >10 mph
N	3	25%	1-hr fuel moisture <12% and eye-level wind speed >2 mph
O	4	20%	Fire under any conditions in this type is unsafe for direct attack
R	8	30%	Flame lengths unlikely to exceed 8 feet even under extreme conditions

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

3.4.4.4 Fire Regime Alteration

The earlier-referenced draft *Gulf Islands National Seashore Fire Effects Monitoring Plan* identifies the following vegetative communities at GUIS: pine flatwoods, wet pine savanna, sand pine-scrub, scrub, xeric sandhills, live oak hammock, coastal grassland, palustrine marsh,

palustrine shrub, estuarine marsh, estuarine shrub, and beach dunes. Based upon the information provided in that document, the historical natural fire regime for pine flatwoods, wet pine savanna, and xeric sandhills is I (0-35 year frequency, low severity). The historical natural fire regime for coastal grassland, palustrine marsh, palustrine shrub, estuarine marsh, and estuarine shrub is II (0-35 year frequency, stand-replacement severity). The historical natural fire regime for sand pine-scrub, scrub, and live oak hammock is closest to IV (35-100+ year frequency, stand-replacement severity). As previously discussed, fire does not play a significant role in the structure or composition of beach dune vegetation.

At present, due to decades of fire suppression and limited prescribed burning at the seashore, Fire Regimes I and II are in condition class 3, as defined in the USDA Forest Service General Technical Report entitled *Development of Coarse-Scale Spatial Data for Wildland Fire and Fuel Management* (2002): "Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range." Fire Regime IV is in condition class 1, as defined in the same report: "Fire regimes are within an historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and function within an historical range."

See section 3.4.1.5 for natural fire return intervals and fire effects regarding specific vegetation communities. Also refer to Appendix 13.14.

3.4.4.5 Control Problems and Dominant Topographic Features

Weather and fuels are the primary influences on fire behavior at GUIS. The topography of the seashore is generally level, and typical of a moderate-energy coastal area. The highest surface elevations are related to the well-developed, wind-driven interior dune systems, present in all units of the seashore except for Davis Bayou and Fort Barrancas (NPS 1978b). Due to the fairly level topography, fire behavior is not affected by slope or aspect. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

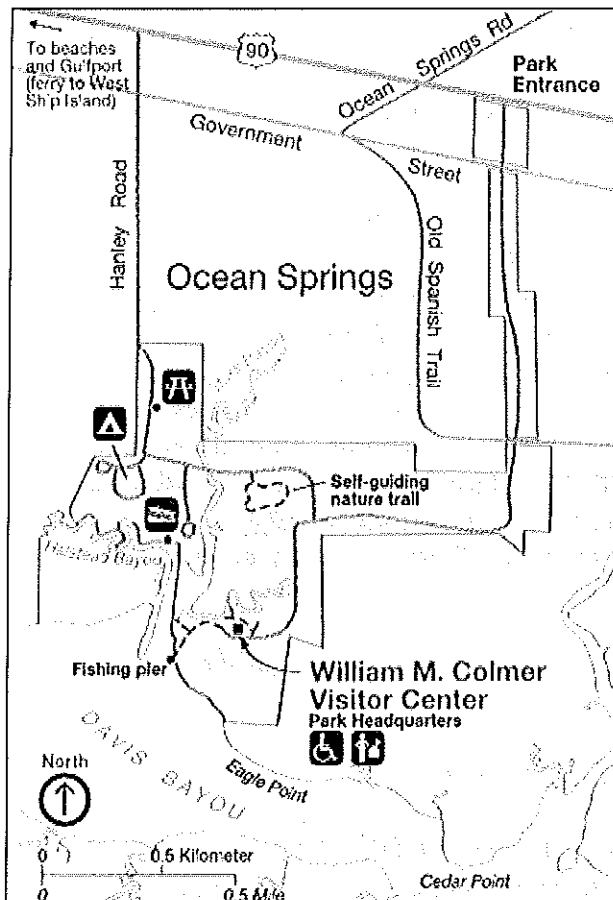
Volatile fuels and unnaturally high fuels accumulations exist in many areas of the seashore, exacerbating resistance to control. Proximity of the water table to the ground surface, and fragility of soils and plants, particularly on the barrier islands, are important management considerations during suppression activities.

3.4.5 Fire Management Units (FMUs)

As previously stated, 12 fire management units (FMUs) have been designated within GUIS in order to facilitate the accomplishment of fire management objectives.

3.4.5.1 Fire Management Unit #1: Davis Bayou Unit

Figure 6: FMU #1



This FMU, containing approximately 401 acres, is located on the mainland within the Mississippi District. Most of the land is adjacent to the coast along three marshy bayous, but the unit also includes a narrow access corridor extending northward to U.S. Highway 90.

Development within the unit includes the Mississippi District headquarters (a visitor center/administrative building with associated parking); a boat operations complex; a maintenance complex; three NPS housing units; a jon-boat tour facility; a campground with 51 sites; a group campground for 40 people; two picnic areas with a combined total of approximately 120 tables, five shelters, and four restrooms; two boat launch ramps; a .5-mile-long nature trail; and a boardwalk. Concentrated residential development is located along narrow greenbelt corridors.

Cultural resources within the unit include the remains of a Civilian Conservation Corps camp and a 4-H club site.

Seashore firefighters, with assistance as needed from the Ocean Springs Fire Department (as per memorandum of understanding), will perform initial attack on wildland fires within this FMU. Fire hydrants are located along the entrance road into the unit and in the visitor center/administrative building parking lot area.

3.4.5.1.1 Fire Management Objectives for FMU #1

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Prescribed burn 7 units over the next five years, totaling approximately 200 acres, to promote ecosystem sustainability and reduce hazard fuels accumulations.
- ❖ Maintain existing hazard fuels breaks along sections of the FMU boundary, bordering adjacent development.

- ❖ Maintain existing defensible space around seashore structures.

3.4.5.1.2 FMU #1 Fire History

Prescribed burning was conducted within this FMU in 2002. Sixteen documented wildland fires have occurred within the unit, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
1/11/1978	0.1	Miscellaneous
5/25/1979	0.1	Miscellaneous
9/24/1979	0.1	Equipment use
3/30/1981	2.0	Children
1/11/1985	1.0	Smoking
3/10/1987	1.0	Campfire
1/30/1993	0.1	Incendiary
1/23/1994	0.5	Smoking
5/23/1994	7.0	Children
11/23/1994	0.1	Miscellaneous
3/11/1996	0.2	Miscellaneous
4/09/1997	0.1	Miscellaneous
4/18/1999	0.3	Debris burning
1/1/2001	0.1	Children
4/19/2001	0.1	Children
4/19/2001	0.1	Children
3/14/06	0.1	Smoking

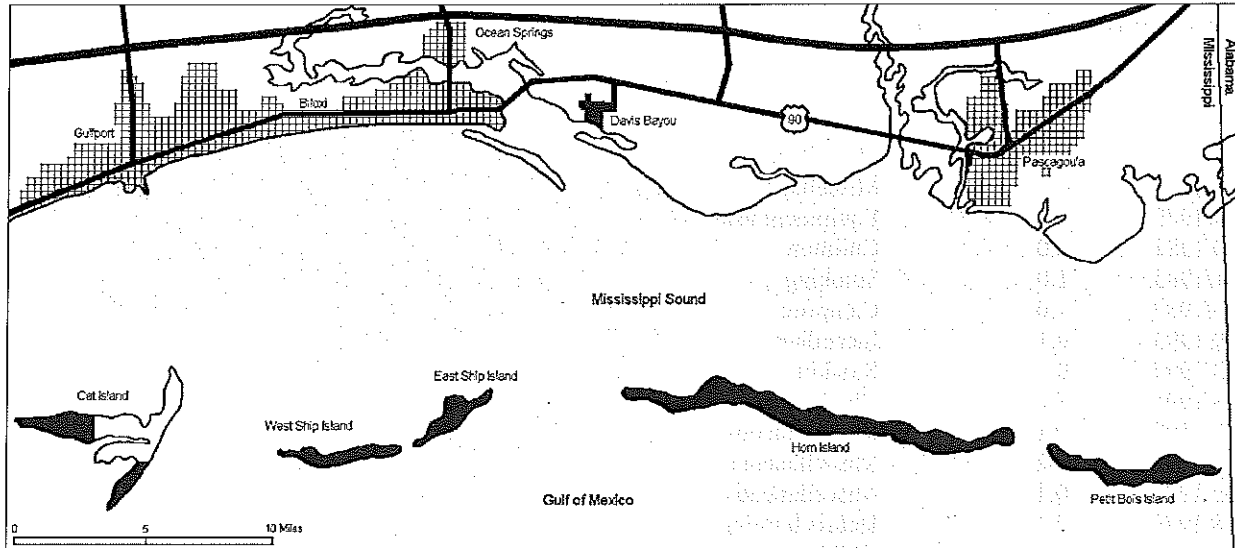
Seashore firefighters provided suppression assistance on a 3,500-acre wildland fire that occurred on adjacent property on 3/19/1981.

3.4.5.1.3 FMU #1 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of pine flatwoods, wet pine savanna, estuarine and palustrine marsh, and live oak hammock. The primary NFDRS fuel models represented are D, N, and R (see Figure 4 for a delineation of fuel model boundaries). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.2 Fire Management Unit #2: Cat Island Unit

Figure 7: FMUs #2 (Cat Island), #3 (West Ship Island), #4 (East Ship Island), #5 (Horn Island), and #6 (Petit Bois Island)



Cat Island is a 2,802-acre barrier island with a unique and distinct “T”-shaped configuration, located six miles off the Mississippi Gulf Coast. It is the westernmost barrier island within seashore boundaries (Mississippi District). The majority of the island has been owned by the Boddie family since 1911. The land up to mean high tide level (tidal wetlands) is owned by the State of Mississippi. During World War II, the island was used by the U.S. Army Signal Corps to train service dogs for the military.

In 2002, The Trust for Public Land purchased approximately 1,000 acres from the Boddie family and transferred that acreage to the NPS for inclusion in the seashore. Over the next several years, the NPS expects to acquire the remaining sections of the island, with the exception of 150 acres, which will remain in private ownership and retained in perpetuity. There is no development located on those portions of Cat Island presently owned by the NPS, nor are there any recorded cultural resources. The island is accessible by watercraft.

Seashore firefighters, with assistance as needed from Mississippi Sandhill Crane National Wildlife Refuge firefighters, will conduct initial attack on wildland fires within this FMU.

3.4.5.2.1 Fire Management Objectives for FMU #2

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.

- ❖ Mechanically create and maintain a hazard fuels break along a section of the seashore boundary, to help prevent the spread of wildland fire to and from adjacent non-agency land.

3.4.5.2.2 FMU #2 Fire History

No recorded wildland fires have occurred within this FMU.

3.4.5.2.3 FMU #2 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, scrub, pine flatwoods, estuarine and palustrine marsh, and estuarine and palustrine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.3 Fire Management Unit #3: West Ship Island Unit

The next barrier island to the east of Cat Island, West Ship Island,* is about 3.7 miles in length, 0.16 to 0.34 miles in width, and contains approximately 555 acres. It is located within the Mississippi District of the seashore. The island is accessible by watercraft.

Development within this FMU includes a ranger office/first aid facility; a concession facility; three NPS housing units; a picnic area with tables, two shelters, and two restrooms; and a boat dock.

Cultural resources within this FMU include the Fort Massachusetts complex, the Ship Island Lighthouse complex, and a Confederate prisoner of war camp site. Fort Massachusetts is listed in the National Register of Historic Places.

Seashore firefighters, with assistance as needed from Mississippi Sandhill Crane National Wildlife Refuge firefighters, will conduct initial attack on wildland fires within this FMU.

3.4.5.3.1 Fire Management Objectives for FMU #3

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

* Prior to hurricane Camille in 1969, Ship Island was a single island about seven miles in length. Hurricane Camille severed the island into three sections. Sand accretion since 1969 has resulted in the lengthening of West Ship Island and the merging of the eastern two islands to form East Ship Island.

3.4.5.3.2 FMU #3 Fire History

Three documented wildland fires have occurred within the unit, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
5/3/1980	2.0	Incendiary
7/4/1983	1.0	Equipment use
8/29/2009	0.33	Lightning

3.4.5.3.3 FMU #3 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, scrub, pine flatwoods, estuarine and palustrine marsh, and estuarine and palustrine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.4 Fire Management Unit #4: East Ship Island Unit

East Ship Island is about 2.6 miles in length, 0.09 to 0.53 miles in width, and contains approximately 362 acres. It is located within the Mississippi District of the seashore. There is no development on the island. The island is accessible by watercraft.

Cultural resources located within this FMU include the French Warehouse Site and the Quarantine Station complex. The French Warehouse Site is listed in the National Register of Historic Places.

Seashore firefighters, with assistance as needed from Mississippi Sandhill Crane National Wildlife Refuge firefighters, will conduct initial attack on wildland fires within this FMU.

3.4.5.4.1 Fire Management Objectives for FMU #4

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.

3.4.5.4.2 FMU #4 Fire History

Two documented wildland fires have occurred within the unit, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
5/26/1979	1.0	Campfire
7/5/1997	62.0	Miscellaneous

3.4.5.4.3 FMU #4 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, scrub, pine flatwoods, estuarine and palustrine marsh, and estuarine and palustrine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.5 Fire Management Unit #5: Horn Island Unit

The next barrier island to the east of East Ship Island, Horn Island is 14.3 miles in length, 0.37 to 0.75 miles in width, and contains approximately 3,650 acres. It is located within the Mississippi District of the seashore. The island is classified entirely as Wilderness except for an enclave of about seven acres that holds a boat dock, a generator building, a fenced compound holding an NPS housing unit and a maintenance building with primitive sleeping quarters, and a fenced area holding a Mississippi Air National Guard telecommunications tower and two photovoltaic panels. The island is accessible by watercraft.

Horn Island was the site of a chemical and biological warfare testing installation during World War II. Associated cultural resources include the chimney of the incinerator, and several concrete building foundations.

Seashore firefighters, with assistance as needed from Mississippi Sandhill Crane National Wildlife Refuge firefighters, will conduct initial attack on wildland fires within this FMU.

3.4.5.5.1 Fire Management Objectives for FMU #5

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.
- ❖ Protect wilderness values during all fire management activities by adhering to the objectives and guidance provided by the seashore's 2004 Wilderness Management Plan.

3.4.5.5.2 FMU #5 Fire History

Eight documented wildland fires have occurred within this FMU, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
2/8/1976	340.0	Debris burning
4/27/1977	213.0	Debris burning
7/17/1984	17.0	Lightning
8/03/1990	600.0	Lightning
7/04/1992	3.0	Miscellaneous
6/27/1997	300.0	Lightning
4/22/2001	108.0	Debris burning

10/15/2003	300.0	Miscellaneous
6/22/2009	1.0	Smoking

3.4.5.5.3 FMU #5 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, scrub, pine flatwoods, estuarine and palustrine marsh, and estuarine and palustrine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.6 Fire Management Unit #6: Petit Bois Island Unit

Petit Bois Island is 7.5 miles in length, 0.19 to 0.75 miles in width, and contains approximately 1,466 acres. It is the easternmost of the barrier islands within the seashore's Mississippi District. There is no development on the island, nor are there any recorded cultural resources. The island is accessible by watercraft.

Seashore firefighters, with assistance as needed from Mississippi Sandhill Crane National Wildlife Refuge firefighters, will conduct initial attack on wildland fires within this FMU.

3.4.5.6.1 Fire Management Objectives for FMU #6

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Protect wilderness values during all fire management activities by adhering to the objectives and guidance provided by the seashore's 2004 Wilderness Management Plan.

3.4.5.6.2 FMU #6 Fire History

One documented wildland fire has occurred within this FMU, as follows:

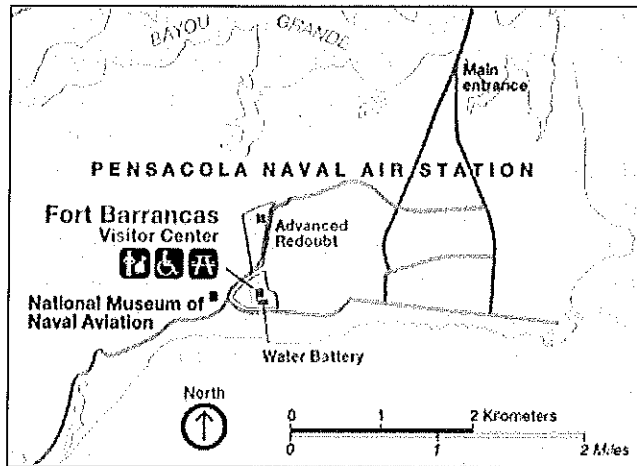
<u>Date</u>	<u>Acres</u>	<u>Cause</u>
4/21/1980	9.0	Smoking

3.4.5.6.3 FMU #6 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, scrub, pine flatwoods, estuarine and palustrine marsh, and estuarine and palustrine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.7 Fire Management Unit #7: Fort Barrancas Unit

Figure 8: FMU #7



This 64-acre FMU is located on the mainland within the Florida District of the seashore, at Pensacola Naval Air Station. Development within the unit includes a visitor center with restrooms, and a picnic area with 10 tables.

Cultural resources within this FMU include the Pensacola Lighthouse complex, and the nineteenth-century Fort Barrancas complex, which includes three fortifications: Fort Barrancas, the Advanced Redoubt of Fort Barrancas, and the Fort Barrancas Water Battery. The Fort Barrancas Historic

District is listed in the National Register of Historic Places; the fort is also a National Historic Landmark.

Seashore firefighters, with assistance as needed from the Pensacola Naval Air Station Fire Department (as per memorandum of agreement), will perform initial attack on wildland fires within this FMU.

3.4.5.7.1 Fire Management Objectives for FMU #7

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.7.2 FMU #7 Fire History

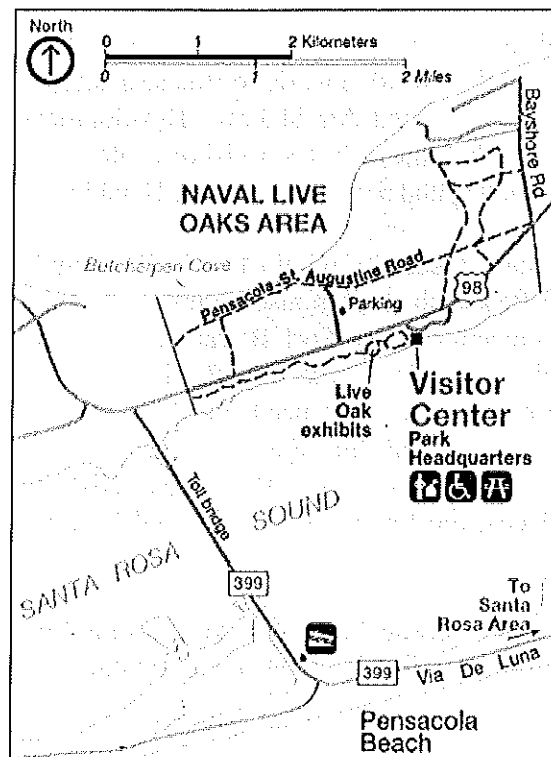
No recorded wildland fires have occurred within this FMU.

3.4.5.7.3 FMU #7 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists primarily of sand pine-scrub. The primary NFDRS fuel model represented is O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.8 Fire Management Unit #8: Naval Live Oaks Unit

Figure 9: FMU #8



This FMU, containing approximately 1,378 acres, is located on the mainland within the Florida District. Development within the unit includes the Florida District headquarters (a visitor center/administrative building with associated parking); a picnic area with 25 tables, a shelter, and a restroom; and a group campground for 40 people. A four-lane highway (U.S. Highway 98) bisects the unit, and an above-ground power line parallels the road. Residential development is located along the northern and eastern sides of the unit.

The Naval Live Oaks Historic District and the Naval Live Oaks Reservation are listed in the National Register of Historic Places (NRHP). The unit includes a number of prehistoric sites, three of which are listed in the NRHP: Butcherpen Mound, Big Heart West, and Third Gulf Breeze. Also located within the unit is the First American Road in Florida, listed in the NRHP.

This FMU contains gopher tortoise habitat. However, due largely to past fire exclusion, stands dominated by sand pine and longleaf pine exhibit severe crowding by hardwood and understory species, threatening the suitability of the habitat. It is essential to continue conducting prescribed burns (began in 1999) within the unit to restore and maintain this habitat.

Seashore firefighters, with assistance as needed from the Gulf Breeze Fire Departments (as per memoranda of agreement), will perform initial attack on wildland fires within this FMU. Midway Fire Fire Department may respond under a mutual aid agreement with Gulf Breeze Fire Department. Fire hydrants are located in the visitor center/administrative building area, and in the central portion of the unit where one of the seashore fire caches is located.

3.4.5.8.1 Fire Management Objectives for FMU #8

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Prescribed burn 18 units over the next five years, totaling 1106 acres, to promote ecosystem sustainability (including gopher tortoise habitat restoration and maintenance) and reduce hazard fuels accumulations.

- ❖ Maintain existing hazard fuels breaks along sections of the FMU boundary, bordering adjacent residential development.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.8.2 FMU #8 Fire History

Longtime residents of the area say that burning of the understory for grazing purposes was common in this area through the 1940s. The NPS has conducted a number of prescribed burns since 1999. Thirteen documented wildland fires have occurred within this FMU, as follow:

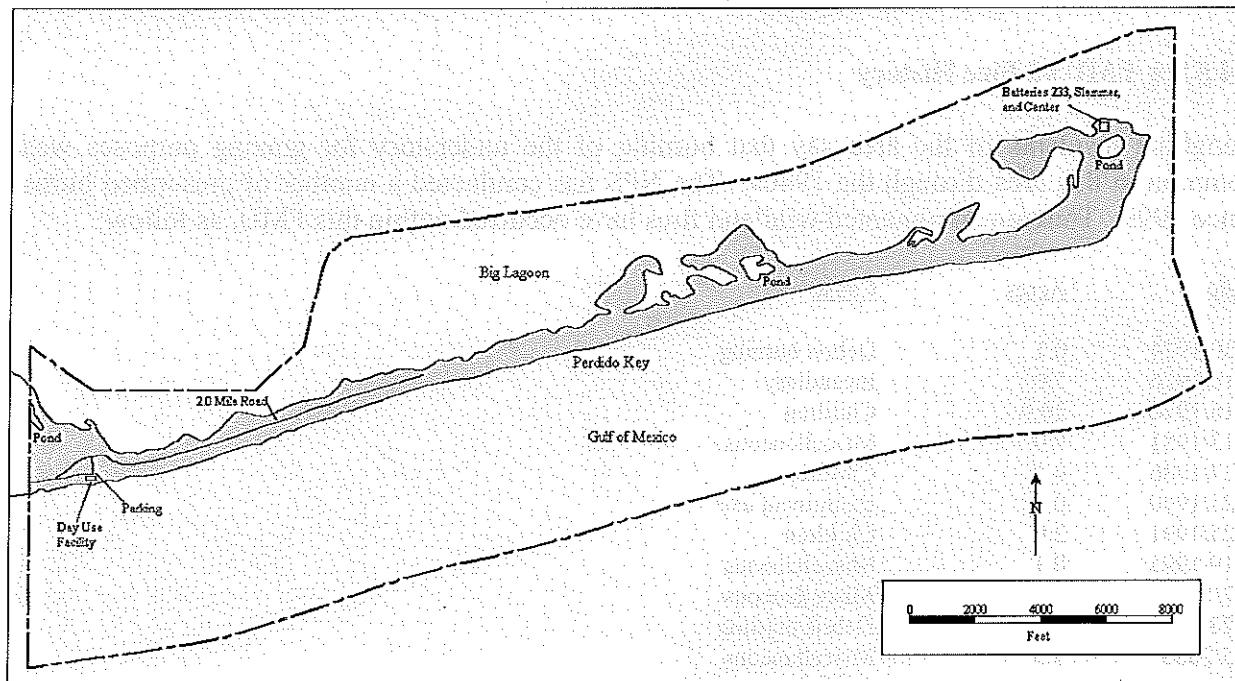
<u>Date</u>	<u>Acres</u>	<u>Cause</u>
3/30/1974	0.1	Debris burning
1/16/1976	5.0	Incendiary
9/16/1976	20.0	Children
7/13/1981	9.0	Miscellaneous
5/27/1986	0.5	Children
7/25/1990	0.1	Equipment use
3/25/1991	2.0	Children
4/19/1995	0.1	Miscellaneous
5/7/1995	15.0	Miscellaneous
3/22/2000	215.0	Debris burning
4/5/2000	3.5	Miscellaneous
12/17/2000	1.5	Campfire
6/11/2002	0.2	Equipment use
6/12/2007	3.2	Lightning

3.4.5.8.3 FMU #8 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of pine flatwoods, sand pine-scrub, scrub, xeric sandhills, and live oak hammock, with small areas of palustrine and estuarine marsh. The primary NFDRS fuel models represented are D, O, and R (see Figure 5 for a delineation of fuel model boundaries). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.9 Fire Management Unit #9: Perdido Key Unit

Figure 10: FMU #9



This FMU, located on the eastern portion of Perdido Key, a barrier island within the Florida District of the seashore, contains approximately 1,041 acres. Development within the unit includes a ranger office/first aid facility; a concession facility; and a picnic area with approximately 64 tables, five shelters, and two restrooms. The island is accessible by vehicle bridges and watercraft.

Cultural resources located within unit boundaries include the nineteenth-century Fort McRee complex (the fort was formerly located on the eastern tip of Perdido Key, but is now under the waters of Pensacola Bay due to the westward migration of Perdido Key lands), and the sites of three concrete coast artillery batteries: Battery Slemmer, Battery Center, and Battery 233. The Perdido Key Historic District is listed in the National Register of Historic Places.

Seashore firefighters, with assistance as needed from the Escambia County Fire Services (as per memorandum of agreement), will perform initial attack on wildland fires within this FMU.

3.4.5.9.1 Fire Management Objectives for FMU #9

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.9.2 FMU #9 Fire History

Five documented wildland fires have occurred within this FMU, as follow:

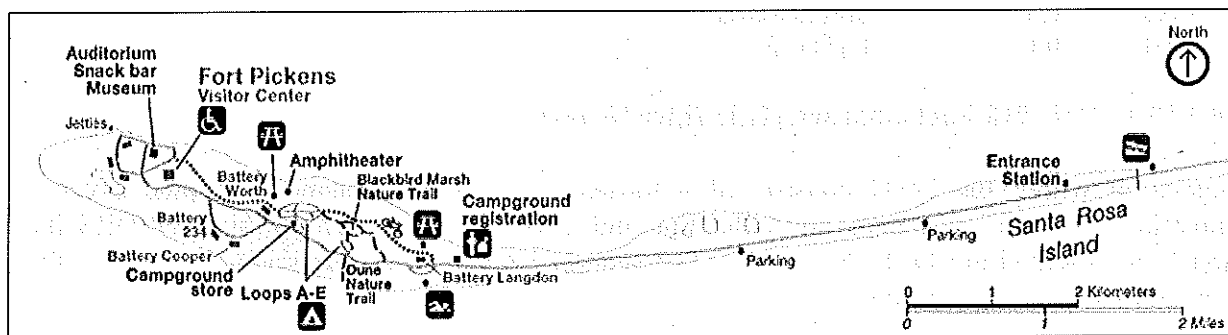
<u>Date</u>	<u>Acres</u>	<u>Cause</u>
7/10/1989	1.8	Campfire
7/4/1992	0.1	Smoking
7/4/1992	0.3	Incendiary
7/5/1993	0.8	Incendiary
8/3/1997	1.0	Incendiary

3.4.5.9.3 FMU #9 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, wet pine savanna, palustrine and estuarine marsh, and palustrine and estuarine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.10 Fire Management Unit #10: Fort Pickens Unit

Figure 11: FMU #10



This FMU, located on the western portion of Santa Rosa Island, a barrier island within the Florida District of the seashore, contains approximately 2,742 acres. Development within the unit includes a visitor center; three concession facilities; a campground with 200 sites; a group campground for 50 people; three picnic areas with a combined total of approximately 80 tables, three shelters, and three restrooms; and a fishing pier. The island is accessible by vehicle bridges and watercraft.

Cultural resources located within this FMU include Fort Pickens, listed in the National Register of Historic Places, and a number of historic shipwrecks located in surrounding waters.

Seashore firefighters, with assistance as needed from the Escambia County Fire Services (as per memorandum of agreement), will perform initial attack on wildland fires within this FMU.

3.4.5.10.1 Fire Management Objectives for FMU #10

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.10.2 FMU #10 Fire History

Twelve documented wildland fires have occurred within this FMU, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
6/16/1975	4.0	Children
6/18/1981	0.1	Children
5/28/1982	0.1	Campfire
7/21/1984	0.0	Miscellaneous
8/17/1988	0.1	Children
1/27/1990	0.1	Campfire
7/3/1993	0.1	Lightning
12/13/1993	0.1	Lightning
2/7/1996	4.0	Debris burning
2/16/1996	10.0	Debris burning
10/18/1997	0.5	Miscellaneous
6/30/2001	0.1	Lightning

3.4.5.10.3 FMU #10 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, wet pine savanna, palustrine and estuarine marsh, and palustrine and estuarine shrub. The primary NFDRS fuel models represented are D, L, N, and O. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.11 Fire Management Unit #11: Santa Rosa Unit

This FMU, located within the central portion of Santa Rosa Island, contains approximately 1,598 acres. Development within the unit includes 5 picnic clusters and a NPS office building/garage. The island is accessible by vehicle bridges and watercraft.

Cultural resources located within this FMU include various prehistoric sites, the Bomb Target complex, and a number of historic shipwrecks located in surrounding waters.

Seashore firefighters, with assistance as needed from the Escambia County Fire Services and the Navarre Beach fire department (as per memoranda of agreement), will perform initial attack on wildland fires within this FMU.

3.4.5.11.1 Fire Management Objectives for FMU #11

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.11.2 FMU #11 Fire History

Three documented wildland fires have occurred within this FMU, as follow:

<u>Date</u>	<u>Acres</u>	<u>Cause</u>
6/10/1976	1.0	Smoking
6/9/1979	30.0	Debris burning
1/22/2000	1.6	Miscellaneous

3.4.5.11.3 FMU #11 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of a mosaic of coastal grassland, live oak hammock, with small areas of palustrine and estuarine marsh. The primary NFDRS fuel models represented are L, N, and R. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.12 Fire Management Unit #12: Okaloosa Unit

This FMU, located on U.S. Highway 98 just east of Fort Walton Beach, contains approximately 19 acres. Development within the unit includes a picnic area with approximately 18 tables and a restroom, and one boat launch ramps. There are no recorded cultural resources located within the unit.

Seashore firefighters, with assistance as needed from the Okaloosa Island VFD (as per memorandum of agreement), will perform initial attack on wildland fires within this FMU.

3.4.5.12.1 Fire Management Objectives for FMU #12

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Maintain existing defensible space around seashore structures.

3.4.5.12.2 FMU #12 Fire History

No recorded wildland fires have occurred within this FMU.

3.4.5.12.3 FMU #12 Fuel Characteristics/Fire Behavior

Vegetation within the FMU consists of coastal grassland, with scattered pine trees. The primary NFDRS fuel model represented is L. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.6 Values to Protect, Manage, or at Risk

❖ Human health and safety: Firefighter and public safety is the highest priority in every fire management activity. In light of this:

- Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job) personnel will be assigned fire management duties (unless assigned as trainees, in which case they will be closely supervised by an individual fully qualified for the given position).
- No fire management operation will be initiated until all personnel involved have received a safety briefing describing known hazards and mitigating actions (LCES*), current fire season conditions, and current and predicted fire weather and behavior. Hazards specific to the seashore include:
 - Snags and dead trees with weak root systems.
 - Volatile fuels and unnaturally high fuels accumulations that preclude direct attack.
 - Stinging/biting insects, scorpions, ticks, and poisonous snakes.
 - Dehydration, heat exhaustion and heat stroke.
 - Boat transport.
- Wildland fire incident commanders and prescribed fire bosses will minimize firefighter exposure to heavy smoke by incorporating the recommendations outlined in the publication *Health Hazards of Smoke* (Sharkey 1997), available from the Missoula Technology and Development Center.
- Prescribed burning will not be conducted when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health. Federal, state, and local air quality standards will be the basis for this decision.
- Seashore neighbors, visitors and local residents will be notified of all planned and unplanned fire management events that have the potential to impact them.

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

- The GUIS superintendent or designee may, as a safety precaution, temporarily close parts of the seashore to the visiting public. In the case of prescribed fire, areas needing to be closed for visitor protection will be closed prior to the initiation of prescribed burning.
- Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during fire events at the seashore (see section 4.3.3).
- ❖ Property: To the greatest extent feasible and appropriate, seashore infrastructure, any other development, and adjacent non-agency land (including private residences) will be protected during all fire management activities.
- ❖ Natural and Cultural Resources: Natural and cultural resources will be protected from the adverse effects of unwanted fire as well as the adverse effects of fire management activities (see section 10.0). During all suppression activities, the minimum impact suppression tactics policy will be incorporated to the greatest extent feasible and appropriate, employing methods least damaging to seashore resources for the given situation (see section 4.2.7).
- ❖ Air and water quality: The seashore will comply with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements. Additionally:
 - The suppression response selected to manage a wildland fire will consider air quality standards.
 - Fire weather forecasts will be used to correlate prescribed fire ignitions with periods of optimal combustion and smoke dispersal. Any smoke situation that arises and threatens any smoke-sensitive areas will entail *immediate* suppression action.
 - During fire suppression, water or type A (biodegradable) foam will be used in lieu of fire retardant whenever possible. If retardant must be used, a non-fugitive type will be chosen, and bodies of water avoided.
 - Because prescribed fire will not be applied under extreme conditions, the probability of denuding the soil will be limited, thereby limiting the possibility of extreme erosion. (The primary threat to water quality is sediments and nutrients resulting from uncontrolled erosion.)

4.0 WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

4.1 General Implementation Procedures

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

4.2 Wildland Fire Suppression

RM-18 defines wildland fire suppression as “an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. [This may include confinement within natural or pre-existing boundaries.] All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources.”

4.2.1 Range of Potential Fire Behavior

Weather and fuels are the primary influences on fire behavior at GUIS. Due to the fairly level topography, fire behavior is not affected by slope or aspect. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

A number of the shrub species that occur at GUIS (e.g. palmetto, yaupon, gallberry, wax myrtle) have a waxy component that makes them very volatile. When live fuels reach a dormant stage, rainfall and periods of high humidity do not tend to retard fire behavior. In many cases a large percent of the shrub fuels will be available to a fire, and the potential for extreme and erratic fire behavior is high. There are areas where the shrub layer can reach 15-30 feet in height, and rapidly spreading fires with flames that torch into the pine canopy are possible. Short-range crowning and spotting ahead of the flaming front can cause serious safety problems for firefighters. Unnaturally high fuels accumulations in areas, coupled with a growing wildland urban interface, particularly along the boundaries of the Davis Bayou and Naval Live Oak units, increase the potential for a wildland fire resulting in property damage.

See Tables 2 and 3 for historic fire weather parameters for the GUIS fire season (Mississippi and Florida Districts, respectively), Tables 4 and 5 for potential fire behavior under average and extreme conditions (Mississippi and Florida Districts, respectively), and Table 7 for critical weather parameters resulting in the need for indirect attack within the given fuel type. See section 3.4.4.3 for park fuel characteristics and fire behavior.

4.2.2 Preparedness Actions

NPS policy requires that every unit with a fire management program incorporate preparedness considerations into its FMP (*RM-18*, chapter 7, provides guidelines). Preparedness involves planning and implementing activities prior to wildland fire ignitions to keep the unit in a state of fire-readiness. It includes routine actions completed prior to fire season as well as incremental actions conducted during fire season in response to increasing fire danger. The GUIS fire management officer (hereinafter referred to as the “seashore FMO”) is responsible for coordinating and completing preparedness tasks, and ensuring that the park has access to additional fire resources as needed. GUIS preparedness will include:

- ❖ Maintaining caches of supplies, materials, and equipment sufficient to meet normal fire year requirements. The FMO, or assigned District Rangers at the seashore will be responsible for maintaining fire cache inventories (see Appendix 13.06), and ensuring that all fire-related

equipment is maintained in good condition, properly identified, and ready for use. Qualified employees will be issued initial attack gear and personal protective equipment from the caches.

- ❖ Maintaining fully-qualified personnel commensurate with the normal fire year workload.
- ❖ Preparing a step-up plan based upon staffing classes derived from the National Fire Danger Rating System (see section 4.2.2.5).
- ❖ Maintaining fire records, weather data, maps and other associated information. The seashore FMO will enter GUIIS data, including daily situation reports during fire events, into the appropriate reporting system. Other system options will be utilized as appropriate to maintain data on employee qualifications, hazard fuels, FIREPRO, etc.
- ❖ Conducting an annual pre-season risk analysis.
- ❖ Maintaining detection and initial attack capabilities. Fire detection will be accomplished primarily by park field personnel, with additional input from visitors, cooperators and adjacent landowners. During staffing class levels of 4 or 5, the seashore FMO will assign fire patrols as per the GUIIS step-up staffing plan.
- ❖ Providing a dispatch system for mobilizing park wildland fire resources to local and out-of-area incidents. In order to facilitate rapid and efficient mobilization:
 - The seashore FMO will prepare a list of available firefighter-qualified personnel at the beginning of the fire season.
 - All firefighter-qualified personnel will be provided initial attack gear and personal protective equipment.
 - Response to fire will take priority over routine, scheduled work projects. Meeting seashore fire suppression needs will take priority over out-of-area assignments.
 - Personnel will receive specific travel, transportation and incident information at the time of mobilization.

Dispatch and mobilization guidelines and procedures are provided in the *National Interagency Mobilization Guide* and the *Southern Interagency Mobilization Guide*.

4.2.2.1 Fire Prevention Activities

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

- ❖ Education: Educating the public regarding the importance of wildland fire prevention can change people's behavior. In order to facilitate public awareness, understanding, and support, interpretive staff at the seashore will include fire prevention messages in interpretive programs and on seashore bulletin boards; campground supervisors and campground hosts will conduct face-to-face contacts with campers regarding fire safety and prevention; and district rangers will make contacts with neighboring landowners concerning fire prevention, structure protection, and fire management practices.
- ❖ Engineering: Engineering involves reducing or eliminating fire risks (ignition sources) and hazards (fuels). District rangers and maintenance staff will ensure that existing defensible space of 20 to 40 feet is maintained around all seashore buildings, and that hazard fuels breaks are created and/or maintained as appropriate along seashore boundaries.
- ❖ Enforcement: Enforcement involves activities that ensure compliance with fire regulations and ordinances (including public use and access restrictions during times of high fire danger). District rangers will ensure that any wildland fire at the seashore is investigated, both to determine the specific cause, and to gain information that can be applied to future prevention efforts. High-risk areas will be patrolled during periods of very high or extreme fire danger.

4.2.2.2 Annual Training Needs of Fire Staff

NPS policy requires administrators to ensure that their employees are trained, certified, and made available to participate in the wildland fire program locally, regionally, and nationally as circumstances demand. NPS fire management training meets criteria specified within the training curriculum approved by the National Wildland Coordination Group (NWCG), which is tiered to positions described in the NWCG *Wildland Fire Qualifications*, *Prescribed Fire Job Qualifications*, and *Incident Command System Wildland Fire Job Performance* guides. The seashore chief ranger will conduct annual training need analyses, and coordinate training courses as appropriate. Courses identified will be based upon employee needs (as reflected in individual employee development plans), park fire management needs, and regional priorities. Training will be conducted on an interagency basis to the greatest extent possible. All firefighter-qualified seashore staff will receive at least eight hours of annual safety refresher training (see section 8.1).

The seashore FMO will enter all pertinent employee data into IQCS (or the appropriate reporting system).

4.2.2.3 Annual Equipment and Supply Readiness Procedures

GUIS maintains caches of supplies and equipment sufficient to meet normal fire year requirements. The FMO, or designated District Ranger(s), will be responsible for maintaining fire cache inventories (see Appendix 13.06), and ensuring that all fire-related equipment is maintained in good condition, properly identified, and ready for use. Cache equipment will be inspected annually.

4.2.2.4 Fire Weather and Fire Danger

4.2.2.4.1 Weather Station

The park maintains a weather station (NFDRS 080202), located within the Naval Live Oaks unit. This station measures pertinent fire danger parameters, facilitating accurate fire predictions and safety for fire personnel.

4.2.2.4.2 National Fire Danger Rating System

The National Fire Danger Rating System (NFDRS) enables a land management unit to determine fire danger based upon an evaluation of the upper limit of predicted fire behavior. Calculations of fire behavior are based on fuels, topography and weather. NFDRS outputs give relative ratings of potential wildland fire growth and behavior, thereby allowing a unit to systematically correlate its readiness level to the predicted fire problems of the day. The seashore uses the burning index (the NPS standard) as its primary day-to-day indicator of the potential amount of effort needed to suppress a single fire in a particular fuel type within a given area, and the Keetch-Byram Drought Index as its primary drought indicator. Both of these indices influence decisions regarding prevention, initial attack, extended attack, and prescribed fire activities.

4.2.2.4.2.1 Burning Index

The burning index (BI) is a number on an open-ended scale, expressing the potential amount of effort needed to suppress a single fire in a particular fuel type within a given area. BI is based upon fuel model, fuel moisture, and current and forecasted weather parameters. As the BI increases, expected fire intensity increases. The higher the expected fire intensity, the more effort that will be necessary for fire suppression. Thus, BI directly influences the staffing class levels that are part of the seashore step-up staffing plan (see section 4.2.2.5).

4.2.2.4.2.2 Keetch-Byram Drought Index (KBDI)

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

4.2.2.5 Step-Up Staffing Plan

As previously stated, the seashore uses the burning index (BI) to indicate the potential amount of effort needed to suppress a single fire in a particular fuel type within a given area. This, in turn, determines the staffing class. Staffing class levels range from 1 to 5 (lowest to highest). As BI increases, the staffing class level increases, with corresponding actions intended to mitigate the predicted difficulty of containing a wildland fire.

Table 8, below, illustrates the correlation between BI and step-up staffing class levels and actions. Break points were established by Mississippi Sandhill Crane National Wildlife Refuge (MSCNWR) fire staff via a FireFamily Plus analysis, with weather inputs from the MSCNWR weather station (NFDRS 228202). Staffing classes 4 and 5 were calculated at the 90th and the 97th percentiles, respectively. (Conditions exceeding the staffing class 4 parameters should occur only 10% of the time, and conditions exceeding the staffing class 5 parameters should occur only 3% of the time.) NFDRS fuel model D was utilized for step-up staffing purposes.

The burning index/staffing class correlation should be validated based upon day-to-day observation and experience. As seashore managers have the opportunity to track indices influencing fire occurrence and size, the step-up staffing plan can be refined to better reflect large fire probability in the future.

Table 8: BI, Staffing Class Levels, and Step-Up Actions

Burning Index	Staffing Class	Step-Up Actions
0-21	1	Normal seashore operations. Currency of firefighter qualifications confirmed. Initial attack gear and personal protective equipment (PPE) maintained in state of readiness.
22-59	2	All staffing class 1 actions continue.
60-82	3	All staffing class 1 and 2 actions continue. Seashore staff maintains state of readiness for in-park mobilization. Current weather forecasts dispatched seashore-wide daily.
83-94	4	All staffing class 1, 2 and 3 actions continue. Seashore FMO requests a pre-suppression number from SERO FMO. All firefighter-qualified personnel keep initial attack gear and PPE readily available while on duty. Seashore FMO determines actions required, based on location, expected duration of fire danger, and availability of suppression resources, including the following possibilities: <ul style="list-style-type: none"> • Increased coverage in dispatch office. • Increased patrols of high fire risk areas. • Placement of personnel on standby at staging areas. • Supplementation of seashore personnel with outside incident management teams, firefighters, and equipment. • Aerial detection. • Close communication with adjacent suppression forces and DOF.
95+	5	All staffing class 1, 2, 3 and 4 actions continue. Increase shift lengths. Additional personnel placed on alert status (non-paid or paid standby). Additional personnel placed on patrol or made available for initial attack. Increased use of aerial detection. SERO FMO notified of possible need for additional resources and/or submission of resource order to Florida Interagency Coordination Center.

Seashore FMO has authority to raise the staffing class one level to account for increased risk of starts/increased suppression difficulty due to human activity, drought, additions to the fuel load, etc.

Expenditure of emergency preparedness funds at GUIs will be tied to the NFDRS Burning Index (BI) 90th percentile breakpoint and to the approval of pre-identified expenditures as identified within the above step-up staffing plan. Authorization to exceed the expenditures pre-identified

in the step-up staffing plan must be documented in writing and approved by the Southeast Regional Office (SERO) FMO. The seashore will request a preparedness account number from the SERO FMO and will add a memorandum to the files justifying each utilization of an emergency preparedness account. Wildland fire suppression funds are controlled by the SERO. A suppression account is obtained from the SERO FMO.

4.2.3 Pre-Attack Plan

At the beginning of each fire season, a pre-attack plan will be written containing the following information: phone numbers of firefighting personnel; lists of MOUs and interagency agreements; park base maps; descriptions of values at risk; and location of water sources, control lines, cultural resources, endangered species critical habitats, and sensitive plant populations. The pre-attack plan will be distributed to seashore district rangers and to the dispatch office.

4.2.4 Initial Attack

The district ranger for the given district at GUIIS will ensure that all fire reports are promptly investigated. Initial attack on a wildland fire is the primary responsibility of the on-scene incident commander (IC), with support from GUIIS staff. The IC will perform or designate an individual to complete a size-up report, containing the following information:

- ❖ Fire name
- ❖ Location
- ❖ Access
- ❖ Terrain and fuels
- ❖ Size of fire
- ❖ Anticipated control problems
- ❖ Values threatened
- ❖ Cause (if known)
- ❖ Weather (winds, humidity, temperature)
- ❖ Resources on fire (number and type)
- ❖ Additional resources needed
- ❖ Fire behavior

The district ranger or designee will assign a qualified employee to assume the role of dispatcher. The chief ranger and resource management specialist will be notified of any wildland fire as soon as possible. The cultural resource specialist will supply information on any cultural sites in the area.

The IC will relay size-up information, request personnel and equipment as needed, and supervise suppression actions. The IC will stay apprised of weather forecasts and predicted fire behavior, and will oversee fire operations until the fire is declared out or until relieved. The IC is responsible for completion of all fire documents, including a written fire report (DI-1202) submitted within five days after the fire is declared out.

Small fires will be controlled by the initial attack hand crew, if possible. Initial attack crews will include at least two persons with all required personal protective equipment. A radio and appropriate tools will be carried in all patrol vehicles. Additional equipment including fire engines, pumps, hoses, fuel, etc., may be provided by backup crews, if needed.

The point of origin will be established and protected so that an investigation can determine or confirm the cause of the fire. Any such area should be treated as a crime scene and left undisturbed. Details concerning vehicles observed while enroute to the fire should be noted, and that information given to the investigation officer. The IC may request a fire investigator on all suspected arson-caused fires. The cause of ignition for each fire will be properly reported, using the *NWCG Wildfire Cause Determination Handbook* as a guide. The chief ranger or designee will be responsible for wildland fire investigation and related law enforcement activities.

After the fire has been controlled, the IC or a designee will evaluate and map the fire. Fires will be patrolled until pronounced controlled by the IC. No fire will be left unattended until the IC is certain that the fire will not escape existing control lines. The district ranger will ensure that all controlled fires are checked by 11:00 a.m. on subsequent mornings until they are comfortable that the fire is completely out.

4.2.4.1 Information Used to Set Initial Attack Priorities

The goal in all initial attack actions is to suppress the fire in a safe, cost-effective manner, consistent with resource management objectives. Initial attack priorities at GUIS are tiered to firefighter and public safety (the highest priority in every fire management activity), and the degree of threat that the wildland fire poses to values at risk, which include seashore infrastructure/development, adjacent properties (including residential development), cultural sites, and threatened and endangered species habitat. Factors considered in assessing the degree of threat that the fire poses include the fire location, fuels involved or potentially involved, and current and predicted fire weather/fire behavior. When multiple fires are reported, fires occurring in the wildland-urban interface will take priority over fires occurring in natural areas.

4.2.4.2 Criteria for Appropriate Initial Attack Response

The appropriate initial attack response will be determined from an analysis of the given situation, and must be consistent with the seashore's general and resource management objectives. Factors dictating the appropriate response include firefighter and public safety, the degree of threat that the fire poses to values at risk, cost-effectiveness, and potential adverse effects of both the fire and suppression efforts.

The appropriate initial attack response will vary from fire to fire, and sometimes even along the perimeter of the same fire. Options range from monitoring with minimal on-the-ground disturbance to aggressive suppression actions along the entire fire perimeter. Table 9 provides an overview of possible situations and responses.

Table 9: Appropriate Initial Attack Response

Situation	Strategy	Tactics
<ul style="list-style-type: none"> Wildland fire which does not threaten life, property, or sensitive resources 	Restrict fire with determined boundaries established either prior to or during the fire.	Hold at natural or human-made barriers. Burn out. Observe and patrol.
<ul style="list-style-type: none"> Wildland fire on NPS property with low values to be protected Wildland fire entering NPS property Escaped prescribed fire entering another unit to be burned 	Take suppression action, as appropriate, which can reasonably be expected to check the spread of the fire under prevailing conditions.	Construct direct and/or indirect line. Use natural and human-made barriers. Burn out. Patrol and mop-up fire perimeter.
<ul style="list-style-type: none"> Wildland fire that threatens life, property, or sensitive resources Wildland fire on NPS property with high values to be protected Wildland fire with observed or forecasted extreme fire behavior 	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned possible.	Construct direct and/or indirect line. Use engine and water. Use aerial retardant. Burn out, use backfires. Mop-up part or all of the fire area.

4.2.4.3 Confinement as an Initial Attack Suppression Strategy

A confinement strategy may be implemented as the initial attack action as long as it is not used to meet resource objectives. Confinement is selected in lieu of wildland fire use to maximize firefighter safety, minimize suppression costs, minimize cost + loss in low-valued and commodity resource areas, and to maximize availability of critical suppression and management resources during periods of high fire danger associated with fire in highly-valued resource areas. Confinement may also be a strategic selection through the wildland fire situation analysis (WFSA) process when a fire is expected to exceed initial attack capability or planned management capability. When confinement is selected as the initial action, the same management process applies as for wildland fire use decisions. A long-term implementation plan is needed to guide the implementation of the confinement strategy. The wildland fire implementation plan (WFIP), prepared in stages, meets this requirement.

4.2.4.4 Typical Fire Response Time

The response time to a fire by initial attack hand crews or engines/pumpers will vary by FMU.

DB (FMU #1), CI (FMU#2), WS (FMU#3), ES (FMU#4), HI (FMU#5), PB (FMU#6), FB (FMU#7), NLO (FMU#8), PK (FMU#9), FP (FMU#10), SR (FMU# 11) O (FMU#12)

Response time to a fire within the Davis Bayou unit (FMU #1), Fort Barrancas (FMU#7), Naval Live Oaks (FMU #8), Perdido Key (FMU#9), Fort Pickens(FMU#10), Santa Rosa (FMU#11) and Okaloosa(FMU#12) should take between 15-25 minutes from the time the fire report is received. Response times to a fire on the MS islands, (FMU#2-FMU#6) will vary depending on weather and Mississippi Sound conditions, but will be on the order of hours for significant resources to arrive.

4.2.4.5 Restrictions and Special Concerns

The use of tractor/plow units, bulldozers, and other heavy equipment is prohibited, except in situations where private and government property are threatened and in life-threatening situations. The following constraints apply to suppression and fire management activities in the Gulf Island Wilderness (Horn and Petit Bois Islands):

- ❖ The use of pumps is permitted; otherwise, no mechanized equipment will be used except in life-threatening situations or with the approval of the superintendent.
- ❖ Whenever possible, seashore and/or district resource management specialists will be consulted prior to the use of foam/retardant.

4.2.4.6 Work/Rest Guidelines, Rest and Recuperation

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

4.2.5 Extended Attack and Large Fire Suppression

4.2.5.1 Determination of Extended Attack Needs

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

4.2.5.2 Implementation Plan Requirements—WFSA Development

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

4.2.5.3 Complexity Decision Process from Initial to Extended Attack

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

4.2.5.4 Incident Commander Delegation of Authority

Only the superintendent or designee is authorized to order an incident management team (IMT). When an IMT is mobilized to a seashore fire event, the GUIS FMO will prepare a briefing package for the IMT which includes incident documentation to date (e.g., detailed maps of the incident, fuels, fire complexity analysis), values at risk, aviation hazards, copies of current interagency fire management agreements, the current FMP, and a limited delegation of authority (see Appendix 13.8). The seashore superintendent or designee will conduct the eventual close-out and evaluation of the team.

4.2.6 Exceeding Existing WFIP, Selecting New Strategy

The existing wildland fire implementation plan (WFIP) is exceeded when a wildland fire escapes initial attack or when the appropriate management response has not been successful, or when a prescribed fire can no longer be implemented in accordance with the approved plan. The incident commander will initiate a wildland fire situation analysis (WFSAs), from which the most appropriate management strategy will be determined.

4.2.7 Minimum Impact Suppression Tactics

NPS policy requires fire managers and firefighters to select management tactics commensurate with a fire's existing or potential behavior, but which cause as little impact to natural and cultural resources as possible. All suppression activities at GUIS will therefore incorporate the minimum impact suppression tactics policy, to the greatest extent feasible and appropriate for the given situation. Examples of minimum impact suppression tactics that will be implemented include:

- ❖ Restricting the use of heavy equipment for constructing fireline. The use of tractor/plow units or bulldozers is prohibited, except in life-threatening situations or with the approval of the seashore superintendent.
- ❖ 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 and shallow as possible when it must be constructed.

- ❖ Avoiding ground disturbance within known natural (e.g. critical habitat) and archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations, it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- ❖ Using water or type A (biodegradable) foam in lieu of fire retardant whenever possible. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- ❖ Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.
- ❖ Minimizing cutting of trees.
- ❖ Scattering or removing debris as prescribed by the incident commander.
- ❖ Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

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

4.2.8 Rehabilitation Guidelines and Procedures

The minimum impact suppression tactics used at GUIS should reduce the need for rehabilitation. In some cases, however, fire or suppression impacts are unavoidable and will require rehabilitation. In no case will rehabilitation be taken which will worsen the situation.

Rehabilitative actions may include obliterating firelines, flush cutting stumps, removing cut logs, erosion control, and scattering brush piles and debris. Whenever possible, burned areas will be allowed to regenerate naturally.

Rehabilitation will begin as soon as possible, in some cases even before the fire is out, if existing equipment and personnel on the fireline are not being fully utilized in mop-up operations. Rehabilitation actions may be funded through emergency fire operations accounts. Requests for an emergency account number will be made to the Southeast Regional Office FMO and will include description of activity, cost, and starting and ending dates. Verbal requests must be followed up in writing.

4.2.9 Reporting and Documentation

Ultimate responsibility for the timely submission of pertinent reports and fiscal records regarding wildland fire management rests with the seashore superintendent. The suggested pattern for the delegation of this responsibility is as follows:

Table 10: Seashore Fire Management-Related Reporting and Documentation

Document	Frequency of Preparation or Revision	Responsibility
DI-1202 (NPS version)	Per incident	Incident Commander or Burn Boss
Computer entry of DI-1202	Per incident	FMO
Fire Situation Report	Daily input during high or extreme fire danger or upon occurrence of fire incident	FMO

ICS-209	Timber fire >100 acres Grass fire >300 acres	FMO
WFSA	As needed	Management
Notification of state coordination center	Per incident	FMO
Fire Atlas	As needed	FMO
Fire Danger	Daily throughout fire season	FMO
Fire Weather	Daily throughout fire season	FMO
FIREPRO submission	Annually	FMO
FMP review	Annually	FMO, District Rangers, Chief Ranger
FMP revision	Every five years	FMO, District Rangers, Chief Ranger
Prescribed Fire Plan	Per burn	Burn Boss, FMO
Fire Qualifications	Annually	FMO, Chief Ranger
Training Needs Analysis	Annual	FMO, District Rangers, Chief Ranger
Pre-Season Risk Analysis	Annual	FMO, District Rangers, Chief Ranger
Pre-Attack Plan	Annual	FMO, District Rangers, Chief Ranger

4.3 Prescribed Fire

As per the draft *Gulf Islands National Seashore Fire Effects Monitoring Plan*, fire is an important ecological process that contributes to the structure and composition of natural plant communities of GUIs. Historically, wildland fires occurred frequently on the landscape and were caused by lightning strikes that ignited fuels to burn across the landscape. The majority of the seashore is dominated by pine forest, which is one of the forest types in the southeastern U.S. that was naturally maintained by frequent, low-intensity fires. Many of the plant species associated with the pine forest (longleaf and slash) of GUIs are not killed by fire, but rather have characteristics that allow the plant to regenerate either vegetatively or reproductively following fire. In the presence of frequent fire, these pine forest areas develop into an open pine stand with little to no mid-story trees or shrubs present and a rich diverse layer of grasses and herbs in the understory. In the absence of fire, heavier fuels such as shrubs and small trees begin to invade these stands and can have a significant shading impact on native herbaceous vegetation in the understory in as little as three years, thus significantly reducing native plant diversity. As heavy fuels build up in fire excluded areas, the potential for higher intensity fire behavior increases.

The vegetation structure of these forests is strongly influenced by the season of burn. Frequent late spring and early summer fires (growing season burns) will reduce woody shrub and tree invasions into the forest. Further, less fire-tolerant, invasive plant species may be eliminated with frequent fire.

Not all plant communities on GUIs should be subjected to frequent burning, however. Natural plant communities such as scrub oak dunes, sand pine-scrub, scrub-shrub, live oak hammocks, cabbage palm hammocks, and maritime hammocks probably had less exposure to frequent fire due to the fuel structure in these communities, and probably only burned in extremely dry conditions. As such, many of the plant species in these communities are not fire-tolerant and are killed back after each fire. As part of the fire management program at GUIs, both frequency and season of burn are considered. Prescribed fire will serve primarily to promote ecosystem sustainability and reduce hazard fuels accumulations.

4.3.1 Planning and Documentation

Each prescribed fire will have an approved burn plan which includes measurable objectives, predetermined prescription parameters, operational procedures to properly prepare for and safely conduct the burn, and contingency actions in the event that the prescription is exceeded.

Prior to all GUIS prescribed fires, the seashore FMO will obtain a burning permit from the Mississippi Forestry Commission or the Florida Division of Forestry, depending upon the location of the burn. Nearby landowners and other interested parties, such as local law enforcement and fire departments, will be notified prior to and on the day of the planned ignition.

Go/no-go documents, one for GUIS superintendent approval and the other for the prescribed fire burn boss, will be completed and signed prior to executing a prescribed fire. The superintendent's go/no-go approval is the final management approval prior to ignition of the prescribed fire. It is valid for up to 30 days after the approved date; if ignition does not occur prior to expiration of the superintendent's approval, a new go/no-go approval document will be completed.

The prescribed fire operations go/no-go checklist is the final operational confirmation that all requirements of the prescribed fire plan have been met, and conditions are appropriate for initiation of the prescribed fire (i.e. do we commence with firing or not?). This checklist will be used as a daily validation until ignition is completed, and there are no existing or eminent threats to the fireline/project boundary.

4.3.1.1 Long-Term Prescribed Fire Strategy

See Appendix 13.10 for GUIS's five-year fuels treatment plan.

4.3.1.2 Personnel Requirements for Program Implementation

The seashore FMO will coordinate with cooperators to obtain qualified prescribed fire personnel, and will obtain any necessary regional and national clearance for use of such personnel. A certified prescribed fire burn boss is required to implement every prescribed fire at the seashore. The burn boss type (RXB1, RXB2) will be determined via the prescribed fire complexity rating process (see *RM-18*, chapter 10). The burn boss may be from another agency as long as s/he is qualified to burn in the fuel type of the proposed prescribed fire. The burn boss will use the complexity rating process to determine the minimum type, number and response time of holding resources. Prescribed fire crewmembers will each be minimally qualified at the type II firefighter level. Burn bosses and all other positions assigned to prescribed fires at the seashore will meet all national requirements for training and experience.

4.3.1.3 Prescribed Fire Monitoring

See section 6.3 for a discussion of monitoring.

4.3.1.4 Prescribed Fire Project Critiques

Immediately following a prescribed burn, the burn boss will conduct a review of the prescribed burn operation. The review will be attended by the overhead staff, crew members, chief ranger, district ranger, resource specialists, and seashore FMO. Topics to be covered include:

- ❖ Safety concerns and issues
- ❖ Accomplishment of objectives
- ❖ Fire effects
- ❖ Logistics
- ❖ Planning process
- ❖ Tactics and operations
- ❖ Ignition plan
- ❖ Holding plan
- ❖ Monitoring plan
- ❖ Predicted weather/behavior vs. actual weather/behavior
- ❖ Recommendations for future projects

4.3.1.5 Reporting and Documentation Requirements for Accomplishments and Escaped Fires

The burn boss on each prescribed fire will document such with the following information, stored individually in GUIS files:

- ❖ Original signed prescribed fire plan
- ❖ Checklist of pre-burn prescribed fire activities
- ❖ All reviewer comments
- ❖ All maps
- ❖ Notification checklist
- ❖ Permits (e.g. burn, smoke, etc.)
- ❖ Monitoring data
- ❖ Weather forecasts
- ❖ Agency administrator go/no-go pre-ignition approval
- ❖ Operational go/no-go checklist
- ❖ Incident action plan(s)
- ❖ Unit logs, daily validation, or other unit leader documentation
- ❖ Press releases, public comments, complaints
- ❖ Smoke dispersal information
- ❖ Post-fire critique
- ❖ Individual fire report (DI-1202), completed by the burn boss and submitted to the Southeast Regional Office FMO for entry into the appropriate reporting system within 10 working days after the fire has been declared out

4.3.1.6 Prescribed Fire Plan

An individual plan is required for every prescribed fire application. The seashore will use the prescribed fire plan format provided in *RM-18*, chapter 10, Exhibit 15.

4.3.2 Exceeding Existing Prescribed Fire Plan

If a prescribed fire can no longer be implemented in accordance with the approved plan, the entire prescribed fire area will be declared a wildland fire, and suppression action taken. All subsequent action (i.e. initial incident commander, operational needs, notifications, strategies, resource orders, etc.) will be defined under the wildland fire transition plan, included in the prescribed fire plan. The contingency plan should be tiered to the worst-case scenario, utilizing current fire behavior processing systems for the fuel types and conditions outside the burn block and adjacent to the project area. In the event that the contingency plan is unsuccessful, the incident commander will develop a WFSA (see section 4.2.5.2).

4.3.3 Air Quality and Smoke Management

The fire management program at GUIS will manage smoke in compliance with the Clean Air Act, and Mississippi and Florida State requirements, so as to minimize its effects on seashore visitors, firefighters, adjoining lands and neighbors, natural and cultural resources, and roads and highways. Smoke management will be incorporated into all GUIS fire management planning and operations. In regard to prescribed fire, the seashore will adhere to the following:

- ❖ Every prescribed fire plan will include smoke trajectory maps and identify smoke-sensitive areas.
- ❖ Mitigation measures will be defined in the prescribed fire plan and arrangements made prior to ignition to ensure that designated resources are available if needed to implement the mitigation measures.
- ❖ Prior to the implementation of prescribed fire, the seashore FMO will obtain a burning permit from the Mississippi Forestry Commission or the Florida Division of Forestry, depending upon the location of the burn. (Both agencies receive weather forecasts including information on mixing heights, transport wind speed, atmospheric stability, potential for fog, wind speed, and wind direction, and permits are issued by local fire towers based on these weather forecasts.)
- ❖ Fire weather forecasts will be used to correlate ignitions with periods of optimal combustion and smoke dispersal.
- ❖ Prescribed fire will not be implemented when mixing heights are less than 500 meters and/or transport winds are less than three meters/second.
- ❖ Prescribed fire will not be implemented when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health. (Federal and state air quality standards will be the basis for this decision.)
- ❖ Smoke production will be minimized through proper firing techniques.
- ❖ Any smoke situation that arises and threatens any smoke-sensitive areas will entail *immediate* suppression action.
- ❖ Local law enforcement, fire departments, and pertinent state agencies will be notified of all GUIS prescribed fire implementation.

Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during wildland and prescribed fire events at the seashore. The following procedures will

be taken to compensate for reduced visibility when a paved road is affected by smoke (the incident commander or prescribed fire boss on a particular event will determine visibility levels):

- ❖ Posting of "Smoke on Road" signs on either side of the affected area.
- ❖ Reducing the posted speed limit when visibility is strongly reduced, and escorting vehicles with a well-marked law enforcement vehicle as necessary.
- ❖ Closing the road to traffic when visibility is severely reduced. Coordinate any closure with local and state agencies.

4.4 Debris Burns

The seashore has historically used debris burns to dispose of wildland fuels, such as slash piles, generated from a variety of activities. As per *DO-18* (chapter 10, section VIII),

Fire may be used to dispose of wildland fuels generated from maintenance activities (such as grass or brush mowing or clippings), hazard tree removal, or during construction activities. These materials must be deemed infeasible or impractical to mechanically remove and must be in a non-wildland fuel environment (parking lot, boneyard, gravel pit, etc.). Generally, debris burning within coastal environments, including shoreline and beach areas will not be condoned. While in a storm recovery mode of operation, requests to burn organic materials within coastal areas will be reviewed on a case by case basis by the park's Fire Management Steering Committee.

If, after consultation with the fire management officer, it is determined that a debris disposal burn will meet all of the following conditions then it may be conducted within debris disposal guidelines.

1. Has virtually no chance to exceed the perimeter of the non-wildland environment.
2. Will not damage surrounding natural or cultural resources.
3. Does not present a safety threat to crew members.
4. Will not require curtailment during the burning operation.
5. Will not require a prescribed fire burn boss or fire-qualified personnel to implement.
6. Requires no follow-up monitoring to evaluate environmental impacts.

Otherwise, it will constitute a prescribed fire and must comply with all requirements for that type of activity.

For debris burns, all personnel will wear appropriate personal protective equipment. The supervisor of the burn will notify appropriate agencies (air quality, local fire departments, etc.) and neighbors and obtain all needed permits, and will develop an appropriate safety and evacuation plan in case of injuries or other emergencies. The crew should include someone who has previously conducted a similar burn at the site or a similar site.

4.5 Non-Fire Fuel Treatment Applications

Non-fire fuels treatment at GUIS will include general grounds-care operations such as mowing and weedeating open areas during the growing season; reducing hazard fuels accumulations and promoting ecosystem sustainability in areas where conditions preclude the safe implementation of prescribed fire; maintaining existing defensible space around seashore structures; maintaining existing firebreaks (including refurbishing existing holding lines around prescribed fire units

prior to burning them); and creating and/or maintaining hazard fuels breaks along sections of the seashore perimeter to help prevent the spread of fire to and from adjacent non-agency land. Reducing hazard fuels accumulations, Maintenance of existing defensible space, refurbishing existing holding lines, and treating units prior to prescribed burning, may involve mowing, weedeating, raking, chainsawing, or bush hogging.

Hazard fuels reduction along urban interfaces of the seashore Naval Live Oaks and Davis Bayou units bordering Reservation Road and Villa Venyce, Bayshore and Stark Bayou will be conducted in association with the Wildland Urban Interface Initiative. Hazard fuels accumulations will be mechanically reduced for 10-15 feet along these boundaries. Mechanically reducing (e.g. selective thinning with chainsaws, or the use of a gyro-trac) hazard fuels accumulations up to 3" DBH. Fuels considered to be "hazards" will primarily be dead and down timber, ladder fuels, and timber of less than 3 inches dbh (diameter at breast height). These fuels will be removed or chipped onsite.

4.5.1 Equipment and Seasonal Use Restrictions by FMU

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

4.5.2 Effects Monitoring

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

4.5.3 Project Critiques

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

4.5.4 Cost Accounting

Maintenance of open areas and existing defensible space should be funded by PMIS. Funding for the creation of defensible space and hazard fuels reduction is available through Wildland Urban Interface, Hazard Fuels (both distributed by the National Interagency Fire Center in Boise), and PMIS. The seashore FMO will ensure that expenditures are tracked in the appropriate accounting system.

4.5.5 Reporting and Documentation

The seashore FMO will document all non-fire applications at the seashore, and report accomplishments in NFPORS or the appropriate reporting system.

4.5.6 Annual Planned Project List

See Appendix 13.10 for GUIS's five-year fuels treatment plan.

4.6 Emergency Rehabilitation and Restoration

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

5.0 ORGANIZATIONAL AND BUDGETARY PARAMETERS

5.1 Fire Management Team Member Responsibilities

Each member of the seashore's fire management team has specific responsibilities and plays a specific role in the decision-making process, both during fire incidents and in year-round planning. Direction for the seashore-wide fire management team will be provided by a fire management steering committee, composed of the Superintendent, Chief of Science and Resources Management, Chief Ranger, Fire Management Officer, resource specialists, and the district rangers (as well as incident commanders and/or burn bosses during specific incidents).

The GUIS Superintendent is responsible for planning and directing all seashore activities and programs, and is ultimately responsible for any fire occurring within seashore boundaries. The superintendent has delegated all fire management responsibility to the chief of science and resource management.

The Chief of Science and Resource Management has overall responsibility for the planning and implementation of the seashore wildland and prescribed fire management programs, with the following specific duties:

- ❖ Heads the GUIS fire management steering committee.
- ❖ Appoints the GUIS fire management officer.
- ❖ Serves as the GUIS representative in cooperative relationships with outside agencies.
- ❖ Ensures that all human-caused fires at GUIS are investigated.
- ❖ Serves as the GUIS information officer during fire incidents.

The Fire Management Officer (FMO) oversees and coordinates the seashore's wildland fire management program, with the following specific duties:

- ❖ Serves on the GUIS fire management steering committee.
- ❖ Develops plans for meeting fire management objectives.
- ❖ Coordinates training and certification of GUIS firefighting personnel.

- ❖ Prepares funding proposals and manages the seashore's fire accounts.
- ❖ Approves and coordinates acquisitions of fire-related equipment and supplies.
- ❖ Manages the seashore's equipment cache.
- ❖ Maintain initial attack and reserve equipment caches for response to district wildland fires.
- ❖ Advises fire management steering committee and seashore dispatch on fire danger conditions.
- ❖ Appoint an incident commander for each wildland fire.
- ❖ Prepares and maintains fire records and reports.
- ❖ Plans and directs special fire management activities, including hazard fuel reduction projects, fire-related research, weather data collection and analysis, etc.
- ❖ Helps draft delegation of authority and serves as agency representative with incoming incident management teams.

Division chiefs are responsible for ensuring the availability of qualified personnel for training and certification as wildland firefighters, for adjusting schedules during fire season in order to allow for the availability of personnel for fire duty, and for providing equipment and personnel for all fire-related actions (including fireline construction, media relations, transportation, etc.).

Interpretive staff will inform and educate the public regarding GUIS fire management objectives and actions and will assist with the fire prevention program as directed by the Chief of Science and Resource Management.

Resource specialists will provide expertise to the FMO and GUIS fire management steering committee regarding the use of prescribed fire in the restoration and preservation of natural and cultural resources and in the protection of such resources from damage by fire. The resource management specialist will assist the FMO in drafting delegation of authority and in representing the agency with incoming incident management teams.

The FMO or designee(s) are responsible for the oversight and control of all wildland fire prevention, pre-suppression, and suppression activities within their respective districts. Each district ranger will:

- ❖ Serve on the GUIS fire management steering committee.
- ❖ Report all fires to the Chief of Science and Resource Management and FMO.
- ❖ Ensure that adequate firefighting personnel within the division are available to meet anticipated initial attack needs.
- ❖ Ensure that all fire reports and time sheets are submitted to the Chief of Science and Resource Management and FMO.

Designated incident commanders (ICs) are responsible for the safe and efficient management of assigned wildland fires. Personnel performing this function will hold the appropriate qualifications as determined by the complexity of the incident and as specified by the NWCG Wildland Fire Qualification Subsystem Guide. Each IC will:

- ❖ Determine the source of ignition and the location (FMU) of fire; determine and recommend appropriate action to the district ranger.

- ❖ Devise safe and effective management actions in concert with the objectives and strategies described in this FMP and in the FMU description; consult with resource specialists concerning natural and cultural resources management concerns and objectives.
- ❖ Maintain effective communications with seashore dispatch personnel and district ranger.
- ❖ Advise district ranger of needs for additional personnel, equipment, or overhead.
- ❖ Submit completed DI-1202 wildland fire report as well as other reports, time sheets, and monitoring data to the district ranger.
- ❖ Ensure the completion of post-fire clean up, equipment reconditioning, and fireline rehabilitation.
- ❖ Fulfill all other duties ascribed to the position.

Designated burn bosses are responsible for the safe and effective execution of prescribed fire plans. Personnel performing this function will hold the appropriate qualifications, as determined by the NWCG Prescribed Fire Complexity Rating System Guide (or an appropriate substitute) and as specified by the NWCG Wildland Fire Qualification Subsystem Guide (Part 2, Prescribed Fire). Each burn boss will:

- ❖ Manage all phases of prescribed fires until the fire is declared out.
- ❖ Coordinate with resource management specialists to review the prescribed fire plan and make adjustments, as necessary.
- ❖ Provide daily reports to management on the status of the fire for inclusion in situation reports.
- ❖ Ensure that prescribed fires are conducted in accordance with national, regional, and seashore policies.
- ❖ Work with assisting staff to prepare units for burning.
- ❖ Apply daily decision criteria and validate the prescribed fire's fulfillment of seashore objectives.

Communications personnel are responsible for disseminating fire danger warnings and information during periods of very high and extreme fire danger, as directed by the FMO. During fire suppression activities, they will:

- ❖ Log all radio and telephone traffic pertaining to fires, and strive to maintain effective communications between members of the seashore's fire management team.
- ❖ Maintain a current roster of seashore fire personnel including names, qualifications, social security numbers, and home phone numbers.

Firefighting personnel are responsible for maintaining an active state of readiness for the performance of fire suppression duties. Additional responsibilities include:

- ❖ Maintaining assigned fire equipment and personal protective equipment in a ready state.
- ❖ Assisting the FMO in maintaining accurate fire personnel records.

5.2 FIREPRO Funding

FIREPRO funds are separate from the ONPS appropriation, and must be utilized for fire-dedicated functions. Base funding needs are calculated each year through the FIREPRO funding analysis. All positions base-funded by FIREPRO will remain dedicated to wildland fire management, with at least 80% of their normal tour-of-duty spent on wildland fire activities. FIREPRO provides funding for fire planning and oversight functions, budgeted activities necessary to prepare for the normal fire year (defined as the third highest occurrence year in the past 10 years of record), and for the development and implementation of the wildland fire suppression, emergency rehabilitation, and hazard fuels reduction programs. FIREPRO-funded fire management program elements include (see chapter 18 of *RM-18* for element details):

- ❖ Preparedness
- ❖ Prescribed fire management
- ❖ Wildland fire management
- ❖ National resource crews
- ❖ Step-up plans
- ❖ Severity
- ❖ Emergency rehabilitation
- ❖ Hazard fuels reduction operations

5.3 Interagency Coordination

The seashore coordinates fire management activities with the U.S. Fish and Wildlife Service, Big Lagoon State Park (FL), the Mississippi Forestry Commission, the Florida Division of Forestry, and area fire departments (see chapter 5 of *RM-18* for authority and guidelines regarding interagency coordination).

5.4 Interagency Contacts

Mississippi District

- | | |
|-----------------------------------|-----------------------|
| ❖ Ocean Springs VFD | 911 or (228) 875-4063 |
| ❖ Mississippi Sandhill Crane NWR | (228) 497-6322 |
| ❖ Mississippi Forestry Commission | (228) 497-1393 |

Florida District

- | | |
|----------------------------------|-----------------------|
| ❖ Pensacola Beach FD | 911 or (850) 932-3131 |
| ❖ Navarre Beach FD | 911 or (850) 939-2448 |
| ❖ Gulf Breeze FD | 911 or (850) 934-5133 |
| ❖ Midway FD | 911 or (850) 932-4771 |
| ❖ Okaloosa Island VFD | 911 or (850) 244-5373 |
| ❖ Innerarity Point VFD | 911 or (850) 492-0544 |
| ❖ Pensacola Naval Air Station FD | (850) 452-3333 |
| ❖ FL Division of Forestry | (850) 957-6145 |

5.5 Fire-Related Agreements

Six memoranda of agreements (MOAs) pertaining to wildland fire suppression currently exist between the seashore and area fire departments, as follow:

- ❖ MOA G5320080057: Escambia County Fire Department
- ❖ MOA 5320-3-9029: Gulf Breeze Fire Department, FL, (provides personnel and equipment required for wildland and structural fire suppression within the Naval Live Oaks unit)
- ❖ MOA 5320-2-9014: Navarre Beach Fire Department
- ❖ MOA 5320-4-9033: Big Lagoon State Park, FL
- ❖ MOA 5320-4-9038: Ocean Springs FD, MS (provides personnel and equipment required for wildland and structural fire suppression within the Davis Bayou unit)
- ❖ MOA 5321-3-9020: Okaloosa Island VFD, FL (provides personnel and equipment required for wildland and structural fire suppression within the Okaloosa unit)
- ❖ MOA xxx-x-xxx: Pensacola Naval Air Station FD (provides personnel and equipment required for wildland and structural fire suppression within the Fort Barrancas unit)

Appendix 13.07 provides copies of these MOAs.

6.0 MONITORING

6.1 NPS Fire Monitoring Handbook

The NPS has established a well-defined set of monitoring protocols and recommended standards that are useful in the development of a monitoring program. These guidelines and methods are presented in the *NPS Fire Monitoring Handbook* (USDI NPS 2001). The fire effects monitoring program established at GUIS follows the guidelines and recommendations described in the *NPS Fire Monitoring Handbook* with some modifications.

6.2 Recommended Standard Monitoring Levels

FMH 2001 provides recommended standards, divided into four monitoring levels, which constitute the lowest level of fire monitoring to be conducted by NPS units. Table 11 illustrates how these monitoring levels correspond to the given management strategy.

Table 11: Management Strategies and Recommended Standard (RS) Monitoring Levels

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

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

6.3 Wildland and Prescribed Fire Monitoring

Environmental monitoring provides a basic level of data that can be collected before a burn event and may consist of basic environmental monitoring data already being taken in a park. Examples of environmental monitoring include weather, fire danger rating, fuel conditions, resource availability, protection structures and values, historical and archeological data, as well as other biological, geographical, geological and social data. Fire observation monitoring provides a physical description of a fire event. Data collected for fire observation monitoring include fire cause, ignition point, fire location and size, logistical information, fuels and vegetation descriptions, current and predicted fire behavior, fire spread potential, current and forecasted weather events, resource threats, safety concerns, smoke volume and movement measures.

Short- and long-term levels of monitoring require more detailed descriptive measures of fuel and vegetation changes in response to management actions within specific monitoring types, that provide a quantitative assessment of whether a management objective was met. While both short- and long-term monitoring may use similar measurement protocols, they differ in timing and emphasis. Short-term monitoring can be effective in management programs with short-term objectives but may be extended to long-term monitoring if trends or longer-term response changes are of interest. Both short- and long-term monitoring are required for a prescribed fire program.

The objective of the monitoring program at GUIS is to characterize the effects of management treatments such as prescribed burning and mechanical treatment on changes in species composition and structure of selected plant communities within the seashore. This information will be provided to fire and resource managers to assess the effectiveness of the management treatment and desired outcomes and consequences of treatments. The *Gulf Islands National Seashore Fire Effects Monitoring Plan*, currently in draft form, will be included as Appendix 13.11 upon its completion.

7.0 FIRE RESEARCH

In some locations within GUIS, present conditions warrant the immediate use of prescribed fire and/or mechanical fuel reduction (e.g., portions of the Davis Bayou and Naval Live Oaks FMUs, where the past exclusion of fire is clearly threatening the viability of certain habitats and the safety of adjacent residential property). In other areas, fire management objectives will require ongoing refinement and will necessitate the following forms of research:

- ❖ Validation of, and if necessary, refinement of specific fuel models being used to represent plant communities at GUIS. Such models could then be used with the BEHAVE program to refine prescriptions and develop more accurate fire behavior projections.
- ❖ Clarification of the historic range of variability of the seashore's natural communities. In some instances the seashore will eventually need to choose between the restoration of pre-settlement conditions and the restoration of culturally and/or historically significant

conditions (e.g., the pre-settlement vs. historical occurrence of live oaks within the Naval Live Oaks unit).

- ❖ Clarification of fire behavior. Data collected from wildland fires and from initial, relatively simple prescribed fires will be critical to the ongoing refinement of the seashore's future planning and implementation of more complex prescribed fires.
- ❖ Analysis of long-term fire effects on species. Multi-year post-fire monitoring will also be critical to the refinement of the seashore's future planning and implementation of prescribed fire.

8.0 FIREFIGHTER AND PUBLIC SAFETY

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

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

NPS wildland fire training, qualification, and certification system meets or exceeds all National Wildfire Coordinating Group (NWCG) standards. Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job) personnel will be assigned fire management duties (unless assigned as trainees, in which case they will be closely supervised by an individual fully qualified for the given position). All personnel (including emergency hire firefighters) engaged in fireline operations must have completed a minimum of 32 hours of basic wildland fire training, including the modules on basic firefighting, basic fire behavior, and standards for survival*. The seashore FMO will coordinate at least eight hours of mandatory annual safety refresher training for all GUIS staff likely to be on the fireline.

Refresher training will concentrate on local conditions and factors, the 10 Standard Fire Orders, 18 Watch Out Situations, LCES (Lookouts, Communication, Escape Routes, Safety Zones), and common denominators of tragedies and near-miss situations. NWCG courses such as Standards for Survival, Lessons Learned, and Look Up, Look Down, Look Around, meet the firefighter safety refresher training requirement. Hands-on fire shelter inspection and deployment practice *will* be included as part of the annual refresher. Efforts should be made to vary the training from one year to the next. It can be presented in an eight-hour block or in increments. The seashore FMO will document completed training for each firefighter and submit this information to the SERO FMO for entry into IQCS (or the appropriate reporting system).

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

* Exceptions to this are area fire departments, whose members adhere to state-determined standards during the first operational period of a wildland fire (beyond that, they must adhere to NWCG standards).

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

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

Prior to and throughout all fire management field operations at the seashore, fireline supervisors will cover safety factors with incident personnel, via operational briefings beforehand, and safety briefings that occur during the incident. At least one person, operationally qualified at a level corresponding to the complexity of the given incident, should be assigned responsibility for safety oversight. Fireline supervisors will designate lookouts, and all operational personnel will maintain open lines of communication, and know where escape routes and safety zones are located at all times. No NPS employee, contractor or cooperator will ever be intentionally exposed to life-threatening conditions (see *RM-18*, chapter 3, for further safety-related planning and operational guidelines).

NPS policy requires that all personnel (including emergency firefighters) engaged in suppression and prescribed fire duties meet the physical fitness standards set by the NWCG. Physical fitness/work capacity levels for wildland firefighters and other fire-qualified employees will be determined by the "pack test" series of tests. Descriptions of the three work capacity levels (light, moderate and arduous), as well as medical and physical fitness requirements and procedures are outlined in the NWCG *Wildland Fire Qualifications Subsystem Guide*. The seashore FMO will annually administer (or coordinate the administration of) the pack test to GUIS fire management personnel, and maintain up-to-date records of employee qualifications.

8.2 Public Safety Issues/Concerns, and Mitigation Procedures

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

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

Every prescribed fire plan will outline safety measures. Actions will be taken as needed to ensure public safety, including contacting GUIS neighbors with as much advance notice as possible for them to properly prepare for the event, posting signs at the seashore alerting visitors of the planned event, ensuring that areas to be ignited are cleared of all visitors prior to ignition, closing portions of the seashore as appropriate, and posting "Smoke on Road" signs and managing traffic flow as needed.

9.0 PUBLIC INFORMATION AND EDUCATION

The following steps will be taken to facilitate public awareness of GUIS fire management policies, objectives, and actions:

- ❖ The resource management and interpretive divisions will work together closely to effectively interpret the fire management program.
- ❖ The ecological bases of the FMP will be incorporated into seashore brochures, wayside exhibits, and bulletin boards.
- ❖ The fire management program will be featured in interpretive walks, talks, slide shows, and off-site programs.
- ❖ The public will be notified of wildland and prescribed fires through press releases and general interpretive presentations.
- ❖ During ongoing fires, press releases will be written and issued through the Office of the Superintendent in a timely fashion to local media.
- ❖ Whenever prescribed fires will be visible to viewers, handouts will be prepared and disseminated. These will explain the benefits of carefully controlled fire and the seashore's fire management program. Interpreters may be stationed near ongoing fires to answer questions. Local media may be periodically invited to observe prescribed fires.
- ❖ GUIS staff will be educated about the fire management program and the status of ongoing fires.

10.0 PROTECTION OF SENSITIVE RESOURCES

10.1 Archeological/Cultural/Historic Resources

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

- ❖ The seashore cultural resources program manager will continue coordination with the Southeast Archeological Center to ensure that GUIS has the most current data regarding archeological resources within its boundaries. S/he will provide recommendations on how to mitigate adverse effects to these resources during fire management activities, and will coordinate compliance with Section 106 of the National Historic Preservation Act, as appropriate.
- ❖ Historic structures will be protected from wildland fire via the maintenance of existing defensible space around each.

- ❖ During all fire management activities, the minimum impact tactics policy (see section 4.2.7) will be incorporated to the greatest extent feasible and appropriate for the given situation. Tactics directly or indirectly facilitating the protection of archeological/cultural/historic resources include:
 - Restricting the use of heavy equipment for constructing fireline. The use of tractor/plow units or bulldozers is prohibited, except in life-threatening situations or with the approval of the seashore superintendent.
 - 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 and shallow as possible when it must be constructed.
 - Avoiding ground disturbance within known archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations, it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
 - Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.

In conjunction with the SERO fire management staff, the Southeast Archeological Center is developing a matrix for cultural resources in the Southeast Region. This matrix will identify values and risks typically associated with different types of archeological sites found in the Southeast, and will provide guidance as to how different fire management activities can be tailored to minimize or mitigate any deleterious effects to the resources potentially at risk.

10.2 Natural Resources

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

- ❖ Avoiding ground disturbance within known natural resource (e.g. critical habitat) locations. When fireline construction is necessary in proximity to these resource locations it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- ❖ Using water or type A (biodegradable) foam in lieu of fire retardant whenever possible. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- ❖ Minimizing cutting of trees.
- ❖ Scattering or removing debris as prescribed by the incident commander.
- ❖ Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

Wilderness values will be protected during fire management activities by adhering to the objectives and guidance provided by the seashore's 2004 Wilderness Management Plan.

Minimum impact suppression tactics will be used in managing all fires that occur in the wilderness, and all fire management activities will be evaluated using the decision process displayed on the flow chart found in Appendix 13.9. The seashore superintendent will approve final management decisions.

The seashore natural resources management staff will continue coordination with the U.S. Fish and Wildlife Service to ensure that GUIS has the most current data regarding identified sensitive, proposed, and listed species, as well as any proposed or designated critical habitat areas within monument boundaries. S/he will provide recommendations on how to mitigate adverse effects to these resources during fire management activities, and will coordinate compliance with Section 7 of the Endangered Species Act, as appropriate.

10.3 Development/Infrastructure/Inholdings

Development at the seashore is described by fire management unit, in section 3.4.5. All seashore structures will be protected from wildland fire via the maintenance of existing defensible defensible space around each.

In 2002, The Trust for Public Land purchased approximately 1,000 acres from the Boddie family and transferred that acreage to the NPS for inclusion in the seashore. Over the next several years, the NPS expects to acquire the remaining sections of the island, with the exception of 150 acres, which will remain in private ownership and retained in perpetuity. There is no development located on those portions of Cat Island presently owned by the NPS, nor are there any recorded cultural resources.

There are several privately owned interests on Horn Island. These interests are difficult to identify on the ground because the island has been over washed in several hurricanes and because the island has moved and changed shape. Private land ownership on Horn Island is complicated by poor definition of property lines and by partial ownership; some lots are partially owned by the holder of title and the United States. With this complexity it is necessary to establish clarity of title, and location of corners and property lines.

11.0 FIRE CRITIQUES AND ANNUAL PLAN REVIEW

11.1 Critiques

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

For incidents lasting no more than one burning period, a critique will occur as quickly as practical upon completion of control and mop-up, and will involve as many personnel who

participated in the incident as possible. Any special concerns or problems identified during the critique will be relayed to the district ranger by the designated incident commander or burn boss.

For incidents lasting longer than one burning period, a critique will be conducted by the Chief of Science and Resource Management, resource management specialists, and others with special knowledge or interest in fire management. Their goal will be to determine the effectiveness of GUIIS's fire management program.

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

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

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

11.2 Annual Plan Review

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

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

12.0 CONSULTATION AND COORDINATION

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

- ❖ Michelle Fidler, Fire Education Prevention and Information Specialist, NPS Southeast Regional Office
- ❖ Dean Gettinger, Fire GIS Specialist, NPS Southeast Regional Office
- ❖ Sue Grace, Regional Fire Ecologist, U.S. Fish and Wildlife Service

- ❖ Gary Hopkins, Biologist, GUIIS
- ❖ Gary Jarvis, Fire Management Officer, National Forests in Mississippi
- ❖ Lisa McInnis, Fire Ecologist, Natchez Trace Parkway
- ❖ Mark Nicholas, Biologist/Fire Management Officer, GUIIS
- ❖ Clay Jordan, Chief Ranger, GUIIS
- ❖ Nina Kelson, Deputy Superintendent, GUIIS
- ❖ Rick Clark, Chief of Science and Resource Management, GUIIS
- ❖ Riley Hoggard, Natural Resource Management Specialist, GUIIS
- ❖ Caroline Noble, Fire Ecologist, NPS Southeast Regional Office
- ❖ Tony Wilder, Fire Management Officer, Mississippi Sandhill Crane NWR

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Appendix 13.01 References Consulted or Cited

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Appendix 13.02 Definitions of Terms, as they Pertain to Fire Management

BEHAVE: A system of interactive computer programs used for formulating fuel models and determining fire behavior.

Burning period: A 24-hour period ending at 10:00 am.

Chain: A unit of measurement equaling 66 feet; commonly used to report fire perimeters and rates of spread.

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

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

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

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

Fire Behavior Prediction System (FPBS): A system of computer models used to estimate fire behavior for various fuel types.

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

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

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

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

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

- ❖ 1 - hour time lag - $< \frac{1}{4}$ " diameter (grass, litter, duff)
- ❖ 10 - hour time lag - $\frac{1}{4}$ " to 1" diameter (twigs, small stems)
- ❖ 100 - hour time lag - 1" to 3" diameter (branches)
- ❖ 1000 - hour time lag - > 3 " diameter (large branches and stems)

Fuel loading: Amount of dead and live fuel present on a particular site at a given time.

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

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

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

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

IQCS: Incident Qualifications and Certification System

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

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

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

Mixing height: Height a column of smoke will rise in the atmosphere before dissipating.

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

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

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

Prescription: The acceptable ranges of fire behavior, weather, fuel moisture content, and/or other variables with respect to the use of prescribed fire.

Rate of spread: The relative activity of a fire extending its horizontal dimensions, expressed as rate of perimeter growth, rate of increase in area, or rate of advance of its flaming front. Generally measured in chains per hour.

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

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

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

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

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

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

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

Appendix 13.03 Seashore Species Lists

Website <http://www.nps.gov/guis/extended/site%20bulletins/Animal.pdf> provides a checklist for mammals, reptiles, and amphibians observed on the offshore islands, the mainland, and in the waters of the Florida District of GUIS. As per the checklist, the following mammals, reptiles and amphibians occur at the seashore.

Common Name	Scientific Name	Abundance	Habitat
Mammals			
Virginia opossum	<i>Didelphis virginiana</i>	C	I, M
Eastern mole	<i>Scalopus aquaticus</i>	C	M
Little brown myotis (bat)	<i>Myotis lucifugus</i>	C	M
Nine-banded armadillo	<i>Dasypus novemcinctus</i>	C	I, M
Eastern cottontail (rabbit)	<i>Sylvilagus floridanus</i>	U	I, M
American beaver	<i>Castor canadensis</i>	R	M
House mouse	<i>Mus musculus</i>	U	I, M
Eastern woodrat	<i>Neotoma floridana</i>	C	M
Marsh rice rat	<i>Oryzomys palustris</i>	U	M
Cotton mouse	<i>Peromyscus gossypinus</i>	U	M
Santa Rosa beach mouse	<i>Peromyscus polionotus leucocephalus</i>	U	I
Perdido Key beach mouse	<i>P. polionotus trissyllepsis</i>	R	I
Black rat	<i>Rattus rattus</i>	U	I, M
Eastern gray squirrel	<i>Sciurus carolinensis</i>	C	I, M
Hispid cotton rat	<i>Sigmodon hispidus</i>	C	I
Coyote	<i>Canis latrans</i>	R	M
Common gray fox	<i>Urocyon cinereoargenteus</i>	U	I, M
Red fox	<i>Vulpes vulpes</i>	U	I, M
Black bear	<i>Ursus americanus</i>	R	I, M
Common raccoon	<i>Procyon lotor</i>	C	I, M
Striped skunk	<i>Mephitis mephitis</i>	C	I, M
Northern river otter	<i>Lutra canadensis</i>	U	I
Manatee	<i>Trichechus manatus</i>	R	A
Bottle-nosed dolphin	<i>Tursiops truncatus</i>	C	A
Reptiles			
Loggerhead sea turtle	<i>Caretta caretta</i>	C	I, A
Green sea turtle	<i>Chelonia mydas</i>	U	I, A
Snapping turtle	<i>Chelydra serpentina</i>	C	I, M
Leatherback sea turtle	<i>Dermochelys coriacea</i>	R	I, A
Gopher tortoise	<i>Gopherus polyphemus</i>	R	M
Eastern mud turtle	<i>Kinosternon subrubrum</i>	C	I
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	R	I, A
Common cooter	<i>Pseudemys floridana</i>	C	I, M
Eastern box turtle	<i>Terrapene carolina</i>	U	I
Slider	<i>Trachemys scripta</i>	C	I, M
American alligator	<i>Alligator mississippiensis</i>	R	I, M
Green anole	<i>Anolis carolinensis</i>	C	I, M
Six-lined racerunner	<i>Cnemidophorus sexlineatus</i>	C	I, M
Mole skink	<i>Eumeces laticeps</i>	C	I, M
Broadhead skink	<i>Eumeces laticeps</i>	C	I, M
Eastern glass lizard	<i>Ophisaurus ventralis</i>	C	I, M
Common Name	Scientific Name	Abundance	Habitat

Reptiles, continued			
Southern fence lizard	<i>Sceloporus undulatus undulatus</i>	C	M
Ground skink	<i>Scincella lateralis</i>	C	I, M
Cottonmouth	<i>Agkistrodon piscivorus</i>	C	I, M
Scarlet snake	<i>Cemophora coccinea</i>	R	I
Southern black racer	<i>Coluber constrictor constrictor</i>	C	I, M
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	C	I, M
Corn snake	<i>Elaphe guttata guttata</i>	C	I, M
Southern hognose snake	<i>Heterodon simus</i>	C	M
Coachwhip	<i>Masticophis flagellum flagellum</i>	C	I, M
Eastern coral snake	<i>Micrurus fulvius fulvius</i>	C	M
Plainbelly water snake	<i>Nerodia erythrogaster flavigaster</i>	U	M
Southern water snake	<i>Nerodia fasciata</i>	C	I, M
Banded water snake	<i>Nerodia fasciata fasciata</i>	U	I, M
Florida green water snake	<i>Nerodia floridana</i>	U	M
Brown water snake	<i>Nerodia taxispilota</i>	C	M
Rough green snake	<i>Ophedrys aestivus</i>	C	M
Pigmy rattlesnake	<i>Sistrurus miliarius</i>	C	M
Redbelly snake	<i>Storeria occipitomaculata</i>	R	M
Southeastern crowned snake	<i>Tantilla coronata</i>	R	M
Eastern ribbon snake	<i>Thamnophis sauritus sauritus</i>	C	I, M
Common garter snake	<i>Thamnophis sirtalis</i>	C	M
Amphibians			
Southern cricket frog	<i>Acris gryllus</i>	C	I, M
Green treefrog	<i>Hyla cinerea</i>	C	I, M
Pine woods treefrog	<i>Hyla femoralis</i>	C	I, M
Barking treefrog	<i>Hyla femoralis</i>	C	M
Squirrel treefrog	<i>Hyla squirella</i>	C	I, M
Ornate chorus frog	<i>Pseudacris ornata</i>	C	M
Pig frog	<i>Rana grylio</i>	C	I, M
Southern leopard frog	<i>Rana utricularia</i>	C	I, M
Two-toed amphiuma	<i>Amphiuma means</i>	C	M
Eastern newt	<i>Notophthalmus viridescens</i>	C	M
Slimy salamander	<i>Plethodon glutinosus</i>	C	M
Oak toad	<i>Bufo quercicus</i>	C	M
Southern toad	<i>Bufo terrestris</i>	C	M
Eastern narrowmouth toad	<i>Gastrophryne carolinensis</i>	C	I, M

Key: In regard to abundance, C = common, U = uncommon, R = rare. In regard to habitat, I = island, M = mainland, A = aquatic.

Appendix 13.04 NEPA Compliance

Appendix 13.05 Fire Call-Up List

Emergency numbers for reporting fires:

Mississippi District (Ocean Springs Police Dept)	(228) 875-2211
Florida District Dispatch (Gulf Breeze PD)	(850) 916-3010

Phone numbers and fire qualifications for GUIS personnel:

Florida District

Mark Nicholas	ENGB	(850) 934-2619 232-3619©
Terry Morris	ENGB	934-2651
Mike Aymond	FFT2	393-8036
Larry Bova	FFT2	232-3650
Melissa Lanshe	FFT2	232-8749

Mississippi District

Ralph Borries	FFT2	(228) 323-1290
Andrew Robinson	FFT2	(850) 469-9611
Ernest Echholes	FFT2	(228) 323-5356
Gary Hopkins	FFT2	348-1062
Robert Harris	FFT2	323-1293
Ben Moore	FFT2	323-5350

Cooperating Agencies:

Florida District

Pensacola Beach FD	911 or (850) 932-3131
Navarre Beach FD	911 or 939-2448
Gulf Breeze FD	911 or 934-5133
Midway FD	911 or 932-4771
Okaloosa Island VFD	911 or 243-8721
Innerarity Point VFD	911 or 492-0544
Pensacola NAS Fire Dept.	452-3333
FL Division of Forestry	957-6145

Mississippi District

Ocean Springs FD	911 or 228 875-4063
Mississippi Sandhill Crane NWR	(601) 497-6322
Mississippi Forestry Commission	1800 240 5161 228 497-1393

Appendix 13.06 Preparedness Inventory

Fire Cache Inventory

Naval Live Oaks Fire Cache		
Tools and Equipment	Protective Gear	Miscellaneous Equipment
6 fire shovels 6 fire rakes 4 pulaskis 8 squad boss combis 4 flappers 2 double-bit axes 2 brush hooks 2 Sandvicks 4 backpack pumps 1 crow bar 1 bow saw tool file 10 rolls of 1.5" hose 8 rolls of 1 " hose 8 1.5" Y valves 4 1" Y valves Various reducers 5 1" nozzles 2 - 1.5" nozzles	15 hard hat 15 head lamp 30 goggles 15 nomex pants 30 nomex shirt 12 gloves 6 fire shelter 10 first aid kits 5 sleeping bag 1 box ear plugs	1 mop-up kit 2 drip torches 1 belt weather kit 1 cases fusees 1 cases MREs 1 case D batteries 1 case AA batteries 3 chain saw kits 2 power trimmers 1 300 gallon trailer-mounted slip-on pumper unit 1 200 gallon slip-on
Davis Bayou Fire Cache		
Tools and Equipment	Protective Gear	Miscellaneous Equipment
5 fire shovels 5 fire rakes 5 pulaskis 5 flappers 5 McCleod rakes 3 brush hooks 3 felling axes 1 Sandvick 5 backpack pumps 1 crow bar 1 machete 1 bow saw 20 - rolls of 1.5" hose	hard hat head lamp goggles nomex pants nomex shirt gloves (2 pair) fire shelter first aid kit tool file sleeping bag ear plugs	2 drip torches 1 belt weather kit 2 cases fusees 2 cases MREs 1 case D batteries 1 case AA batteries 1 chain saw kit 1 tool sharpening kit

12 - rolls of 1" hose 16 - 1.5" Y valves 4 - 1" Y valves 16 – reducers (various) 11- 1" nozzles 5 - 1.5" nozzles		
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Appendix 13.07 Memoranda of Understanding

Appendix 13.08 Limited Delegation of Authority

Gulf Islands National Seashore

Limited Delegation of Authority

_____, Incident Commander
(Name)

As Superintendent of Gulf Islands National Seashore, I have the ultimate responsibility for protection of the seashore's resources and the lives of seashore visitors and employees. Your expertise in the area of fire management will assist me in fulfilling that responsibility during the present emergency. By means of this memorandum on this ____ day of _____ at _____ hours, I am delegating to you the authority to carry out the task of suppressing the _____ Fire (Fire No. ____) in accordance with the attached Line Officer's Briefing Package.

The package will provide you with my priorities in fire suppression, specific restraints which are necessary to protect the seashore's cultural and natural resources, and other guidelines for carrying out your overall task of fire suppression within this Seashore. In addition, the Line Officer's Briefing Package will provide you with a list of park personnel who have been assigned to assist you in carrying out your duties and a list of facilities which are available to you under the conditions stated.

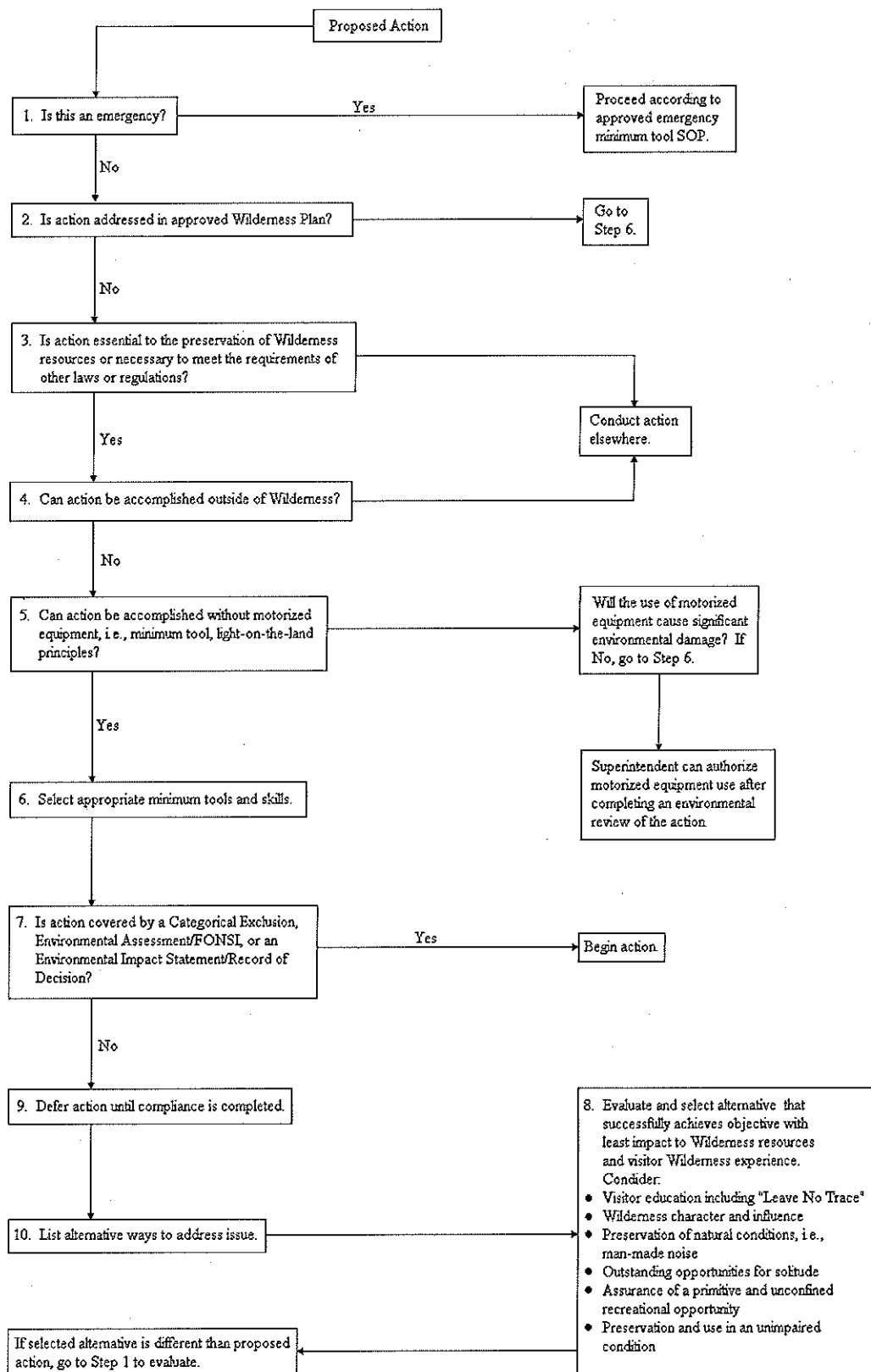
Upon your arrival, I (or my appointed alternate) will conduct an on-site briefing for you and your Incident Management Team. A fireline briefing will also be conducted for you and your team by the current (local) Incident Commander or Agency Liaison Officer.
My considerations are as follows:

1. Heavy equipment such as dozers should not be used without specific authorization.
2. I would like the fire suppressed, but with as little environmental damage as possible utilizing minimum impact techniques.
3. Burned acreage is much preferred to suppression scars and this should be weighed carefully.
4. All dunial deposits and associated dune vegetation are environmentally fragile.
5. My representative will be _____, who is the _____.
6. Emergency funds are available for suppression but must be fully justified.
7. Please make safety of seashore visitors and suppression forces a high priority.
8. Staging areas should be established with the concurrence of a resource advisor.
9. Retardant shall not be used without specific authorization, unless there is a threat to life, structures, or developed areas.
10. If feasible, establish a separate radio network to minimize impacts on other seashore operations as well as minimize impacts of other seashore operations on the fire operation.
11. Please try to minimize impacts on park visitors.

Superintendent

Date

Appendix 13.09 GUIS Minimum Requirement Method, as per the Seashore Wilderness Management Plan (2004)



Appendix 13.10 Five-Year Fuels Treatment Plan

Year	FMU	Burn Unit Name	Acres	Year Accomplished
1999	Naval Live Oaks	NLO-8	33	02/1999
1999	Naval Live Oaks	NLO-7A	30	02/1999
2000	Naval Live Oaks	NLO-7B	64	03/2000
2000	Naval Live Oaks	NLO-9 (Villa Venyce)	90	02/2000
2000	Naval Live Oaks	NLO-5 Gopher Tortoise "Attempt"	8.5	03/2000
2002	Davis Bayou Unit	Pitcher Plant	8	02/2002
2002	Naval Live Oaks	NLO-6	60	03/2002
2002	Naval Live Oaks	NLO-5 Gopher Tortoise "Attempt 2"	19	03/2002
2003	Naval Live Oaks	NLO-5B (Pinelands)	44	03/2003
2003	Naval Live Oaks	NLO-7A	30	03/2003
2006	Naval Live Oaks	NLO-8	35	March, 2006
2007	Naval Live Oaks	NLO-8	37	2007
2007	Naval Live Oaks	NLO-6	60	2007
2007	Naval Live Oaks	NLO-7B	64	2007
2007	Naval Live Oaks	NLO-9	90	2007
2007	Naval Live Oaks	NLO-10	25	2007
2008	Naval Live Oaks	NLO-4d	90	2008
2008	Naval Live Oaks	NLO-4c	52	2008
2008	Davis Bayou	Park Block (Stark)	60	2008
2008	Naval Live Oaks	NLO-2	64	2008
2008	Naval Live Oaks	NLO-5B	43	2008
2008	Naval Live Oaks	NLO-7A	30	2008

Year	FMU	Burn Unit Name	Acres	Year Accomplished
2009	Naval Live oaks	NLO-4A	25	2009
2009	Davis Bayou	Maint Block	28	2009
2009	Naval Live Oaks	NLO-5A	93	2009
2009	Naval Live Oaks	NLO-4B	136	2009
2010	Naval Live Oaks	NLO-9	90	
2010	Naval Live Oaks	NLO-8	72	
2010	Naval Live Oaks	NLO-7B	64	
2010	Naval Live Oaks	NLO-6	60	
2010	Davis Bayou	Park Block (Stark)	60	
2010	Davis Bayou	Trail Block	42	
2010	Naval Live Oaks	NLO-10	25	
2011	Naval Live Oaks	NLO-5B	44	
2011	Davis Bayou	Maint Block	28	
2011	Naval Live Oaks	NLO-4C	52	
2011	Naval Live Oaks	NLO-4d	90	
2012	Naval Live Oaks	NLO-7A	30	
2012	Naval Live Oaks	NLO-4A	25	
2012	Davis Bayou	Trail Block (Pine Uplands)	41.9	
2012	Naval Live Oaks	NLO-5A	93	
2012	Naval Live Oaks	NLO-4B	136	
2013	Naval Live Oaks	NLO-8	72	
2013	Naval Live Oaks	NLO-7B	64	
2013	Naval Live Oaks	NLO-9 (Villa Venyce)	90	
2013		NLO-6	60	

Appendix 13.11 GUIIS Fire Effects Monitoring Plan

Plan in draft form; to be included upon its completion

Appendix 13.12 Seashore Archeological Sites Management Information System (ASMIS) List, and List of Classified Structures

Seashore ASMIS List

ASMIS #	State ID #	Site Name	Comments
GUIS00001	08ES 0003	Site 5 Miles West of Navarre	
GUIS00002	08ES 0004	First Site Opposite Woodlawn	
GUIS00003	08ES 0005	Second Site Opposite Woodlawn	Not on NPS land
GUIS00004	08ES 0006	Third Site Opposite Woodlawn	Not on NPS land
GUIS00005	08ES 0017	Fort Barrancas Complex	
GUIS00006	08ES 0020	Fort Pickens No. 1	
GUIS00007	08ES 0022	Santa Rosa Pensacola (1722-1752)	
GUIS00008	08ES 0024	Ship Keel Site	Not on NPS land
GUIS00009	08ES 0050	Pura Pendeja	
GUIS00010	08ES 0051	Bomb Target Complex	
GUIS00011	08ES 0052	Isabella Wreck	Not Relocated
GUIS00013	08ES 0054	Management Area No. 1 Midden	
GUIS00014	08ES 0055	First Sturm Site	
GUIS00015	08ES 0056	Wreck Scatter Site	
GUIS00016	08ES 0057	Simons Pottery Mortuary Site	Not on NPS land
GUIS00017	08ES 0058	Second Sturm Site	Not on NPS land
GUIS00018	08ES 0059	Clam Midden Site	Not on NPS land
GUIS00019	08ES 0060	No Name Midden	
GUIS00020	08ES 0061	Hidden Midden Site	
GUIS00021	08ES 0062	Bomb Site North Midden	
GUIS00022	08ES 0063	Young Site	
GUIS00023	08ES 0064	Pensacola Lighthouse Complex	
GUIS00029	08ES 0070	Fort Pickens Complex	
GUIS00038	08ES 0079	Old Life Saving Station	
GUIS00047		Battery Brown	
GUIS00054	Unassigned	Filled Area	
GUIS00056	08ES 0097	Old Ferry Slip	
GUIS00057	08ES 0098	Hotel-Bar Site	
GUIS00058	08ES 0002	Top Bench Mark 1	Not on NPS land
GUIS00059	08ES 0100	Wreck Scatter	
GUIS00061		WWII Battery and Bunker Complex	
GUIS00062	08ES 0111	4 th Opposite Woodlawn	Not on NPS land
GUIS00063	08ES 0112	Redfish Point	
GUIS00064	08ES 0113	Fort McRee Complex	Destroyed
GUIS00065	08SR 0006	First Gulf Breeze	
GUIS00066	08SR 0007	Second Gulf Breeze	
GUIS00067	08SR 0008	Third Gulf Breeze	
GUIS00068	08SR 0011	Fourth Gulf Breeze/Tent Camp Site	
GUIS00070	08ES 0023	Top Bench Mark 2	Not on NPS land
GUIS00071	08SR 0012	La Casa	
GUIS00072	08SR 0013	Escola Site	
GUIS00073	08SR 0014	Inky East Pond	
GUIS00074	08SR 0022	Big Heart	
GUIS00075	08SR 0023	Camp Inky Site	
GUIS00076	08SR 0029	Butcherpen Mound Complex	

GUIS00077	08SR 0036	Navy Liveoak Reservation Cemetery	
ASMIS #	State ID #	Site Name	
GUIS00078	08SR 0040	Manly Mound Complex	
GUIS00079	08SR 0042	Boy Scout Water Site	
GUIS00080	08SR 0048	Naval Live Oaks Reservation	
GUIS00081	08SR 0060	Butcherpen Cove	
GUIS00082	08SR 0061	Tornado Corner	
GUIS00083	08SR 0062	Limestone Rock	
GUIS00084	08SR 0063	Inky Rutherford Cemetery	
GUIS00085	08SR 0064	Inky Tent North	
GUIS00086	08SR 0065	Naval Live Oaks North Line	
GUIS00087	08SR 0066	First American Built Road	
GUIS00088	08SR 0067	Plantation Hill West	
GUIS00089	08SR 0068	Big Heart West	
GUIS00090	08SR 0069	Butcherpen Cove East	
GUIS00091	08SR 0070	La Caseta	
GUIS00092	08SR 0071	Butcherpen Cove Swamp	
GUIS00093	08SR 0072	Sacksaw Landing West	
GUIS00094	08SR 0073	Rattlesnake Midden	
GUIS00095	08ES 0081	Road Side Site	Not on NPS land
GUIS00096	08ES 0233	2 nd Road Site	Not on NPS land
GUIS00097	08ES 0231	Missue	Not Relocated
GUIS00098	22HR 638	French Warehouse	
GUIS00099	Miss	Cemetery Complex	
GUIS00100	22HR 639	Quarantine Station Complex	
GUIS00101	22HR 640	Ship Island Lighthouse Complex	
GUIS00102	22HR 641	Fort Massachusetts Complex	
GUIS00103	Unassigned	Magnolia Park	
GUIS00104	Unassigned	4-H Club Site	
GUIS00105	Unassigned	Civilian Conservation Corps Camp	
GUIS00106	Unassigned	No Official Name	
GUIS00107	Unassigned	No Official Name	
GUIS00108	Unassigned	No Official Name	
GUIS00109	Unassigned	Ivory Wreck	Not Relocated
GUIS00110	Unassigned	No Official Name	Not Relocated
GUIS00111	Unassigned	No Official Name	Not Relocated
GUIS00112	Unassigned	Spanish Wreck	Not Relocated
GUIS00113	Unassigned	Shark Cove Wreck	
GUIS00114	Unassigned	No Official Name	
GUIS00115	Unassigned	No Official Name	Not Relocated
GUIS00116	**VOIDED**	**VOIDED**	
GUIS00117	08SR 0081	No Official Name/North-East Wreck	Not Relocated
GUIS00118	08ES 0101	E. W. Fowler Wreck	Not Relocated
GUIS00119	08ES 0099	Tug Boat Sport Wreck	
GUIS00120	**VOIDED**	**VOIDED**	
GUIS00121	08ES 0053	Fichtner's Ship Ballast Pile	Not Relocated
GUIS00127	Unassigned	Confederate Prisoner of War Camp	
GUIS00128	Unassigned	Coastal Defense Battery Complex	
GUIS00129	Unassigned	Chimney Biological Warfare Site	
GUIS00130	Unassigned	Camp Big Heart (Main Lodge)	

GUIS00131	Unassigned	Isabella Ingraham Girl Scout Camp	
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Seashore List of Classified Structures (LCS)

Preferred Structure Name	Structure Number	LCS ID
Fort Barrancas	FB-0	000526
Fort Pickens Seawall	P-23	005384
Igloo Magazine by Fort Pickens	P-26	005386
Igloo Magazine by Coast Guard Station	P-27	005387
Dugout Shelter, Battery Fixed	P-28	005388
90 mm Gun Emplacement Platforms	P-29	005389
Search Light Tower #1 Foundations	P-30	005390
Search Light Tower #2 Foundation	P-31	005391
Narrow Gauge Railroad Bed	P-32	005392
Chasefield Plantation Headstones	P-37	005393
Mosquito Control Canal	P-38	005394
BC/CRF Station, Battery 234	P-39	005395
155 mm GPF Panama Mounts	P-44	005399
Battery Fixed Ant-Aircraft Gun Emplacement Ruin 1	P-45	005400
Battery Fixed Ant-Aircraft Gun Emplacement Ruin 2	P-46	005401
Battery Fixed Ammunition Shelter	P-47	005402
Observation Tower Foundation	P-48	005403
Rutherford Family Cemetery Headstones	N-10	005405
First American Road in Florida	N-11	005406
Battery Pensacola	B-01	005411
Battery Langdon	B-02	005412
Battery Worth	B-03	005413
Battery Cooper	B-04	005414
Battery 234	B-05	005415
Battery Payne	B-06	005416
Battery Trueman	B-07	005417
Batteries Cullum-Sevier	B-09	005419
Battery Van Swearingen	B-10	005420
Advanced Redoubt, Fort Barrancas	FB-1	005421
Battery San Antonio	FB-2	005422
Battery 233	PK-1	005423
Battery Slemmer	PK-2	005424
Battery Center	PK-3	005425
Fort Massachusetts	M-1	007374
1853 Lighthouse Ruins, Ship Island	M-2A	007375
1886 Lighthouse and Keeper's Quarters Ruins, Ship Island	M-2B	007376
Fort Pickens	P-0	007459
Building 4	P-04	007460
Building 3	P-03	007461
Building 2	P-02	007462
Building 7	P-07	007463
Building 8	P-08	007464
Building 1	P-01	007465
Building 5	P-05	007466
Building 6	P-06	007467
Warehouse	P-17	007468
Mine Loading Room	P-15	007469
Mine Storeroom	P-16	007470
Pumping Plant	P-11	007471
Pump House	P-10	007472

Appendix 13.13 Summary of Major Vegetative Communities/Habitats in the Davis Bayou Unit, and Fire Management Recommendations, as Per the Report Entitled *Wetland Delineation and Hydrologic/Community Survey of the Davis Bayou Area of Gulf Islands National Seashore* (MSU 2002)

The report entitled *Wetland Delineation and Hydrologic/Community Survey of the Davis Bayou Area of Gulf Islands National Seashore* (MSU 2002) identifies seven major vegetative communities/habitats occur within this unit: southern mixed hardwood forest, wet pine flatwoods, tidal marsh, bayhead swamp, transitional wet forest, wet pine savanna, and maritime forest. Discussion of each follows, with fire management recommendations, as per that report.

- ❖ Southern mixed hardwood forest: This community currently occupies approximately 134 acres within the Davis Bayou unit. Formerly longleaf pine forest, it is a pine-dominated upland community, which presently includes a variety of hardwood species and a varied assemblage of understory trees and shrubs. In addition to longleaf pine and loblolly pine, the canopy layer of the mixed hardwood forest may include beech, laurel oak, southern magnolia, white oak, sweetgum, water oak, southern red oak, pignut hickory, black gum, and post oak. Sweetgum, water oak, and black gum are common understory trees, particularly as saplings, along with flowering dogwood, tree huckleberry, American holly, red maple, and black cherry. Common shrubs include yaupon, large gallberry, edible blueberry, tree huckleberry, squaw huckleberry, and horsesugar. Poison ivy, catbriars, and grapes are also common.

Historically, naturally-set, periodic fires (3-5 year cycle) maintained a forest dominated by the fire-dependent longleaf pine, with an open grassland understory; thus the designation as former longleaf forest.

Loblolly pine and many of the above-listed hardwood trees and shrubs were restricted by fire to isolated, protected areas of the forest and to the wetter sites, and have only recently invaded the forest in the absence of periodic fire. The current lack of longleaf pine within these sites is a result of fire exclusion. Unless periodic fire is re-introduced to these sites, they should continue to maintain their general forest conditions, including a relatively closed canopy of mixed pine and hardwood species, a relatively diverse assemblage of shrubs and saplings, a relatively bare herbaceous layer, and a mixed composition of vines.

- ❖ Wet pine flatwoods: This community currently occupies approximately 62 acres within the Davis Bayou unit. It is a pine-dominated community that occurs on moderately- to poorly drained soils. Longleaf pine dominates sites where periodic fire (3-5 year cycles) occurs. In addition to longleaf pine and slash pine, the canopy may include black gum, red maple, sweetgum, southern red oak, water oak, laurel oak, and sweet bay magnolia, with the hardwood species becoming more common in sites where fire has been excluded. Common shrubs include saw palmetto, common gallberry, large gallberry, swamp titi, fetterbush, wax myrtle, red bay, and winged sumac, along with lianas such as catbriars and grapes. A rich assemblage of grasses and other herbaceous plants is also common, particularly where fire maintains an open, grassland understory, with common species including wiregrass, broomsedge, muhly grass, blazing star, butterfly weed, and asters.

This community may have been wet pine savanna in the past; the historical absence of fire leads to alterations in the floral nature of these sites that can mask the habitat type. The presence of relatively large numbers of trees and shrubs that would normally be suppressed by periodic fire (e.g. loblolly pine, black gum, sweet bay magnolia) suggests that these sites have not experienced fire in some time. Unless periodic fire is reintroduced, this community will continue to exist in its present form, and species diversity will continue to decline. Active management through the use of periodic fire is recommended to restore it to more ideal conditions and increase species diversity. It is probable that grass species such as wire grass, muhly grass, bluestem, and toothache grass, along with fire-adapted shrubs including dwarf huckleberry

and running oak, could flourish with proper fire management. Rather unique species such as carnivorous plants, including pitcher plants, sundews, butterworts, and bladderworts, as well as numerous species of terrestrial orchids, sunflowers, and other flowering plants would probably establish with the reintroduction of fire.

- ❖ Tidal marsh: This community currently occupies approximately 52 acres within the Davis Bayou unit. It is composed largely of wet and salt-tolerant grasses and sedges that occur along the shorelines of coastal areas, including the tidally influenced portions of coastal rivers where salty ocean waters and fresh waters from rivers mix and move back and forth as tides. The most common species of plants and their preferred elevations include smooth cordgrass (low marsh), black needlerush (mid-elevation marsh), and salt marsh hay (high marsh). Other species that are common in moderate to high salinity marshes include salt grass, leafy bulrush, glasswort, and salt marsh aster. In low salinity marshes, big cordgrass and lance-leaf arrowhead may be common.

Historically, fire has been used by trappers in tidal marshes as a means of encouraging the growth of new, tender plant shoots that attract fur-bearing animals. Although studies have shown minimal effects from this practice (Hackney and de la Cruz 1981; Hackney and de la Cruz 1983), there is little evidence to suggest that fire plays any major role in controlling vegetative patterns or that it occurs with any predictable frequency. In some extreme cases, frequent fires (e.g. yearly) set during dry periods lead to complete loss of vegetation and soil.

- ❖ Bayhead swamp: This community currently occupies approximately 20 acres within the Davis Bayou unit. Bayhead swamps are forested wetlands found at or near the heads of large drainage basins or as the main part of smaller or local drainage systems. These wetlands drain quickly following rain events. Commonly occurring trees include sweet bay magnolia, swamp black gum, red bay, red maple, slash pine, and sweetgum. Common shrubs include wax myrtle, large gallberry, and titi. The ground or herb layer commonly consists of cinnamon fern, royal fern, netted chain fern, lizard's tail, and sphagnum moss, with occasional grasses and sedges. Laurel-leaf greenbrier is also common. Fire is not an apparent controlling factor in this community, occurring only under dry conditions.
- ❖ Transitional wet forest: This community currently occupies approximately 18 acres within the Davis Bayou unit. As the name implies, it occupies zones of transition from one habitat type to another. In the case of the Davis Bayou unit, it occupies the wet soils between the upland ridges, which are dominated by southern mixed hardwood forests, and adjacent swamps. In general, this wet forest includes sweet bay magnolia, southern magnolia, water oak, laurel oak, sourwood, red maple, red bay, and slash pine. Common shrubs include wax myrtle, large gallberry, and yaupon. The ground layer includes cinnamon fern, royal fern, and netted chain fern. Laurel-leaf greenbrier and poison ivy are also common.

The effects of fire on this community are unknown. Although similar to bayhead swamps in vegetative and soil characteristics, its upland proximity to fire-susceptible southern mixed hardwood forest may expose it to periodic fire. However, as with bayhead swamp, this community may support fire only under dry conditions.

- ❖ Wet pine savanna: This community currently occupies approximately 12 acres within the Davis Bayou unit. Wet pine savannas are open grasslands with scattered pines that occur on poorly-drained terraces.

Under natural conditions of periodic fire (3-5 year cycles), longleaf pine is the only common tree species, and a diverse assemblage of herbaceous plants forms the ground layer grassland, including species that are adapted to fire and the nutrient-poor soils characteristic of this habitat. Common grasses include two species of wiregrass, muhly grass, bluestem, and toothache grass, along with fire-adapted shrubs such as dwarf huckleberry and running oak. This habitat also includes a large number of carnivorous plants,

including pitcher plants, sundews, butterworts, and bladderworts, as well as numerous species of terrestrial orchids, sunflowers, and other flowering plants.

In the absence of fire, slash pine, red maple, sweet bay magnolia, and red bay may become more common, as well as shrubs like common gallberry, large gallberry, yaupon, wax myrtle, and swamp titi, which shade out the diverse herbaceous assemblage. Unless periodic fire is reintroduced to this community, it will continue to develop toward the conditions described above for wet pine flatwoods. Active management through the use of periodic fire is recommended to restore it to more ideal conditions and increase species diversity

- ❖ Maritime forest: This community currently occupies approximately 4 acres within the Davis Bayou unit. The maritime forest of the lower Gulf coastal plain is part of a series of vegetative assemblages that occupy the barrier islands and mainland shoreline areas exposed to the effects of the salty environment of the open ocean. As such, this community is defined by location and by the presence of salt-tolerant vegetation. Within the Davis Bayou unit, trees include live oak, water oak, loblolly pine. Shrubs include wax myrtle and yaupon, with the herbaceous layer consisting of a sparse coverage of bracken fern and young individuals of yaupon. Muscadine is abundant, along with catbriar and cross vine.

Within the range of maritime communities, fire is most often associated with scrub habitats, occurring with 30-35 year frequency. Although fire is also reported in pine-dominated stands and live oak forest, it does not appear to be a major factor affecting vegetation in this community.

Appendix 13.14 Natural Fire Return Intervals and Fire Effects Regarding Specific Vegetation Species at GUIS

The species discussed below are some of the more common in the ecosystems represented at the seashore. Expected fire effects are derived from the NWCG/USFS Fire Effects System (FEIS), from field observations at Gulf Island National Seashore, and from discussion with foresters, resource management specialists, and fire management personnel from the states of Florida and Mississippi (NPS 1998).

- ❖ **Longleaf Pine:** Longleaf pine is classified as fire-resistant and fire-dependent. It is ideally suited to a high-frequency, low severity surface fire regime, and the natural fire interval is every year to every 5 to 10 years. Open-grown grass-stage seedlings with root collar diameters smaller than 0.3 inch can be killed by light fire. Under a pine overstory, where excess pine litter results in hotter fire, light fire can kill seedlings smaller than 0.5 inch in diameter. In the height-growth stage, seedlings 1 to 3 feet tall are extremely vulnerable to fire. Once a seedling is about 3.3 feet tall, it is likely to survive low-severity ground fires. After the sapling is 10 feet tall, it is very fire-tolerant, and trees 10 inches in diameter and larger survive all but the most severe fires. A high-severity crown fire kills some mature trees and nearly all trees smaller than 10 inches in diameter.

Frequent late-spring or early-summer fires are necessary to restore the longleaf pine-grassland savannas that were common in pre-settlement times. In some portions of the seashore, particularly Davis Bayou and Naval Live Oaks, longleaf stands are threatened by encroachment of hardwoods and dense understory, due largely to decades of fire exclusion in these areas. This encroachment, in turn, is adversely impacting local populations of gopher tortoises, which depend upon the relatively open understories naturally characteristic of this community.

- ❖ **Sand Pine:** Sand pine is classified as fire-resistant and fire-dependent, in that it regenerates profusely through seeds after fire. Despite low tolerance of mature trees to fire because of thin bark, sand pine is maintained by infrequent, high-severity fires. The dense crown canopy of sand pine reduces understory vegetation and fuel build-up on the ground; most understory vegetation is evergreen which does not produce a thick litter of dry leaves, and there is little or no grass. As a result, fire usually stalls out at the outside edge of a sand pine stand; if the stand is ignited, however, severe fire will occur. This delayed pyrogenic strategy results in instant site recapture. Large numbers of seeds are released from serotinous cones and germinate on the exposed ground. Sand pine stands usually only burn in the spring when high winds carry fire into the crowns. In addition, needle water content is at its lowest and ether content at its highest in the spring. Sustained hot weather will also make the stand more susceptible to ignition. A fire return interval of 20 to 60 years maintains even-aged sand pine stands. If more frequent, trees may not be old enough to reproduce. If less frequent, sand pine becomes senescent and is replaced by other species.

Due to fire exclusion, many of the seashore's sand pine stands are aging and will eventually be usurped by oak. In the Naval Live Oaks unit, encroachment by hardwoods and dense understory species is threatening the long-term viability of the sand pine community and is also introducing ladder fuels which increase the likelihood of catastrophic canopy fire. While canopy fire is necessary to the perpetuation of these stands, the close proximity of dense urban development demands that fire be implemented methodically, when safety and control can be ensured. The use of mechanical fuel reduction may be necessary in this unit in order to preserve the habitat but protect nearby development.

- ❖ **Slash Pine:** Slash pine will invade longleaf pine stands where fire has been absent for at least 5 to 6 years. In the absence of fire, slash pine flatwoods are replaced by southern mixed hardwood forests on xeric sites and by bayheads on mesic sites. Young slash pine is susceptible to fire, but mature trees are fire-resistant.

Thick bark and high, open crowns allow individuals to survive fire. Slash pine, however, is less fire-resistant than longleaf pine or sand pine. Seedlings grow rapidly, and in 10 to 12 years slash pine is resistant to fire that does not crown. Estimates of the natural fire frequency of slash pine flatwoods range from 3 to 15 fires per century; a fire return interval of at least 5 to 6 years allows young trees to develop some fire resistance. Fires are ignited by lightning in late spring and summer. Ample soil moisture in slash pine habitat impedes fire entry. Occasional fire serves to reduce hardwood competition and expose mineral soil which enhances germination.

- ❖ Live Oak: Live oaks have thin bark and are readily top-killed by fire; however, the roots and root crown survive fire and sprout vigorously. Dominant live oaks (greater than 3 inches in d.b.h.) can survive low-severity fire that does not crown. The large, spreading oak canopy encloses a humid microclimate. The leaves are concave and, as litter, hold moisture to the ground. The moist environment discourages fire entry and keeps fire temperatures low. Live oak is considered fire-tolerant except when relative humidity is unusually low.

In the Naval Live Oaks unit, live oak stands near open water contain heavy dead-and-down fuels resulting from hurricane activity. Research is needed into the relationship between this natural occurrence and the local fire regime.

- ❖ Turkey Oak: Large, mature turkey oaks have relatively thick bark and can survive low-severity fire. If top-killed, turkey oak sprouts vigorously from the root collar. Historically, natural fire occurred at 3- to 4-year intervals in sandhill vegetation. Frequent low-severity fire keeps turkey oaks small, stunted, and widely scattered.
- ❖ Laurel Oak: Laurel oak is fire-intolerant. It is frequently top-killed by even low-severity surface fires because it has relatively thin bark. Young laurel oak sprouts vigorously from the root crown if top-killed by fire. Older trees do not sprout as readily. Trees subject to occasional fires commonly develop heart rot where fire-wounded.
- ❖ Southern Magnolia: Southern magnolia is well adapted to fire. Although the bark is relatively thin, the cork layer underneath the bark does not burn easily and is relatively resistant to heat. Seedlings are easily killed by fire; however, plants sprout vigorously when top-killed by fire. Where fire is excluded or infrequent, southern magnolia and live oak can become dominant species in the southern mixed hardwood forest. The transition from an open, fire-maintained forest to a closed-canopy, deciduous forest favors the *Quercus-Magnolia* climax community.
- ❖ Southern Bayberry: The stems and foliage of southern bayberry contain large amounts of aromatic compounds that are quite flammable, making it a potential fire hazard. Fire periodicity probably determines the long-term fire response of southern bayberry. In loblolly stands in South Carolina, single or occasional summer fires caused southern bayberry cover to increase. By contrast, annual summer fires reduced southern bayberry cover and sprouting vigor, eventually eliminating it.
- ❖ Yaupon: Mild fires probably top-kill yaupon. Yaupon may be killed by fires severe enough to consume the soil's organic layer.
- ❖ Saw-palmetto: Saw-palmetto is well adapted to fire, making it difficult to control. It can be held in check using fire, but it remains vigorous and recovers. A very short fire return interval (1 to 3 years) perpetuates saw-palmetto understories and kills pine seedlings on palmetto-prairies. Summer fires are most effective at removing saw-palmetto top-growth. The effects of fire exclusion on saw-palmetto depends on the associated plant communities. Fire exclusion or long fire return intervals may decrease saw-palmetto

cover in scrub communities where other understory hardwoods can overtop it, while the same can cause southern pinelands to become overgrown with saw-palmetto. An overgrown saw-palmetto understory constitutes a fire hazard, promoting wildland fires that may kill pine seedlings and saplings. Tall saw-palmetto understories also carry fire into the overstory, killing mature trees. Saw-palmetto is the largest contributor to understory fuels in the Florida pinelands.

- ❖ Black Rush: The effects of fire on black rush mortality vary with water depth and soil moisture. On flooded sites, and on sites with exposed but saturated soils, fire may consume above-ground plant portions but leave underground regeneration structures unharmed. When a marsh floor is completely dry, however, fire can burn deep into the soil, consuming the rhizomes and killing entire stands. Prescribed burning on a 4- to 5-year rotation can be used to maintain the vigor of black rush marshes. Burning more frequently would be difficult because of insufficient fuel (it takes more than 3 years for total biomass to reach pre-burn levels).
- ❖ Smooth Cordgrass: Fire is an important factor in the ecology of the Gulf Coast marshes. Natural fires, caused by lightning and from spontaneous combustion in dense stands, have resulted in a fire-dependent ecosystem. Growth occurs year-round in southern marshes, and the vegetation is so luxuriant that an unburned marsh becomes extremely volatile within 3 to 4 years.
- ❖ Hooded Pitcher-plant: Fire generally benefits hooded pitcher-plant. Periodic, moderate fires are necessary to reduce the encroachment of competing plants and stimulate growth by releasing nutrients bound up in organic matter. Hooded pitcher-plant survives fire by re-sprouting from rhizomes. Fire exclusion results in a build-up of fuels, causing severe fires which damage species normally considered to be fire-tolerant, such as the hooded pitcher-plant. Fire is a natural event in carnivorous plant habitats. The season during which fire occurs may influence the floristic composition of pitcher-plant bogs. Historically, summer fires were frequent, probably ignited by lightning.