

National Park Service
U.S. Department of the Interior

Padre Island National Seashore
Texas



Fire Management Plan



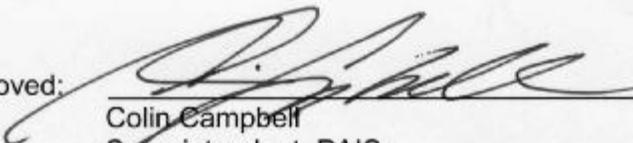
Fire Management Plan

Padre Island National Seashore
Corpus Christi, Texas

Produced by:
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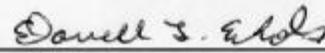
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I. INTRODUCTION

The significance of Padre Island National Seashore (PAIS) lies in the unique, undeveloped nature of a natural, ever-changing barrier island. Padre Island National Seashore is located along the southern coast of Texas approximately eight miles south of Corpus Christi, and is bordered by the Laguna Madre and the Gulf of Mexico (Figure 1). The natural environment of the park includes nearly 50,000 acres of fire dependent habitats dominated primarily by coastal grasses. The Fire Management Plan (FMP) will allow fire to function in its natural ecological role (as nearly as possible), restore ecosystem balance of phytic communities, and manage hazardous fuels in high-risk areas (Urban Interface) through the use of prescribed fire and mechanical treatments. The plan describes a range of appropriated management actions that are consistent with resource management objectives, public health issues, firefighter and public safety, environmental laws and regulations, activities of the area, and is based upon the best available science. It incorporates mitigation, burned-area rehabilitation, and fuels reduction and restoration activities.



Figure 1. Park Vicinity Map.

This plan complies with the Director's Order-18 requirement that all areas with vegetation capable of sustaining a fire will develop a FMP, and uses the format outlined in Reference Manual 18-Chapter 4.

The Padre Island fire management program complies with various legislative mandates including:

- Public Law 87-712, which established Padre Island National Seashore
- Clean Air Act
- Clean Water Act
- Endangered Species Act
- Archeological Resources Protection Act
- National Environmental Policy Act (NEPA)
- National Historic Preservation Act.

The NEPA process was initiated on April 16, 2003, with an internal scoping meeting that included park administrative, fire, and resource management staff. This meeting was held by the park's Interdisciplinary Team, which consisted of:

Dave McHugh, Fire Program Officer, Big Thicket National Preserve (BITH)
Fulton Jeansonne, Fire Effects Specialist, BITH
D. W. Ivans, Prescribed Fire Specialist, BITH
Jock Whitworth, Superintendent, PAIS
Randy Larson, Chief Ranger, PAIS
Darrell Echols, Chief, Science and Resources Management Division, PAIS
Arlene Wimer, Environmental Protection Officer, PAIS

From this meeting, preliminary Fire Management Units (FMU) and appropriate fire management activities were developed, along with informational requirements that needed to be addressed. Two FMU's were developed and included the Malaquite Beach Fire Management Unit and the Down Island Fire Management Unit.

On February 23, 2004, the Department of Interior expanded the use of Categorical Exclusions (CE) to include fire management actions. The expanded CE applies to parks conducting suppression and fuels reduction activities that meet the following guidelines:

"Hazardous fuels reduction activities using prescribed fire not to exceed 4,500 acres, and mechanical methods for crushing, piling, thinning, pruning, cutting, chipping, mulching, and mowing, not to exceed 1,000 acres. Such activities:

- Shall be limited to areas (1) in wildland urban interface and (2) Condition Classes 2 or 3 in Fire Regime Groups I, II, or III, outside the wildland urban interface;

- Shall be identified through a collaborative framework as described in “A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment 10-Year Comprehensive Strategy Implementation Plan;”
- Shall be conducted consistent with agency and Departmental procedures and applicable land and resource management plans;
- Shall not be conducted in wilderness areas or impair the suitability of wilderness study areas for preservation of wilderness;
- Shall not include the use of herbicides or pesticides or the construction of new permanent roads or other new permanent infrastructure; and may include the sale of vegetative material if the primary purpose of the activities is hazardous fuels reduction.”

Additional conditions for use of the CE for FMP’s include 1) the potential effects of the fuels activities should be less than “measurable” (i.e. “minor”) as determined by the park’s interdisciplinary team; 2) other cautions concerning the use of categorical exclusions found in §3.6 of the DO-12 Handbook should be considered; and 3) parks would need to do public involvement at the beginning of the planning process to scope the use of the CE, and again before approving the FMP.

The park’s Interdisciplinary Team met in April 2004 and determined that the CE can be applied due to the following reasons:

- The purpose of Padre Island National Seashore’s fire management program is to protect urban interface values, including roads, park infrastructure, historic structures, visitor use facilities, and oil and gas facilities in the Malaquite Beach FMU and Down Island FMU by suppressing wildland fires and managing hazardous fuels through prescribed burning treatments, of less than 4,500 acres each and mechanical treatments of less than 1,000 acres each. Mechanical treatments may include mowing, grass trimming, or the application of herbicides along road shoulders and around structures. Limited suppression response to meet wildland fire cost reduction goals will occur in the Down Island Fire Management Unit.
- The Malaquite Beach FMU includes the majority of the park’s urban interface area, while the Down Island FMU has urban interface values along the Pan Am road and Yarborough Pass area. With the exception of the urban interface areas, the remaining acreage is identified as being in Fire regime I due to frequent surface fires and a savannah vegetation structure and in condition class 2 due to vegetation that is recovering from centuries of cattle grazing.
- Partnerships with U.S. Fish and Wildlife refuges, Nature Conservancy of Texas, Nueces County Emergency Services District, Riviera and Ricardo Volunteer Fire Departments, and Naval Air Station-Corpus Christi satisfy the collaborative requirement.

The purpose of this fire management plan is to comply with agency, department, and park resource management policies and guidelines. No wilderness area has been designated within Padre Island National Seashore, and the actions outlined in this plan would not impair future wilderness suitability. Herbicide use is covered under a separate exotic plant management plan, and therefore no pesticide use is included in this plan. This plan does not include the construction of roads or sale of vegetative material.

The interdisciplinary team determined that potential effects from fire management activities permitted under this plan will likely be negligible or minor, and short in duration. This preliminary decision is documented on the standard Environmental Screening Form (ESF) and decision memorandum (Environmental Statement Memorandum ESM03-2), which are located in Appendix D. Public scoping was performed between July 15, 2004 and August 15, 2004 through a notice published in the Corpus Christi Caller Times on July 15, 2004. All public comments provided to the park were in favor of a FMP as long as the beach was not closed to vehicular traffic.

As part of the NPS's external scoping process, discussions were initiated with the U.S. Fish & Wildlife Service, Texas Parks and Wildlife, and the Texas Commission on Environmental Quality to determine if any natural resources would be affected by the park's hazardous fuels reduction program or suppression activities associated with wildfire response. No resources were identified through these discussions. Through the process of completing the Environmental Screening Form, no cultural resources would be affected by proposed hazardous fuels reduction or wildfire suppression activities and consultation with the State Historic Preservation Office was not sought. Based on the assessment of resources likely to be affected through the proposed fire activities identified in this document, the Categorical Exclusion for hazardous fuels reduction was selected to ensure park compliance with the National Environmental Policy Act.

The FMP was reviewed by the Intermountain Regional Office to ensure that the plan is comprehensive and accurate. The plan was reviewed by L. Dean Clark, regional fuels specialist, Larry Helmerick, prevention education specialist, and Lisa Hanson, NEPA/Sec. 106 Specialist. Reviewer comments were incorporated and are included in the plans administrative record.

This plan will implement fire management policies and help achieve resource management and fire management goals as defined in:

- Federal Wildland Fire Management Policy and Program Review
- Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (USDOJ/USDA)
- A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10-Year Comprehensive Strategy Implementation Plan

- Healthy Forest Initiative
- Fire Strategic Plan
- Padre Island National Seashore's Strategic Plan

A. Authorities

The authority for fire management is broadly stated in the "Organic Act" of the National Park System (Title 16 USC 1), dated August 25, 1916:

"...The service thus established shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations...by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Authorities for procurement, personnel, and other administrative activities necessary to accomplish wildland fire suppression missions are contained in the Interagency Incident Management Handbook.

Authorities to enter into agreements with other Federal bureaus and agencies, with state, county, and municipal governments, and with private companies, corporations, groups, and individuals are cited in NPS-20 (Federal Assistance and Interagency Agreements).

The authority for interagency agreements is found in "Interagency Agreement Between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture" (1982).

The authority for rendering emergency fire or rescue assistance outside of the National Park system is the Act of August 8, 1953 (16 USC 1b(1)), and the Departmental Manual (910 DM).

31 U.S. Code 665 (E) (1) (B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

II. RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

A. NPS Management Policies

The NPS is committed to protecting park resources and natural ecological processes, but firefighter and public safety must be the first priority in all fire management activities.

NPS fire management activities will be performed in accordance with the principles, policies, and recommendations of the Final Report of the Federal Wildland Fire Management Policy and Program Review, and with Part 620 of the Departmental Manual. Air operations during wildland fire incidents will comply with the provisions of Director's Order 60: Aviation Management and Parts 350-354 of the Departmental Manual.

All naturally caused wildland fires may be managed to accomplish resource management goals, provided there is an approved fire management plan, and provided they do not compromise firefighter and public safety, threaten property, or violate air quality laws or regulations.

To implement NPS *Management Policies* governing fire management, the NPS will administer its wildland fire program in a manner that will:

- Educate employees and the public about the scope and effect of wildland fire management, including fuels management, resource protection, and prevention, hazard/risk assessment, mitigation and rehabilitation, and fire's role in ecosystem management.
- Stabilize and prevent further degradation of natural and cultural resources lost in and/or damaged by impacts of wildland fires and/or fire management activities.
- Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program
- Integrate fire management with all other aspects of park management.
- Manage wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics and maximize efficiencies realized through interagency coordination and cooperation.
- Scientifically manage wildland fire using best available technology as an essential ecological process to restore, preserve, or maintain ecosystems and use resource information gained through inventory and monitoring to evaluate and improve the program.
- Protect life and property and accomplish resource management objectives, including restoration of the natural role of fire in fire-dependent ecosystems.

- Effectively integrate the preservation of wilderness including the application of “minimum requirement” management techniques into all activities impacting this resource.

NPS staff responsibilities for implementing operational policies and procedures will include the Associate Director for Park Operations and Education, the park Superintendent, and park personnel.

The Associate Director for Park Operations and Education will prepare and issue a reference manual (Reference Manual 18) to help NPS managers and field staff understand and implement Departmental and NPS policies applicable to fire management. The reference manual will contain detailed procedures emphasizing personnel safety, the use of wildland fire for beneficial purposes, monitoring of smoke behavior, and the concept of risk management.

The superintendent of each park that contains burnable vegetation will ensure that Reference Manual 18 is available in sufficient quantities to serve the needs of fire management staff within the park, and will ensure that fire management staff is adequately versed in the Departmental and NPS policies and procedures contained therein.

NPS employees will take advantage of appropriate opportunities to educate the public about the positive values of wildland fire and the manner in which the NPS manages fire to meet ecosystem management objectives.

B. Padre Island National Seashore Legislation and Planning

Various documents are used that plan and guide the operations of the park. These documents address how the park and its natural and cultural resources will be managed. The basis of the park’s fire management program is addressed in these documents.

C. The Enabling Legislation

Congress established Padre Island National Seashore on September 28, 1962 (Public Law 87-712) "*to save and preserve, for the purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped.*"

D. The General Management Plan

The park’s 1983 General Management Plan (GMP) states “Padre Island National Seashore preserves a dynamic barrier island ecosystem that offers outstanding opportunities for shoreline recreation, natural history study, and contemplation of past and present uses of the coastline....This combination General Management Plan/Development Concept Plan contains an integrated set of proposals that will be carried out over the next 10-15 year period to (1) ensure the continued protection of the

island's natural and cultural resources....Natural process will be allowed to shape the barrier island with as little interference as possible. The vestiges of historic and prehistoric occupants of the island will be protected from man-caused damage but not from the effects of natural forces....The GMP/DCP reflects several basic concepts about the nature of Padre Island, the purpose of the seashore, and the character of appropriate uses. First, it recognizes that left alone the natural barrier island processes will perpetuate the unique resource values recognized by Congress and enjoyed by the public....Consequently, the island will be managed to sustain natural processes, accepting natural change as part of its evolution through time and space....The lands and waters....give Padre Island its character and value as a natural and visual resource.”

The GMP is being revised and the following goals will be incorporated:

- Manage the wildland fire program in accordance with congressional intent as expressed in the annual appropriations act and enabling legislation, and comply with applicable departmental manual and agency policies and procedures.
- Promote an interagency approach to managing fires on an ecosystem basis.
- Employ strategies to manage wildland fires that provide for firefighter and public safety, minimize cost and resource damage, and are consistent with values to be protected and management objectives.
- Restore and rehabilitate resources and improvements lost in or damaged by fire or suppression activities.
- Minimize, and where necessary mitigate, human-induced impacts to resources, natural processes, or improvements attributable to wildland fire activities.
- Promote public understanding of fire management programs and objectives.
- Organize a fire staff that can apply the highest standards of professional and technical expertise.
- Encourage research to advance understanding of fire behavior, effects, ecology, and management.
- Integrate fire management through all levels of the planning process.
- Prevent and investigate all unplanned human-caused fires.
- Protect human life and property and natural/cultural resources within the seashore.
- Minimize damages and maximize overall benefits of wildland fire within the framework of land use objectives and resources management plans.

E. The Resource Management Plan

The 1996 Resource Management Plan (RMP) states:

“Padre Island National Seashore consists of approximately 130,000 acres of land and water. The National Seashore is approximately 70 miles in length and from ½ to three miles-in-width. The park is bordered on the east by the Gulf of Mexico and is separated from the Texas mainland, to the west, by the Laguna Madre, a shallow, hypersaline body of water. With the longest stretch of undeveloped ocean beach in the country, PAIS provides a rare opportunity for primitive recreation. A barrier island, Padre Island

National Seashore is a dynamic system, which was formed and is continually being shaped by the action of wind, currents, and waves. The seashore's landscape changes from broad sandy beaches, to ridges of fore-island dunes, then to grassy flats separated by smaller dunes, ephemeral ponds, and wetlands. Back-island dunes and wind tidal flats that merge with the waters of the Laguna Madre define the western portion of the Seashore. The park encompasses tens-of-thousands of acres of pristine wetlands that are important habitat for numerous flora and fauna species. Approximately 80-90 percent of the area behind the gulf dune line, to the Laguna Madre, is comprised of a rich variety of wetlands, including estuarine emergent wetlands, freshwater ponds, wind tidal algae flats, Laguna Madre intertidal zone, lagoonal sea grass beds, and marshes."

The RMP further identifies how the island's vegetative communities have been altered historically. Specifically, the RMP states "The majority of vegetation in the park has been altered by various historic land-use practices, primarily the grazing of domestic livestock before the park's enactment. Consequently, since 1968 -- when all the cattle were removed from the island -- the park's vegetation communities have changed dramatically in species composition, and relative abundance (Drawe 1992). To date, the park's fire management strategies have been mainly those of active suppression. This has greatly altered the structure and composition of vegetation communities."

A wilderness suitability study was developed for the park, but due to present and future oil and gas development, the park was not eligible for wilderness designation. Therefore, no park areas have been designated as wilderness.

F. Wildland Fire Management Plan

The Fire Management Plan describes a range of appropriate management actions that are consistent with the resource management objectives, public health issues, firefighter and public safety, environmental laws and regulations, activities of the area, and is based upon the best available science. It incorporates mitigation, burned-area rehabilitation, and fuels reduction and restoration activities.

G. Strategic Plan

The current Strategic Plan describes mission goal 1a as:

"Natural and cultural resources and associated values of Padre Island National Seashore are protected, restored, and maintained in good condition and managed within their broader ecosystem and cultural context. This goal includes the concepts of biological and cultural diversity. Broader ecosystem and cultural context includes both natural systems and cultural landscapes that extend beyond the park boundary. The cultural context also refers to those park resources to be preserved and interpreted in relationship to the historical events or cultural uses and living processes unique to the Padre Island area. Long-term goals related to the Mission Goal 1a will include the protection, restoration, and maintenance of ecosystems, rare plant and animal populations and assemblages, archeological and ethnographic resources, historic structures and objects, and research, all of which are relevant to the purpose and/or

significance of Padre Island National Seashore. Long-term goals will deal with both current and future threats to natural ecosystems and cultural landscapes, the perpetuation of wilderness values and scenic grandeur, and also to seek cooperation and participation in achieving those goals with neighboring land managers, Federal and State agencies, educational institutions, and the general public to promote effective ecosystem management and to help define the NPS management strategy”.

III. WILDLAND FIRE MANAGEMENT STRATEGIES

A. General Management Considerations

The primary objective of the fire management program is to allow fire to function in its natural ecological role as nearly as possible, and manage hazardous fuels in high-risk areas (Urban Interface) through the use of prescribed fire and mechanical treatments. Replication of fire’s ecological role in maintaining the grassy barrier island habitat is essential to the health and diversity of Padre Island National Seashore. Research has indicated a need to burn excess litter during late winter or late summer to increase total production, to increase plant vigor, and to suppress the detrimental accumulations of thatch within the low coastal sands of Padre Island (Drawe and Kattner 1978) and increase species richness and plant cover coastal vegetative species (Lonard et. Al 2003).

Fire management planning, preparedness, prevention, suppression, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners. Padre Island National Seashore will provide certified employees and equipment to participate in regional and national assignments per national fire level determinations. The seashore will pursue agreements with local agencies and groups including the U.S. Fish and Wildlife Service, the Nueces County Emergency Services District, Corpus Christi Fire Department, the Nature Conservancy of Texas, and civic groups for wildland fire management and urban interface actions. The seashore will coordinate necessary fire activities with the Texas Commission on Environmental Quality, Kleberg County, Kenedy County, Willacy County, and the Texas Forest Service. The Big Thicket National Preserve provides fire management assistance, oversight, and coordination to Padre Island National Seashore, through an Interpark Agreement (Appendix E).

B. Wildland Fire Management Goals

The NPS is committed to protecting park resources and natural ecological processes, but firefighter and public safety must be the first priority in all fire management activities.

NPS fire management activities will be performed in accordance with the principles, policies, and recommendations of the Final Report of the Federal Wildland Fire Management Policy and Program Review, and with Part 620 of the Departmental Manual. Air operations during wildland fire incidents will comply with the provisions of

Director's Order 60: Aviation Management and Parts 350-354 of the Departmental Manual.

All naturally caused wildland fires may be managed to accomplish resource management goals, provided there is an approved fire management plan, and provided they do not compromise firefighter and public safety, threaten property, or violate air quality laws or regulations

The objectives of the wildland fire management program are to:

- Protect human life and property and natural/cultural resources both within and adjacent to agency administered lands
- Restore fire's function in a natural system to maintain species diversity and natural patterns of vegetation succession on the landscape scale
- Minimize damages and maximize overall benefits of wildland fire within the framework of land use objectives and resources management plans
- Manage the wildland fire program in accordance with congressional intent as expressed in the annual appropriations act and enabling legislation, and comply with applicable departmental manual and agency policies and procedures
- Promote an interagency approach to managing fires on an ecosystem basis
- Employ strategies to manage wildland fires that provide for firefighter and public safety, minimize cost and resource damage, and are consistent with values to be protected and management objectives
- Restore and rehabilitate resources and improvements lost in or damaged by fire or suppression activities
- Minimize, and where necessary mitigate, human-induced impacts to resources, natural processes, or improvements attributable to wildland fire activities
- Promote public understanding of fire management programs and objectives
- Organize a fire staff that can apply the highest standards of professional and technical expertise
- Encourage research to advance understanding of fire behavior, effects, ecology, and management

- Integrate fire management through all levels of the planning process
- Prevent and investigate all unplanned human-caused fires

These goals contribute to accomplishing regional and national strategic plans including the 10-Year Comprehensive Strategy, and the NPS Strategic Plan and wildland fire policy. Fire program goals reflect federal fire policy, the core principles and goals of the Comprehensive Strategy, and Cohesive Strategy where supported by land and resource management plans.

C. Wildland Fire Management Options

1. Wildland Fire Suppression

Direct suppression actions will normally only be taken to protect life, property, park buildings, infrastructure, historic resources, and petroleum production and transportation facilities. Generally, direct attack using heavy equipment (engines) will be used along existing roads, preventing resource damage from off-road equipment use and reducing firefighter risk. It is possible that heavy equipment may travel off-road if necessary.

2. Prescribed Fire

Prescribed fire will be used to control hazardous fuels in the urban interface and visitor use areas and to protect petroleum facilities. Park areas likely to have prescribed fire projects include Bird Island Basin, park Headquarters, Malaquite Visitor Center and Campground, oil and gas facilities, and existing road corridors. The use of prescribed fire for the benefit of park resources will not be addressed in this document.

3. Wildland Fire Use

Wildland Fire Use (WFU) is a management strategy to achieve resource benefit from natural ignitions when weather prescriptions are defined and appropriate. Padre Island National Seashore has determined that (WFU) will not be used as a management strategy in the park's fire management program. Little natural resource data is available about the role and affects of fire in the coastal prairie habitat. Also, compliance that is necessary for a WFU program has not been completed. An Environmental Assessment is necessary to analyze the appropriateness of a WFU strategy and its potential affects on park resources and visitors.

4. Non-Fire applications

Mechanical fuel treatments (mowing & line trimmers) along some park road shoulders and around/in the Novillo Line Camp, and other park facilities, will reduce hazardous fuels and reduce accidental vehicle ignitions. Chemical treatments will be addressed in a separate Exotic Plant Management Plan, and used within the purposes and constraints identified on the chemical label (i.e. in wetlands).

D. Description of Fire Management Units

Padre Island is the southernmost island in a chain of barrier islands along the Texas coast. The Laguna Madre, a shallow, hypersaline estuary, separates the barrier island from the Texas mainland. Padre Island extends from the city of Corpus Christi almost to Mexico, with Mansfield Channel splitting the island and forming the southern boundary of Padre Island National Seashore. The park is approximately 70 miles in length and varies in width from .5 miles to 2.5 miles. The rationale for dividing the park into two fire management units for specific fire management strategies includes:

- Ecological factors such as vegetation type, availability of fuels, fire history, wildlife habitat, and threatened and endangered species.
- Sociological factors such as visitor use patterns, interpretive values, and public perception of fire management.
- Management factors such as accessibility, boundaries, cultural resources, petroleum facilities, fire management staff and equipment, travel time, fire management policies and constraints, and research and management information available.

1. Malaquite Beach Fire Management Unit

The Malaquite Beach Management Unit is bordered on the east by the beach and Gulf of Mexico, the Laguna Madre, a hypersaline lagoon, to the west, the park's northern boundary, and the Bird Island Basin road and the end of Park Road 22 as the southern boundary. The Malaquite Beach Management Unit encompasses the area east of Park Road 22 (from the North boundary to the 0-mile marker), and west of Park Road 22 from the north boundary to Bird Island Basin Road (Figure 2). Park Road 22, which is the main road from Corpus Christi to the park, passes north-to-south through the FMU to the Malaquite Visitor Center. The paved Bird Island Basin road and unpaved Novillo line camp road divides the FMU east-to-west.

Historically this area has had the highest occurrences of fires. It contains the largest concentration of visitors, most of the Park infrastructure, and the historic Novillo line camp. Management actions will emphasize the protection of life and safety of park staff, visitors, and fire personnel, and the protection of all structures and facilities.

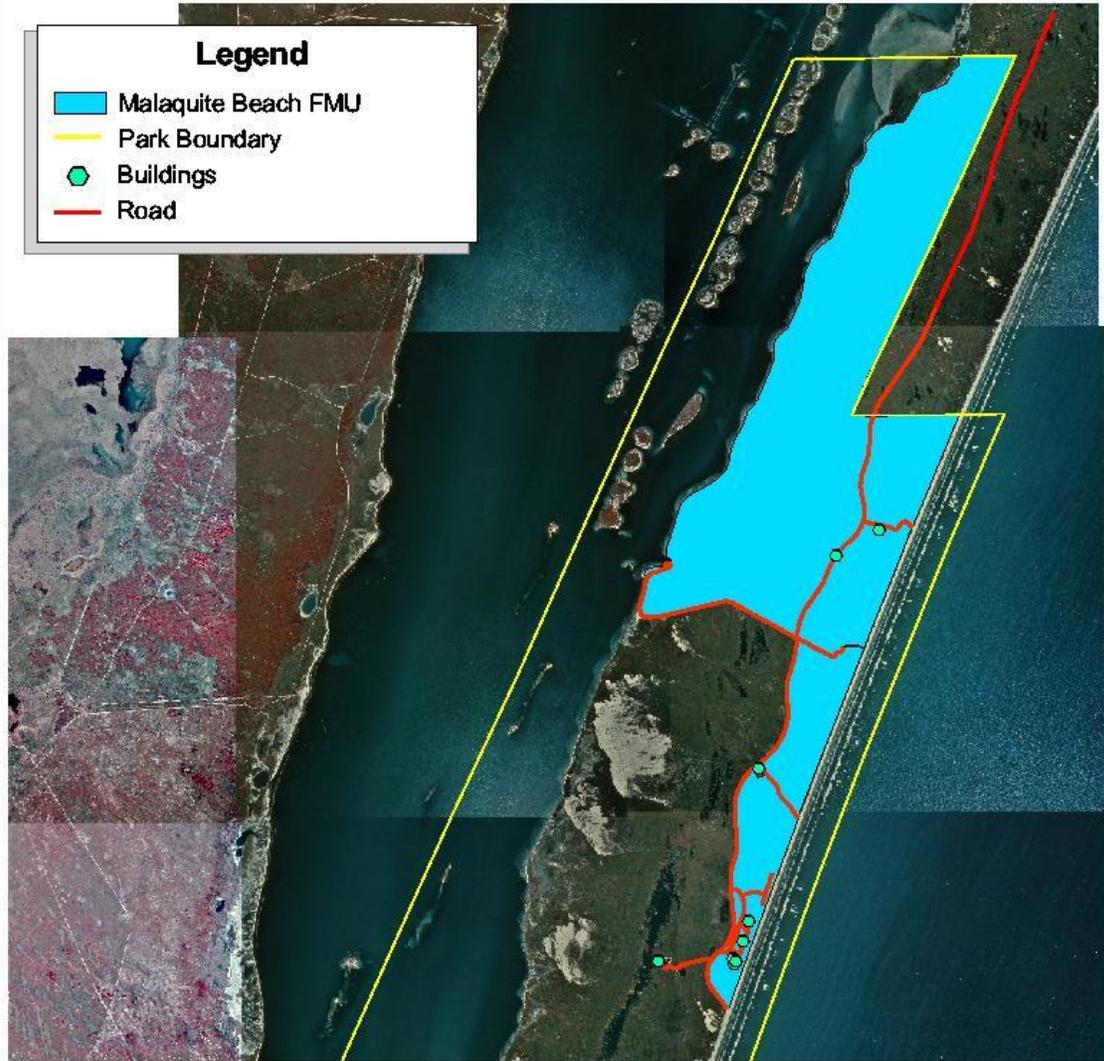
The Malaquite Beach Fire Management Unit encompasses 5,018 acres, which are contained within five treatment areas:

- The North Beach Treatment Area (385 acres) is north of North Beach Access Road to the North boundary (Figure 3).
- The Novillo Treatment Area (412 acres) encompasses the area from the Novillo Line Camp north to North Beach Access Road, and includes the Line Camp and water pumping station (Figure 4).

- The Headquarters Treatment Area (407 acres) encompasses the area north of the Headquarters complex to Novillo Line Camp, and east of Park Road 22 (Figure 5).
- The Malaquite Treatment Area (441 acres) encompasses the area between the Visitor Center and the Headquarters complex, east of Park Road 22 (Figure 6).
- The Bird Island Basin (BIB) Treatment Area (3,373 acres) is north of BIB road to the park boundary, and west of Park Road 22. It includes the visitor use and concession areas adjacent to Laguna Madre (Figure 7).



Malaquite Beach Fire Management Unit



1 0 1 Miles



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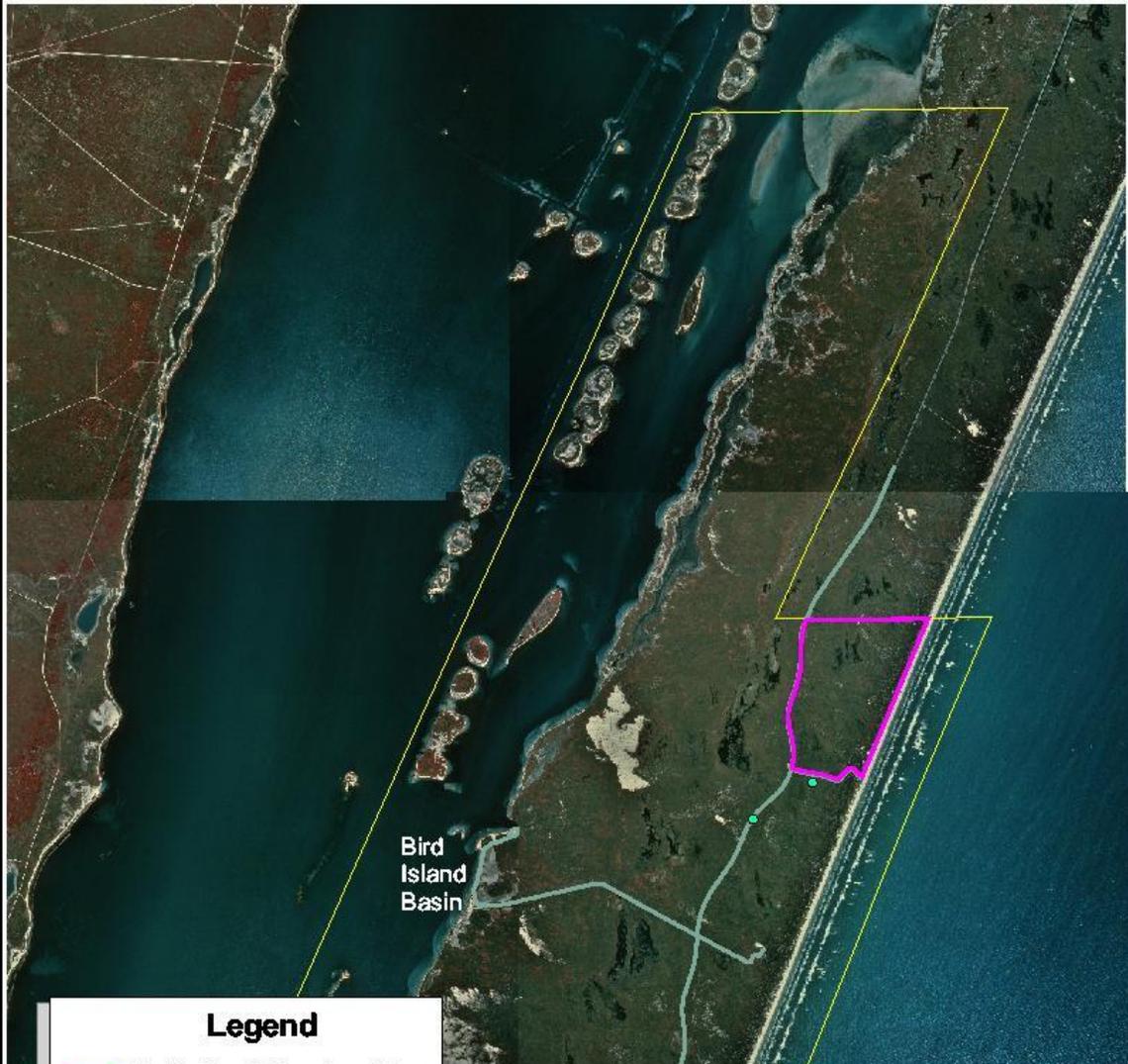
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Figure 2. Malaquite Beach Fire Management Unit.



North Beach Treatment Area



Legend

- North Beach Treatment Area
- Park Boundary
- Buildings
- Road

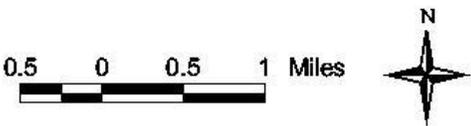
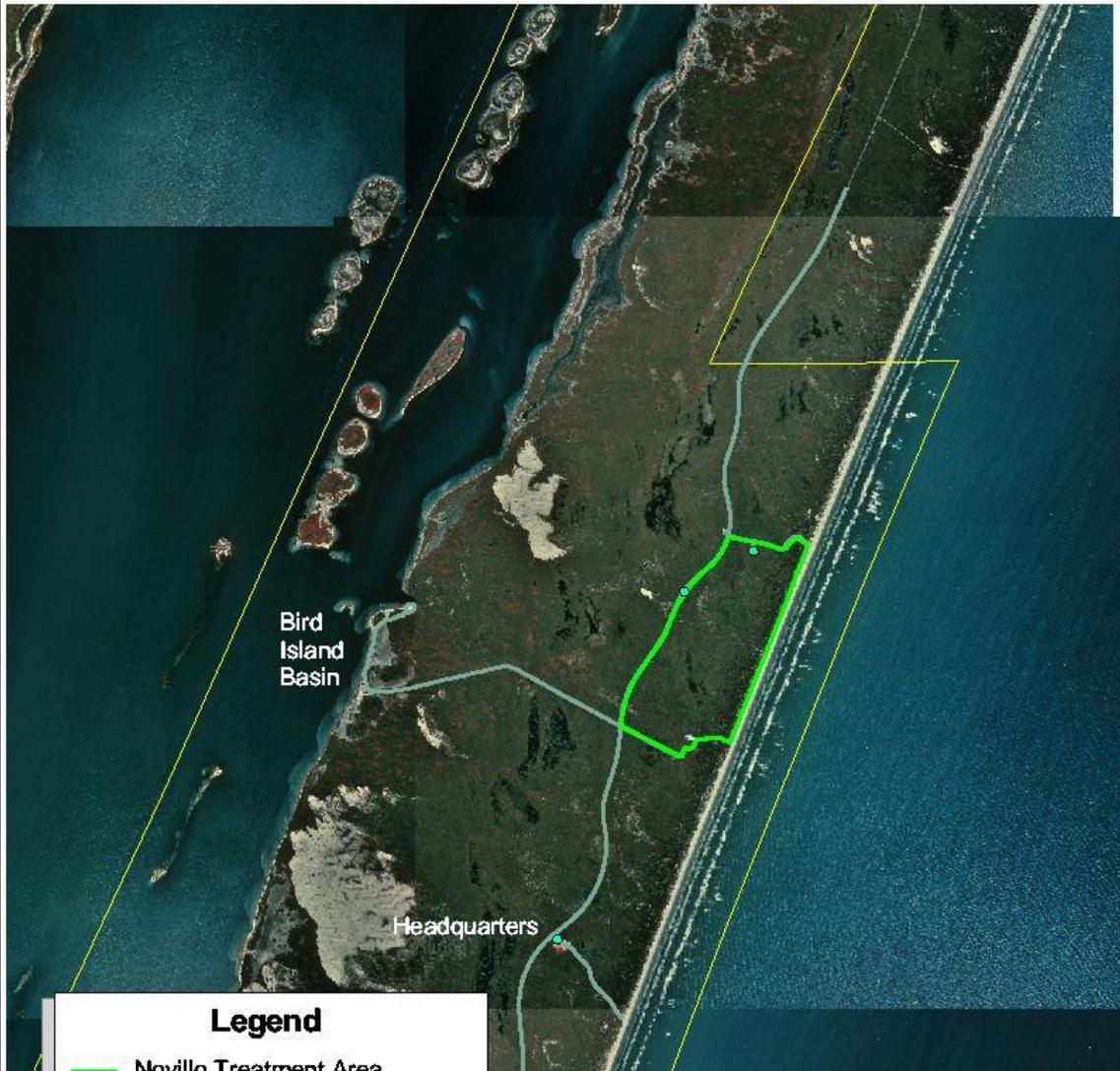


Figure 3. North Beach Treatment Area.

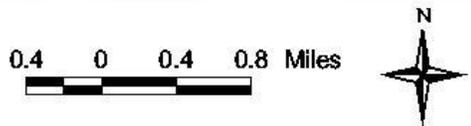


Novillo Treatment Area



Legend

- Novillo Treatment Area
- Park Boundary
- Buildings
- Road



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Figure 4. Novillo Treatment Area.

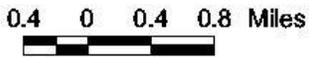


Headquarters Treatment Area



Legend

- Headquarters Treatment Area
- Park Boundary
- Buildings
- Road



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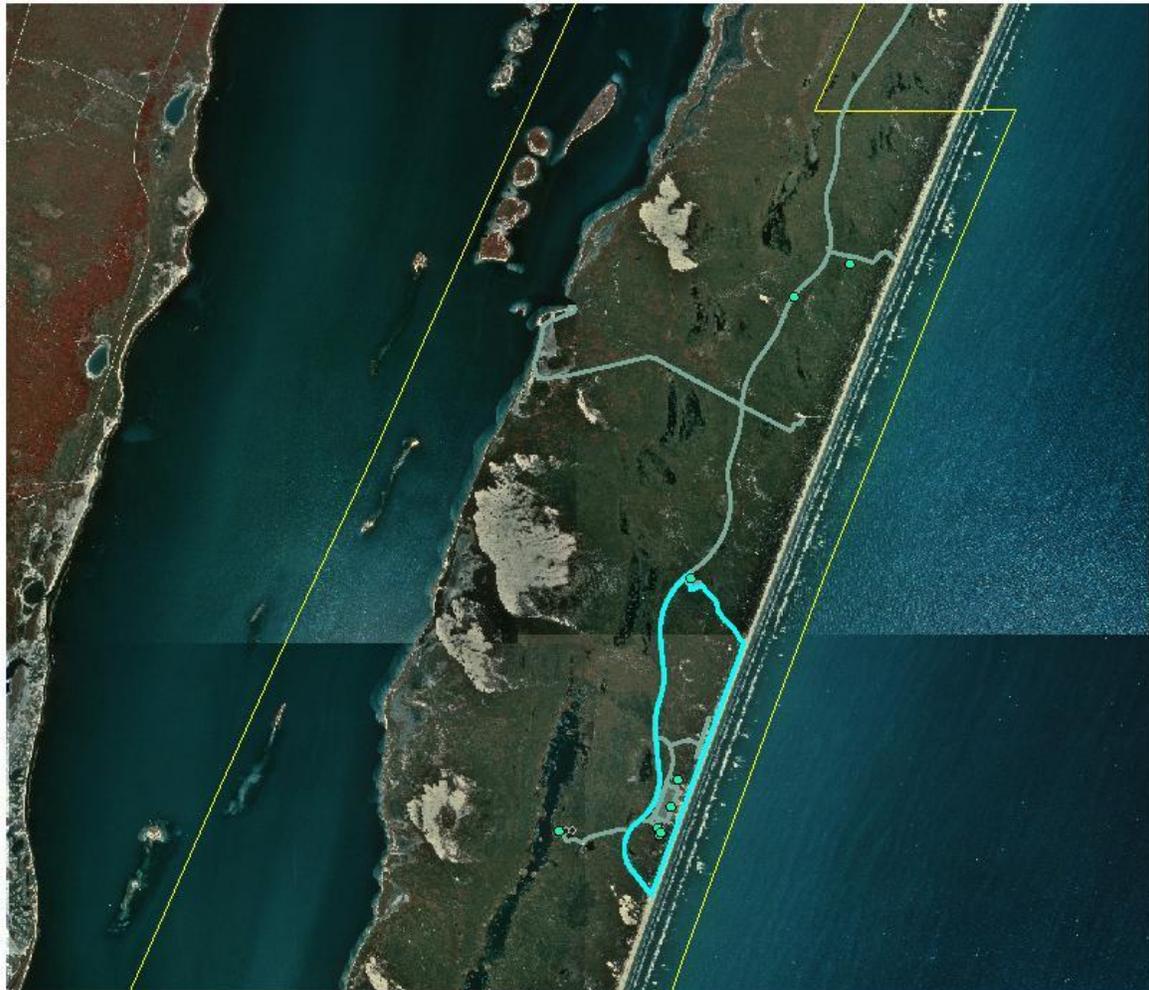
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Figure 5. Headquarters Treatment Area.

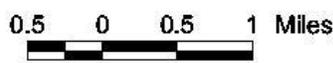


Malaquite Treatment Area



Legend

- Malaquite Treatment Area
- Park Boundary
- Buildings
- Road



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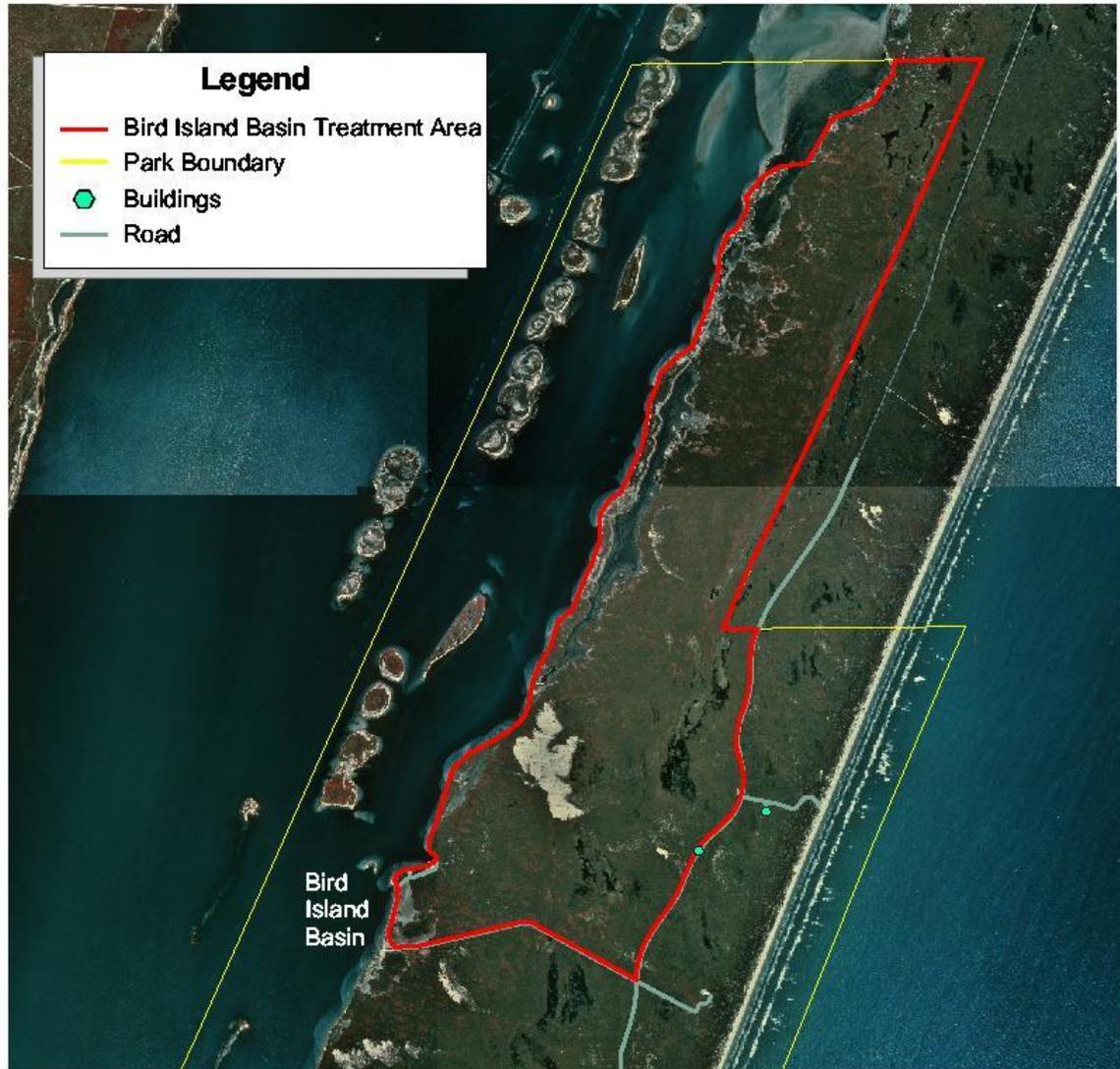
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Figure 6. Malaquite Treatment Area.



Bird Island Basin Treatment Area



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Figure 7. Bird Island Basin Treatment Area.

Natural and Cultural Resources

Climate

The climate is subtropical with long, hot summers, and short, mild winters. Spring and fall are merely transitional periods. Based on 37 years of park rainfall data, the average annual rainfall is 32.89 inches. Increasing rainfall has raised the water table and promoted dune field growths at the expense of sediment export (Kocurek, et al., 1991). On average, September and October receive the most rainfall and December through April receives the least amount (Figure 8).

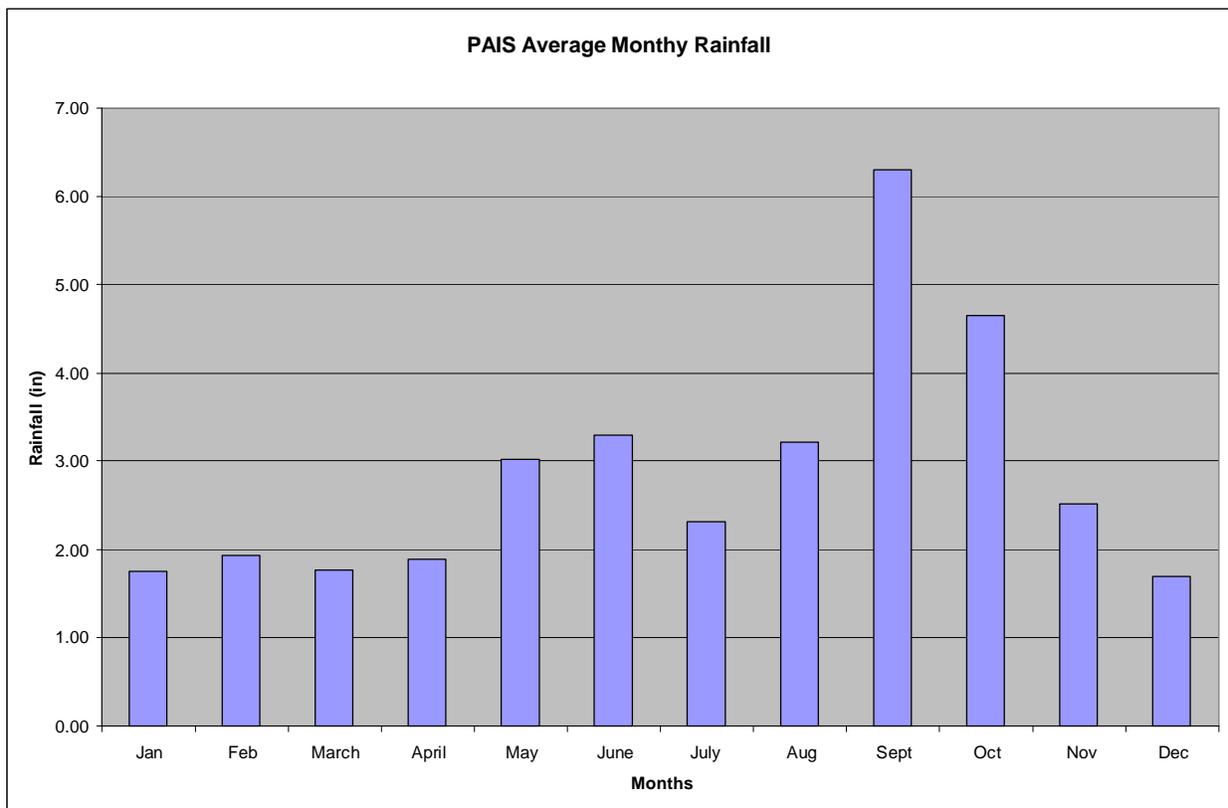


Figure 8. PAIS Average Monthly Rainfall Data based on 37 years of rainfall data.

Temperatures on the island are moderated by tropical maritime air coming off the Gulf of Mexico. Although temperatures on the nearby Texas mainland commonly exceed 100° F during the summer, island temperatures are rarely above 95° F, with a yearly average of 72° F. At Corpus Christi near the northern end of the island, the temperature falls to freezing or below about 10 times per year (Dahl et. al., 1974). Freezing temperatures are less frequent south of Corpus Christi and rare on Padre Island.

Persistent southeasterly winds occur from March to September, and northwesterly winds occur from October to February. Winds typically remain out of a northerly

direction for 2-3 days before switching back to the southeast. Weather on the island is changeable and often dramatic, with high tides and winds, and sudden temperature changes. The hurricane season begins June 1 and lasts through October. Tropical storms or hurricanes are occasional, with an average of 5-10 years between hurricanes along the Texas coast.

The most recent hurricane to hit the park was Hurricane Brett in August 1999. Tidal surges push ashore on the island, erode the beach, and cut washover channels through the foredunes, thereby dissipating the storm's energy. The foredune ridge blocks the storm surge, but it may open channels across the island. In the storm's aftermath, water drains from the mainland and the Laguna back across the island to the gulf through these same channels, which may last longer than four weeks.

Topography

Wind, waves, and currents deposit sand onto the island, which form the dominant topography. Elevations ranging from an average of 20 feet to heights of more than 50 feet along the foredune ridge (Figure 9). The majority of the park is less than 15 feet above mean sea level. Winds may blow loose sand from the fore-dunes and beach across the island, creating active dune fields that move west across the island. Vegetation may grow and stabilize some dunes. The movement of dunes may bury vegetated areas, leaving sparsely vegetated flats or wind deflection troughs. While the typical on-shore breezes gently sculpt the sands, occasional hurricanes produce significant change.



Figure 9. Dunes.

Hydrology

Generally, a freshwater lens underlies the island and overlays a lower saltwater level. Depth to freshwater generally follows the topography and averages four feet below the surface. The extent (depth) of this lens is dependent on rainfall and topography. The grassland areas contain many ephemeral ponds, which may act as firebreaks (Figure 10). Interstitial water acts to reduce or retard heat transmission in soils. This insulating effect tends to protect roots of



Figure 10. Wetlands.

vegetation and allow recovery to proceed rapidly under normal conditions.

Ecosystems

Natural processes have produced a predictable pattern of ecosystems across the island. The sequence from the Gulf of Mexico to the Laguna Madre includes the sand beach, a primary fore-dune ridge, vegetated grass flats with perennial wetlands (shallow brackish and freshwater ponds in the wind-deflation depressions), and vegetation stabilized back dunes, which are shorter than the foredunes. On the west side of the island, active dune fields blend into tidal mudflats.

Soils

In 2002, the Natural Resource Conservation Service (NRCS), formerly Soil Conservation Service (SCS), initiated a parkwide soil survey. The 2002 soil survey has redefined the two previously accepted soil series for the park into nine new soil series. The Daggerhill, Greenhill, Padre, and Pan Am series were formally included in the Galveston series. Daggerhill and Greenhill soils are vegetated, and occupy the foredune ridge, as well as vegetated dunal areas. These soils do not have a water table within six feet. Daggerhill soils contain seashell fragments and have a higher pH than Greenhill soils. Padre and Pan Am soils occupy low dunes (mounds) on the grassland portions of the island. These soils have redoximorphic depletions or a depleted matrix ("gray colors") within 40 inches of the surface and a water table within 40 inches for some time in normal years. Pan Am soils contain seashell fragments and have a higher pH than padre soils.

The Malaquite and Madre series were formerly included in the Mustang series. The Madre series has Sodic soils (soils having a Sodium Absorption Ratio (SAR) of greater than 13 in the 10 to 40 inch control section). Malaquite soils have a Salic horizon (salinity greater than 30mmhos/cm).

The Novillo series was established for freshwater marsh areas that are in the north central portion of the island. The Twin Palms and Yarborough series are set up on dredge material islands occurring primarily along the Intracoastal Waterway and other channels dredged along the upper and lower Laguna Madre. There are two distinct soils occurring in a complex on these spoil islands. The Twin Palms series has a water table generally within about four feet of the surface. Because of better drainage, the Twin Palms series supports vegetation, such as seacoast bluestem (*Schizachyrium littorale*), gulfdune paspalum (*Paspalum monostachyum*), prickly pear cactus (*Opuntia englemannii* var. *lindheimeri*), ragweed (*Ambrosia artemisiifolia*), and scattered mesquite (*Prosopis glandulosa*). The Yarborough series has a water table within 18 inches of the surface. With this poor drainage, it supports vegetation such as seashore saltgrass (*Distichlis spicata*), bushy sea ox-eye daisy (*Borrchia frutescens*), and glasswort (*Salicornia bigelovii*) (USDA, 2003).

Little organic matter is present in the soils except as litter on the surface and living roots penetrating to the freshwater level. Disturbed soils, generally consisting of caliche, exist along paved road shoulders and unpaved roads and parking lots within the park.

Vegetation

Island vegetation is recovering from the cattle-grazing period, which began in the 1800's and ended in the early 1970's. Due to a harsh salty environment, island vegetation is predominantly low-lying grasses, forbs and shrubs, and stunted oak trees that grow on low dunes (Oak Mottes). Trees are not very common in the park and primarily consist of three small oak mottes and black willows that occur near the western edge of the park near the Laguna Madre. Nearly 450 vegetation species have been identified for the park (Nelson 2000). A recent classified landcover map produced for Padre Island National Seashore identified 12 vegetative classes. These classes and their respective acreage percentage of the park include sparse vegetation (6%), emergent vegetation (15%), grassland (10%), beach (3%), urban (<1%), sand dunes (5%), washover channels (<1%), unconsolidated shore (5%), spoil islands (<1%), tidal flats (22%), and three water classifications for ponds (2%), Laguna Madre (23%), and the Gulf of Mexico (10%) (USGS 1998). by the United States Geological Survey in 1998 that identified 12 vegetative classes. Depending on fuel moisture content and surface water conditions, fire will primarily occur within 37% of the park including sparse vegetation, emergent vegetation, grassland, unconsolidated shore, and spoil island vegetation classes. Grassland and sparse vegetation habitats in the Malaquite Beach FMU are dominated by seacoast bluestem (*Schizachyrium littorale*). Vegetation along the wind tidal flats is dominated by seashore dropseed (*Sporobolus virginicus*) and shoregrass (*Monanthochloe littoralis*). A list of vegetation species for Padre Island National Seashore is located in Appendix C.

The role of fire is important in North American grasslands where periodic droughts, high temperatures, and strong winds provide an ideal environment for ignition and perpetuation of fire (Collins and Wallace 1990). Fire has been one of the most important natural disturbances to an ecosystem, but has become less frequent due to the historical impacts of over-grazing on the native vegetation and aggressive fire suppression activities. Some areas currently have fuel accumulations that could contribute to detrimental stand replacing wildfires. Prescribed burning is now seen as a technique to restore the natural processes in an ecosystem. Prescribed burning can create mosaics of vegetation on the landscape (Gottfried et. al., Date Unknown). Plants have the ability to die down to underground organs, exposing only dead tops aboveground. The same adaptation is thought to protect grassland plants from fire. Grassland fires tend to move rapidly, and although soil surface temperatures can vary from 83 to 680°C, soil is a good insulator. Thus, there is little penetration of heat more than a centimeter below the surface (Collins 1990). Soil moisture on the island is not considered a critical problem in prescribed burning due to the high insulating properties of the coarse sand which buffers severe temperatures (Drawe 1975).

The information available on the effects of fire on park vegetation communities is sporadic. Dr. Robert Lonard analyzed the recovery of grassland vegetation following a fire in December of 1999. Based on his research, an increase in live plant coverage and a reduction in leaf litter occurred for more than two years

The information available on the effects of fire on park vegetation communities is sporadic. Dr. Robert Lonard analyzed the recovery of grassland vegetation following a fire in December of 1999. Based on his research, an increase in live plant coverage and a reduction in leaf litter occurred for more than two years following the fire, and a return of species diversity and abundance within 71 days depending on the vegetative communities. Dr. Lonard also documented a rapid increase in grassland species diversity and richness, which surpassed non-burned areas within 51 days of the fire (Lonard et. al. 2004). Dr. Lonard studied the affects of fire on vegetation surrounding wind tidal flats and observed species richness and diversity were restored after 108 days. The primary effect of fire on tidal flat vegetative communities is the reduction in standing dead plants and surface litter. In addition, species richness of burned areas exceeds species richness of unburned areas. More species were documented in the burned areas due to emergence of several ephemeral annuals such as golden tickseed (*Coreopsis tinctoria*) and unidentified dicot and grass seedlings (Lonard et. al. 2003). Research indicated that species density and diversity fluctuated over two years and more species in the burned area as a result of plant species that require more time to re-establish such as sea purslane (*Sesuvium portulacastrum*). Natural fire disturbance can promote patch dynamics, which in turn can enhance community diversity on a larger spatial scale (Sousa 1985).

Large accumulations of litter have occurred in recent years due to the removal of large herbivores and have caused recurrent, unplanned fires. Build-ups of large amounts of litter in grassland regions lower soil temperatures which in turn reduce bacterial activity, tie up nutrients, and slow the general nutrient cycling process (Drawe, 1975).

The vegetated dunes are critical areas for island stability and are easily damaged by human activities, including fire suppression methods. This type of vegetation (Fuel Models 1 and 2) supports moderate intensity, fast moving fires. Rate of fire spread is more dependent on wind condition than on fuel loading. Continuity of fuels is critical to fire management activities.

Invasive vegetation species on Padre Island include Kleberg bluestem, guinea grass, and salt cedar. Other species such as Brazilian pepper, oleander, date palm, and agave occur on dredge material islands in the Laguna Madre portions of the park. Kleberg bluestem is the primary invasive species that concerns park management since it prefers disturbed soils, which are located along each road located within the Malaquite FMU. This species was located in 2002 and is thought to have been brought in with road fill material used along Park Road 22 and oil and gas roads. An initial chemical treatment started in 2003, but sprouting from seed has maintained its presence.

Prescribed fire is commonly used as a method of ecological management for native grassland communities (Grace et. al. 2001). Research has shown that prescribed burns and wildfires have decreased the number of invasive plants within the burned areas. Dr. Lonard's study of the recovery of vegetation after a wildfire in 1999 produced only one exotic species, rabbit foot grass (*Polygomon monspeliensis*) within the burned area (Lonard et. al. 2003), while in his 2004 study no exotic species were established in the burned area (Lonard et. al. 2004). Invasive plants have varying levels of adaptation to fire; therefore plants that are not well adapted to fire tend to be easily eliminated within the burned area. In a study of interactions between fire and invasive plants in temperate grasslands of North America, invasive plants have been categorized into three groups based upon their adaptations to fire. These include, those that are not well adapted to fire and can be easily eliminated, those that are better adapted to burning, but their weaknesses can be exploited if burns are timed to coincide with physiologically vulnerable periods, and those that are extremely well adapted to fire and will not be eliminated through burning alone. This study states that the fire regime does not have substantial negative effects on the native dominant species and, thus, promotes the long-term existence of the native, fire-adapted community (Grace et. al. 2001). In some cases fire promotes the colonization process, but otherwise inhibits an invader. In this case, occasional fires promote an invader while frequent fires are inhibitory (Grace et. al. 2001). Germination of some plants can become stimulated during a fire when the seedcoat becomes scarred, but a biennial plant can be killed if burned during the growing season in its second year of growth. Therefore, frequent burning is recommended as a means of controlling an invasive species.

Archeological Resources

Archeological resources of Padre Island National Seashore include pre-historic and historic sites that record the native American, European, ranching, and maritime cultural associated with the park.

A reconnaissance was conducted in 1974 of the 15 sites recorded by Dr. Story (1968), the 10 sites located by Louis Rawalt between 1934-1974, and the three historic line camps (Scurlock et. al. 1974). The surveyors located approximately half of these sites from artifacts easily observed, while the remaining sites were either covered by sand, vegetation, or were inaccessible due to marshy conditions. Since this time, additional archeological surveys have been conducted in the park that have identified a new site, but has been unable to locate previously identified sites (Rickliss 1998, 1999). Archeological surveys have been conducted of the park's Headquarter and Visitor Center areas. No cultural sites or artifacts were identified from these surveys (Bradford and Payne 1993, and Labadie 1999)

Passage of flames over buried archeology sites will have no impact on artifacts buried more than 2" beneath the sand. Generally, the most significant risk to sites is disturbance or exposure associated with direct suppression methods. Park fire suppression tactics do not utilize off-road vehicle traffic by fire trucks and therefore impacts to park archeological resources are not expected. Handline construction will be

limited to areas where archeological clearances have been met. A second consideration is looting of cultural items after the ground cover is removed. Law enforcement personnel are typically active on fire duty, and will monitor and protect over exposed sites. The final consideration is possible discovery of new sites as vegetation is removed. The Chief Ranger and Chief of Science and Resource Management will be notified immediately, and an appropriate response initiated.

Areas that experience a fire will be surveyed for new archeological resources. Any existing archeological or historic resources damaged by fire will be documented. All archeological resources uncovered as a result of fire will be collected following guidance provided by the Santa Fe Support office and accessioned into the park's collection. Care will be taken to ensure that archeological resources are not lost or damaged as a result of wildland fire suppression activities.

Historic Structures

The Novillo line camp is the park's most significant example of barrier island ranching and is listed on the National Register of Historic Places. The Novillo line camp consists of historic grounds, fences, corrals and chutes, a bunkhouse, an outdoor kitchen, windmill base, and water tank, and represents the historic ranching culture that existed on Padre Island since 1870. Novillo was surveyed by the Southwest Cultural Resources Center in 1979 and again in 1998. Stabilization and management recommendations were made to park management that included the reduction of hazardous fuels to protect the structure from wildland fire. The site is at high risk due to heavy fuel loading of native grasses that surround existing structures. Mechanical reduction of fuels immediately adjacent to the structures (annually mowed – typically during June), and planned ignitions to manage hazardous fuel levels throughout the area will be implemented.



Figure 11. Novillo Line Camp.

Fire Effects on Wildlife

Wildlife is a product of the habitat, which is often the product of fire. Historically, natural fires have always influenced wildlife habitats. Generally, a mosaic of serial and climax stages of vegetation created by a series of fires over time in grassland, shrub, and forest communities is the preferred habitat for the highest diversity and number of wildlife species (Wright and Bailey 1982). Such habitat provides maximum "edge" for nesting, loafing, feeding, and escaping (Leopold 1932). Animals are often well adapted to fire in their environment.

Fire-induced mortality of wildlife is rarely reported for the Southeast. The majority of vertebrates avoid fire by retreating into underground burrows or by emigration. Most reports indicate the major factor affecting wildlife is the abrupt habitat change following the fire rather than direct mortality during the fire (Erwin and Stasiak 1979). Perhaps Means and Campbell (1981) present one of the best statements summarizing the effects of fire on wildlife in the Southeast:

"It is illogical that animals associated with fire vegetation are not themselves at least behaviorally adapted to resist mortality by fire. Indeed, the literature is not convincing that mortality caused by fire is a serious problem for any animal. There are far more papers that mention either the indirect beneficial effects of fire on maintaining habitat quality, or the indirect negative effects due to adverse habitat changes as a result of fire exclusion."

As the park's vegetation has recovered from cattle grazing, deer have become well established and now occur throughout the park. The thickly vegetated flats provide habitat for pocket gophers, moles, weasels, ground squirrels, mice, snakes, and insects. These provide a food source for coyotes, badgers, shrews, bats, raccoons, skunks, rabbits, and armadillos. Forty-one mammal species are thought to occur within the park, but no comprehensive baseline inventory of park mammal species has been conducted for the park. The current mammal species list has been generated from staff and visitor sightings, limited field investigations, range citations in field guides, and database information from other resource agencies. Appendix C provides a list of expected mammal species for the park, but recent mammal projects suggest that the current mammal species are less than previously thought. Harris (1988) reported 33 terrestrial mammal species on Padre Island. In 1979, five species of small mammals were identified by Baccus and Horton in the Big Ball Hill area of the park near the 7-mile marker. Baccus and Horton's study was replicated by Dr. Alan Nelson in 1997 that identified only three small mammal species in the same region, but located eight species in other areas of the park. A long-term drought and vegetation succession following the removal of cattle are cited as likely reasons for the decline in small mammal species.

Taylor (1981) reviewed available research on fire effects on small mammals in the southeastern United States. His literature review reveals the following conclusions: species and density changes following fire are largely attributed to changes in habitat; little evidence of direct mortality is reported; small mammals avoid fire by seeking refuge in underground burrows or by emigration; post-fire population recovery is often dependent upon recovery of ground cover; and home range is slightly reduced by fire.

Lawrence (1966) concluded that some vertebrate species decrease whereas others increase following a burn, no species is totally eliminated, nor is there any apparent diminution of total on a burn after plant growth resumes. He reported in bare ash after

the fire many species were severely exposed to predation and populations of most small animals decreased, but predatory mammals increased.

Bendell (1974) reports that the total number of small mammal species change little following management ignited prescribed burns and the few species that are lost are replaced by new species. He concludes that the persistence of many species in a burned area indicates that they either tolerate a wide range of conditions or that fires burn so unevenly that unburned portions of all habitats are left.

Vogl (1973) did not observe any fire-induced mammal injury during a control burn in a Florida wetland. He states that fire is a variable that is superimposed on varied landscapes with their assorted micro-diversities and multitudes of organisms with inherent biological variations and, therefore, tend to produce multiple changes. Even those changes or effects that man might classify as severe or totally destructive, can produce positive effects for some organisms. He reported that mammal populations in the burned and unburned areas appeared similar four months after the fire. Ford (2001) divided small mammal species into “fire-positive,” such as the Hispid pocket mouse (*Perognathus hispidus*), grasshopper mouse (*Onychomys leucogaster*), spotted ground squirrel (*Spermophilus spilosoma annectens*), and “fire-negative” species such as harvest mouse (*Reithrodontomys flavescens*) and cotton rat (*Sigmodon hispidus berlandieri*). “Fire-positive” mammals include species which live and nests in burrows, species that use ambulatory locomotion in microhabitats with a relatively open herbaceous layer and feed on seeds and/or insects, and species that use saltorial locomotion (Whitaker 1994; Kaufman et al. 1990). “Fire-Negative” mammals include species that forage on invertebrates in the litter layer, species that live in relatively dense vegetation and eat plant foliage, and species that use –at least partially- above ground nests of plant debris (Kaufman et al. 1990).

All mammal species respond differently to fire. Previous studies have documented the succession of species, which is directly related to the succession of plant species following a fire. Inventories have documented a decrease in mammal species in the park, which can be attributed to the changing ecosystem of the island. One of the changes of the ecosystem is the suppression of wildfire. Wildlife habitat is constantly changing and needs some form of maintenance to remain suitable for many animal populations, which has been historically influenced by natural fires. Most birds and mammals that immigrate in response to fire are attracted by food resources (Lyon et al. 2000). Generally, animals are a product of a habitat, which is often a product of a fire (Wright and Bailey 1982).

Amphibians and Reptiles

Historically, 56 species of herptofauna were identified for the park, which was based on staff and visitor observations, range information from field guides, research projects, and museum collections (Rabalais 1975). However, based on a recent survey conducted by the Nature Conservancy of Texas, only 28 reptile and amphibian species were identified for the park (Duran 2004). Despite a reduction in species abundance

likely due to habitat changes from a long-term drought, two new species were identified for the park including the Texas scarlet snake and the woodhouse's toad. See Appendix C for a list of amphibian and reptile species for the park.

Fire-caused changes in plant species composition and habitat structure influence reptile and amphibian populations (Means and Campbell 1981; Russell et al. 1999). Russell et al. (1999) reported that fire in isolated wetlands usually increases areas of open water and enhances vegetation structure favored by aquatic and semi-aquatic herptofauna.

Vogl (1973) reported that some cold-blooded vertebrate mortality was observed and would be expected because of slow-moving and secretive habitats, herptile numbers were far from decimated. There are very few reports of fire-caused injury to herptofauna, even though many of these animals, particularly amphibians, have limited mobility (Russell et al. 1999 and Lyon et al. 2000). The vulnerability of snakes to fire may increase while they are in ecdysis (the process of shedding skin); of 68 eastern diamondback rattlesnakes (*Crotalus atrox*) marked before a fire in Florida, the only two killed were in mid-ecdysis (Lyon et al. 2000). Fire that burns in a mosaic pattern will provide habitat in the unburned areas for many species.

Lyon et al. (2000) reports that little is known about amphibian and reptile immigration and emigration after a fire. Southern diamondback rattlesnakes have been observed sunning themselves in recent burned areas, and on a recent park prescribed fire, two snakes were observed killed by the fire.

Birds

Padre Island hosts large numbers of resident and migratory birds including: peregrine falcon (*Falco peregrinus*), piping plover (*Charadrius melodus*), snowy egret (*Egretta thula*), and the only annually re-occurring nesting population of American white pelicans (*Pelecanus erythrorhynchos*) west of the Mississippi. Due to the high number of park bird species, the importance of the park as foraging, nesting, migratory, and wintering habitat, and the number of protected bird species, Padre Island National Seashore has been designated as a Globally Important Bird Area by the American Bird Conservancy. Approximately 350 bird species occur within the park including 10 federally or state protected species such as the black-capped vireo (*Vireo atricapillus*), cerulean warbler (*Dendroica cerulea*), piping plover (*Charadrius melodus*), reddish egret (*Egretta rufescens*), and brown pelican (*Pelecanus occidentalis*). See Appendix C for a list of park bird species.

Fire-caused bird mortality depends on the species, season, uniformity, and severity of burning. Most birds will leave a burning area to avoid injury, but a few species are attracted to burning areas to take advantage of altered habitat (USDA 2000). Many other species will return in the days and weeks following the fire. Fires that occur during nesting season have the largest affect on birds. Adult mortality from fires is usually considered slight, but nests, nestlings, and fledglings all suffer due to their lack of

mobility (USDA 2000). Species that nest on or near the ground are most susceptible to sustaining fire damage.

Burning can be beneficial to some species by creating an abundance of prey or habitat. Predatory birds and scavengers are often attracted to burned areas because of the abundance of food and lack of cover for prey. Turkey Vultures (*Cathartes aura*) and Crested Caracaras (*Polyborus plancus*) feed on small mammals and reptiles that may perish in the fire, while northern harriers (*Circus cyaneus*), American kestrels (*Falco sparverius*), red-tailed hawks (*Buteo jamaicensis*), and other predatory birds can locate prey more easily due to lack of cover (Tewes 1984). An abundance of invertebrate prey following a fire often attracts many bird species (Smallwood, et al. 1982). In many cases, arthropod density and biomass increase significantly after a fire, benefiting insectivorous bird species. The abundance of dead insects and seeds attract birds such as the bobwhite quail (*Colinus virginianus*) even before the area stops burning (Wright and Bailey 1982). Burned areas around wetlands may also create open areas favored by shorebirds and waterfowl (Vogl 1967, Ward 1968). Without fire, large accumulations of litter in grasslands discourages foraging and renders habitat unusable by ground-dwelling bird species such as the Grasshopper Sparrow (*Ammodramus savannarum*) and Lincoln's Sparrow (*Melospiza lincolni*).

Bird populations in a burned area correspond with changes in food, cover, and nesting habitat (USDA 2000). Depending on the season, migratory birds may be affected indirectly, or not at all if they are not present at the time of the fire (USDA 2000). Raptor populations may increase in a burned area due to the increase in prey and decrease in prey cover (Dodd 1988). Birds that require more cover provided by mature scrub will likely avoid an area for several years after a fire (Beyers and Wirtz 1997). Largest mortality of birds from fire occurs during nesting season. Fires during the nesting season may destroy active nests or kill young. Reproductive success during the following nesting season may be affected by the availability of prey. Fires occurring closer to the nesting season may reduce the availability of prey and decrease productivity, while fires just after nesting season may increase prey numbers and reproductive success for the following years (Finch et al. 1997). Prescribed burns should be avoided during nesting season, and wildfires managed to avoid important nesting areas.

Populations of ground-dwelling bird species are likely to be adversely affected by fire (USDA 2000). Savannah sparrows (*Passerculus sandwichensis*) and clay-colored sparrows (*Spizella pallida*) declined significantly after a fall prairie fire in Saskatchewan, but slowly returned several years after the fire (Pylypec 1991), however, grassland bird species seem to be well adapted to rapid, predictable changes in habitat due to fires. Few grassland species completely abandon burned areas (USDA 2000).

The oak forests (mottes) were significantly reduced during the cattle grazing period and are naturally expanding. These young trees are heavily used as nesting sites and will be protected or carefully under burned during management-ignited fires.

Fire Management Objectives

- 95% or higher of all unplanned and unwanted wildland fires are controlled during initial attack (48 hours or 1,000 acres).
- 5% of high priority condition Class 2 acres are moved to a better condition within 10 years.
- 100% of prescribed burns are conducted in a manner consistent with Federal, State, Tribal, and local smoke management requirements.
- All Treatment Units that contain fire monitoring plots will be monitored and results used to determine appropriate burn intervals.
- Partnerships will be developed with all area agencies interested in assisting the park with its fire program.
- All park facilities and infrastructure including oil and gas locations will be protected by reducing hazardous fuel loading.
- All wildland fires will be mapped and documented.
- All unplanned human-caused fires will be investigated.
- Migratory bird populations and nesting behavior will be considered in all implementation plans.

Management Constraints

In addition to the Wildland Fire Management Goals outlined in Section III, the following objectives apply:

- Ensure that air quality requirements at Corpus Christi are considered in all implementation plans by consulting with Texas Commission on Environmental Quality.
- Tree mortality in Oak Mottes and Black Willow trees must be considered in development of implementation plans, as they provide foraging and perch sites for Neotropical migratory birds.
- No unacceptable impact to cultural resources or T&E species will be allowed.
- Minimum-Impact-Suppression-Tactics will be utilized on all wildland fires where appropriate. Detrimental impact from suppression actions will be considered when formulating all Incident Action Plans.

- Ensure socio-political economic impacts, including urban interface, are considered in developing implementation plans.

Fire History

A limited long-term fire history exists for Padre Island National Seashore. Historical records indicate that an extensive "tall grass prairie" existed on Padre Island (Horizon Environmental Service 1989). Accounts indicate that the Karankawas used the tall grass as cover from which to attack shipwrecked crews in the mid-1500's. Further evidence that expanses of tall grass existed in the park can be gathered from the fact that the island sustained cattle grazing from the 1850's to the early 1970's. Overgrazing reduced the abundance of tall grasses and converted the dominant vegetation to less palatable grasses. Fire may have been used to improve grazing, but the extent and frequency of burning is unknown. Compiling a fire history is difficult since fire scarred trees are absent, and the shifting topography precludes the development of habitats, such as bogs, that can be analyzed for fire occurrence. Without an extensive historical fire perspective, a prescribed burning program must first include research to determine the appropriate fire return interval.

Limited information exists for fires occurring in the park (Appendix N). However, records have been kept for most park fires since 1972. Between 1972 and 2004, 80 fires have been documented ranging from .2 to 4,503 acres and burning a total of 34,429 acres (Figure 12). Padre Island National Seashore experiences both manmade

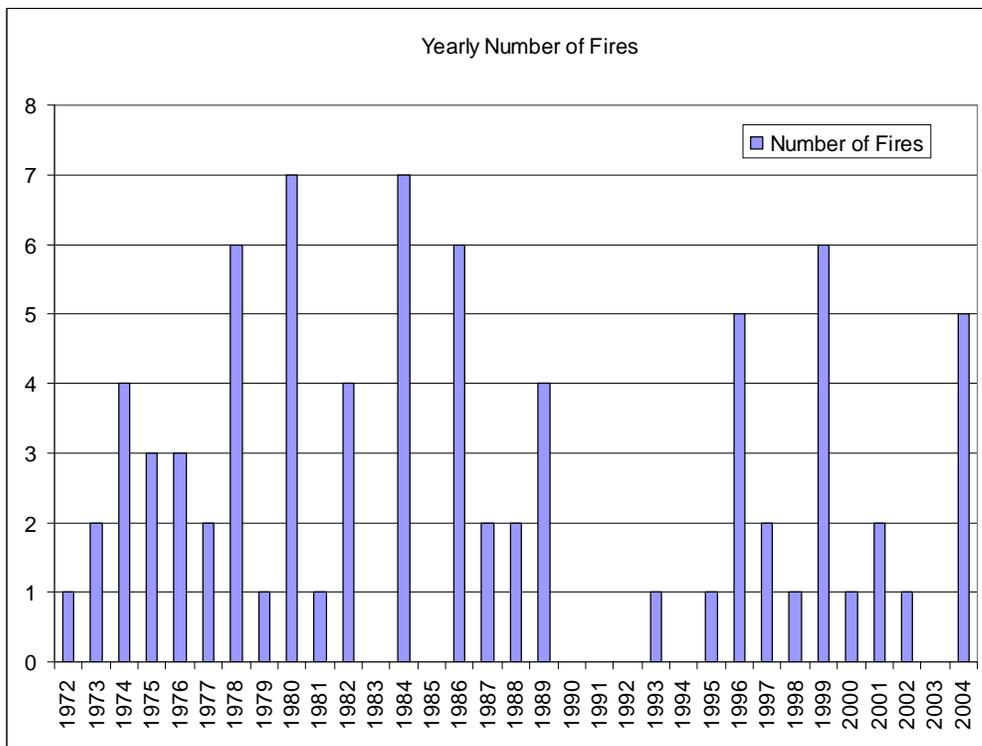


Figure 12. Yearly Number of Fires.

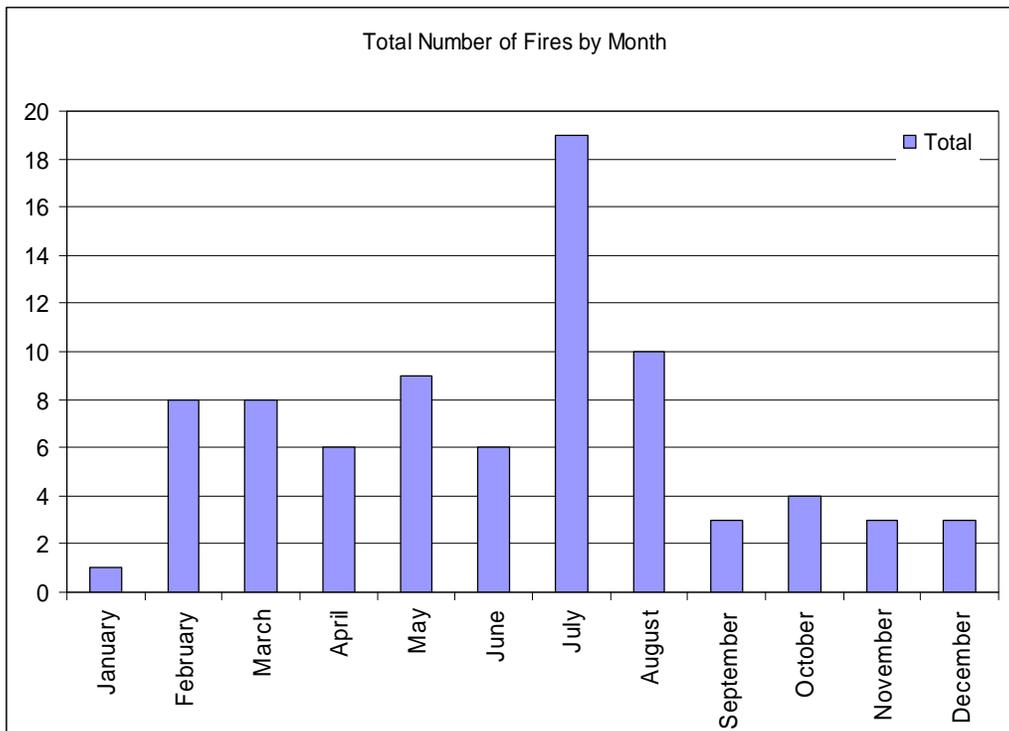


Figure 13. Number of Fire Occurrences by Month.

and natural fires throughout the year. Manmade fires account for 39 historic fires (48.75%), natural fires account for 7 fires (8.75%), and fires with an unknown cause account for 34 fires (42.5%). The park's peak fire season occurs between February and August, which accounts for 82.5% of park fires (Figure 13). The highest fire occurrence happens in the months of July and August, and January having the least number of fires.

Of the 80 historical fires, 35 were less than 10 acres, 10 were between 11 and 50 acres, 4 were between 51 and 100 acres, 11 were between 100 and 500 acres, 11 were between 500 and 1,000 acres, and 9 fires were over 1,000 acres. Fireworks, incendiary flares, vehicles, arson, campfire, smoking, oil and gas equipment, and a single prescribed burn account for the sources of man-caused ignitions. Many fires have occurred along roadways and near camping areas. Fires are most frequent during July when fireworks are available. Fireworks accounted for three of the nine fires greater than 1,000 acres. Lightning accounts for all natural sources of ignition within the park and lightning caused fires account for only seven of the historical fires with an average fire size of 23 acres. Despite low recordings of lightning caused fires, it is highly likely that additional lightning caused fires occur, but are not recorded. In a recent overflight following the passage of a northern weather front, 31 lightning strike fires were documented throughout the park. Most of these strikes did not sustain a fire for an extended period of time, but at least one 26 acre fire occurred. Historical fires have occurred within all eight FMU identified within the park (Figure 14). Forty documented fires have occurred in the Malaquite Beach Fire Management Unit since 1972.

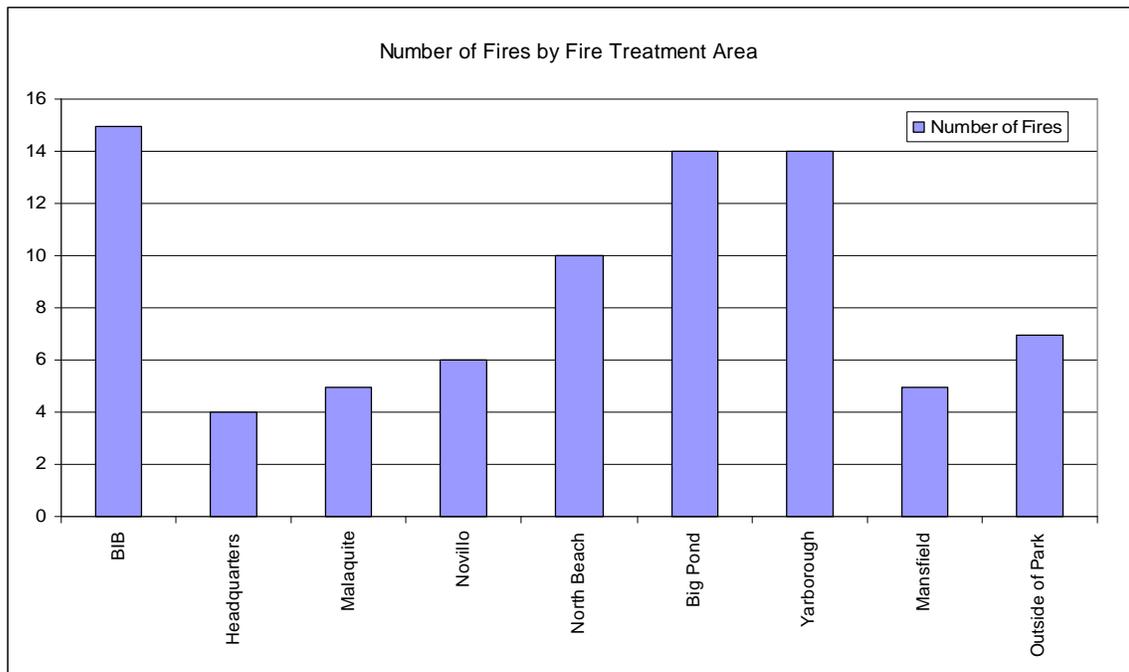


Figure 14. Number of Fires by Fire Management Unit.

The grassy fuels (Fuel Models 1 and 2), and typical breezy conditions along the seashore, occasionally create high rates of spread, resist direct attack, and produce large fires. The extent of which is dependent on the amount of precipitation received (fuel moisture), wind speed (rate of spread), fuel continuity (availability of fuel), and fuel loading.

Fire Management Situation

Historical Weather Analysis

Cold front passage during the fall and winter lifts moisture higher into the atmosphere and produces thunderstorms and widespread rainfall ahead of the front. Long-term soaking rains are produced if it backs up from the gulf as a warm front. During the summer, solar heating lifts moisture above the island, which is carried inland on a sea breeze. This produces thunderstorms and rain showers on the mainland; while the island is significantly drier.

Fire season

The fire season is typically identified as February 1st through August 31st, with July and August being the most active. However, grass is a flashy fuel and can carry an intense fire at any time of the year. The summer fire season can be affected by tropical storms; however, fires can burn over standing water.

Fuel Characteristics

The principal carrier of wildland fire is grass, which responds quickly to changes in relative humidity, and dries quickly in the typical sea breeze. An increase in flammability is apparent during the winter due to curing of annual grasses.

Fire Regime Alteration

The natural fire regime was significantly altered by decades of cattle grazing. The grassy fuels have recovered, but Oak Mottes are limited to a few sites. Suppression actions have been limited, due to vehicle inaccessibility, which has permitted a more natural fire regime. The grassy fuels place this fire management unit in Fire Regime Group 1 [0-35 years, low severity], and Condition Class 2.

Control Problems

Padre Island is exposed to a daily southeast 'sea breeze' that will quickly push a head fire across the island due to flashy fuels. Open ponds, wind tidal flats, and active dune fields provide natural barriers that will be utilized when possible. Vehicle travel should be limited to existing roads and the beach. Fire lines may be constructed using handlines or mechanical methods such as mowing.

Values at Risk

Park resources included in the Malaquite Management Unit that are at risk include the headquarters, visitor center, Bird Island Basin, entrance station, Novillo Line Camp, and water treatment facilities. The headquarters facilities are made of wood that is surrounded by high volumes of grass. The north side of the complex has common cane (*Phragmites sp.*) against the structures, putting them at high risk of loss during a fire. Other park structures with the exception of the water treatment facilities are also constructed of wood and are either at high or moderate risk. See Appendix I.

The Novillo Line Camp is a historic structure composed of salt-cured fence posts and wood. The structure could be protected by clearing fuels with a line trimmer or mower around the posts, bunkhouse, or kitchen if time permits. However, the fast moving fires typical of grassland fires precludes working in front of headfires. This structure is at a high risk of loss during a fire.

Other values at risk include lands adjacent to the park and lands on the mainland of Texas. The lands adjacent to the Seashore's northern boundary are the responsibility of the Texas General Land Office and frequently see wildland fire. The Padre Isles community is located seven miles north of the park, and is occasionally threatened by grass fires occurring on the Texas General Land Office lands. The King Ranch is located on the Texas mainland, across the Laguna Madre from this FMU and is at low risk due to the distance from this FMU.

The closest Class I airshed is Big Bend National Park, 375 miles west-northwest of the seashore. Due to prevailing winds it will not be affected by any smoke plume.

2. Down Island Fire Management Unit

The Down Island FMU begins at the Bird Island Basin Road, west of Park Road 22, and continues past the end of Park Road 22 south to the Mansfield Channel (Figure 15). This unit contains two historical structures and little park development. The primary visitor use occurs along the beach with little visitor use of the back island environment. No paved roads occur within this management unit, but several unimproved roads exist including oil and gas access roads and the Back Island Road. Most of the park's nonfederal oil and gas operations occur within this unit and as of 2004, nine oil and gas production sites and four pipelines are in operation. Each oil and gas operator must address fire prevention and fuels reduction in their approved Plan of Operation. Operators are responsible for the areas around production equipment, along access roads, and surface pads. In each petroleum production area, the appropriate fire management strategy will ensure the protection of the petroleum facilities and the safety of production staff working at these sites.

The Down Island Fire Management Unit encompasses 38,153 acres, which are contained in three treatment areas:

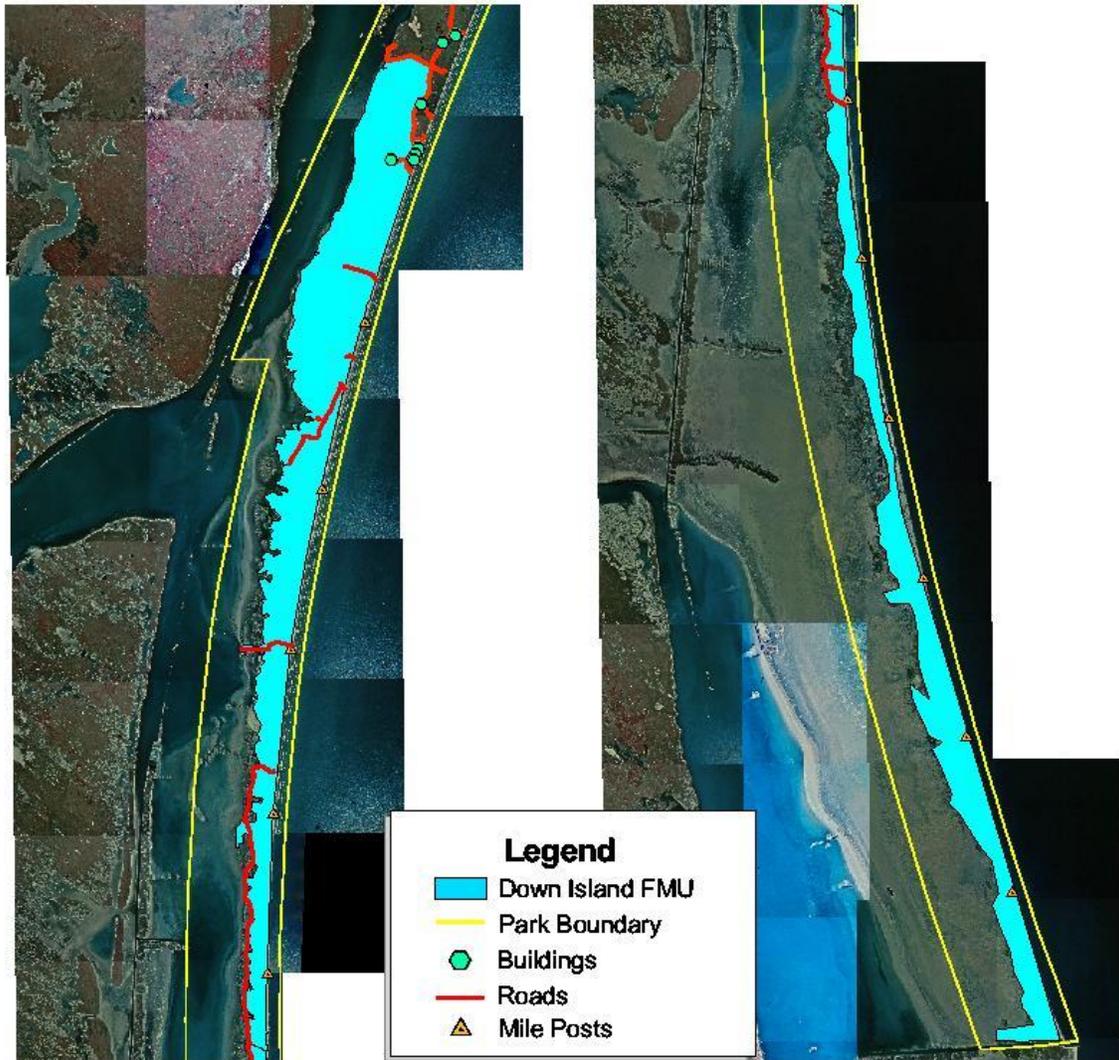
- The Big Pond Treatment Area (13,506 acres) extends from Bird Island Basin Road, west of Park Road 22 south to the western edge of the Pan Am road, which is located at mile post 6 (Figure 16) . This treatment area includes the parks water treatment site, and eight oil and gas production sites and three gas pipelines.
- The Yarbrough Pass Treatment Area (10,399 acres) begins along the eastern edge of the Pan Am Road continuing south to mile post 30 (Figure 17). This treatment area includes one oil and gas production site, three gas pipelines, the Back Island Road, Yarbrough Pass, Black Hill Line Camp, and Green Hill Line Camp.
- The Mansfield Treatment Area (14,248 acres) extends from mile post 30 south to the Mansfield Channel (Figure 18). No oil and gas facilities exist in this treatment unit, but the unit includes the U.S. Army Corps of Engineers disposal site along the Mansfield Channel.

Natural and Cultural Resources

The natural and cultural resources of the Down Island FMU are similar to the Malaquite Beach FMU and therefore the differences between the two FMU's will be described for the Down Island FMU.



Down Island Fire Management Unit



5 0 5 Miles



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Figure 15. Down Island Fire Management Unit.



Big Pond Treatment Area

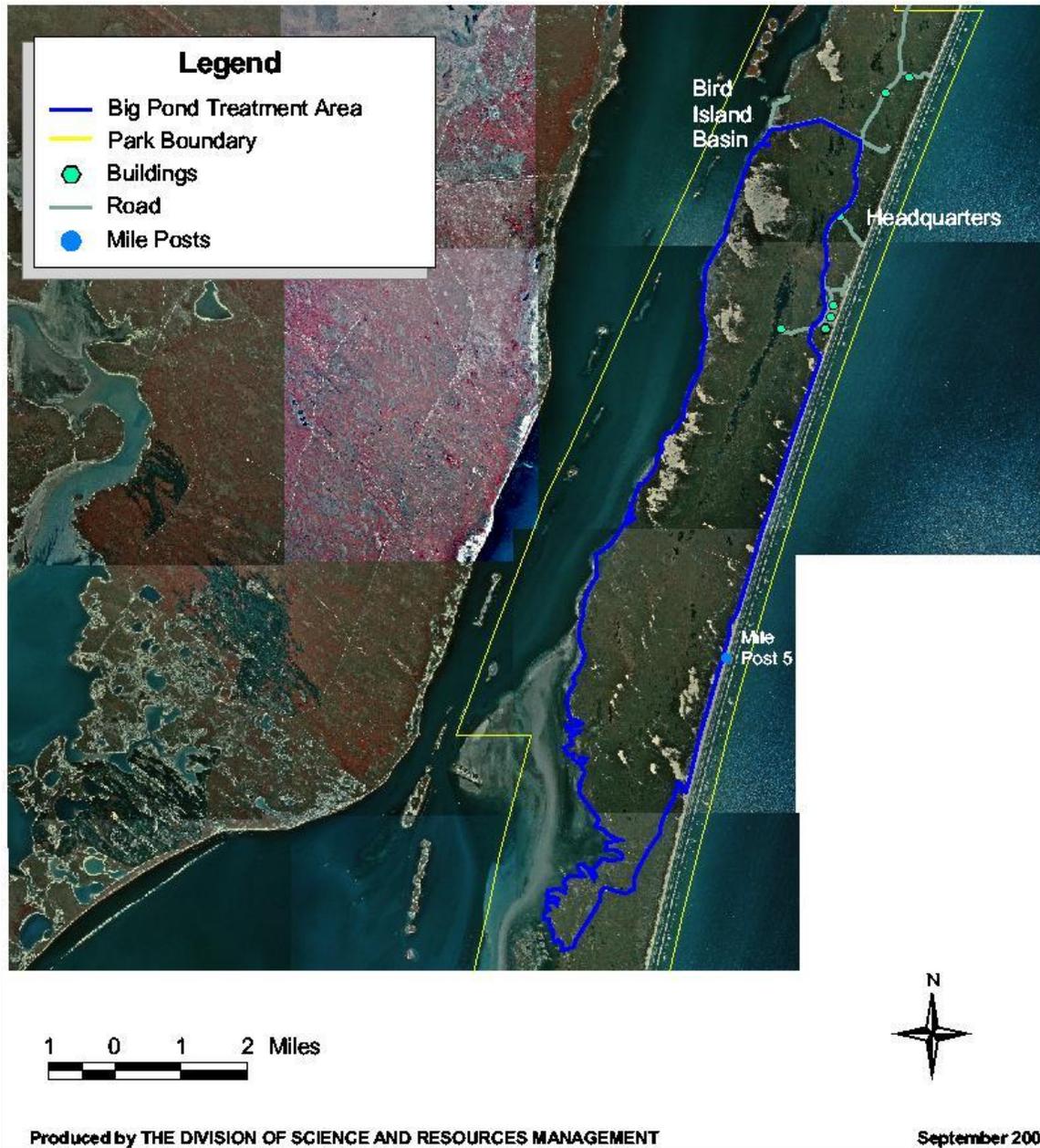
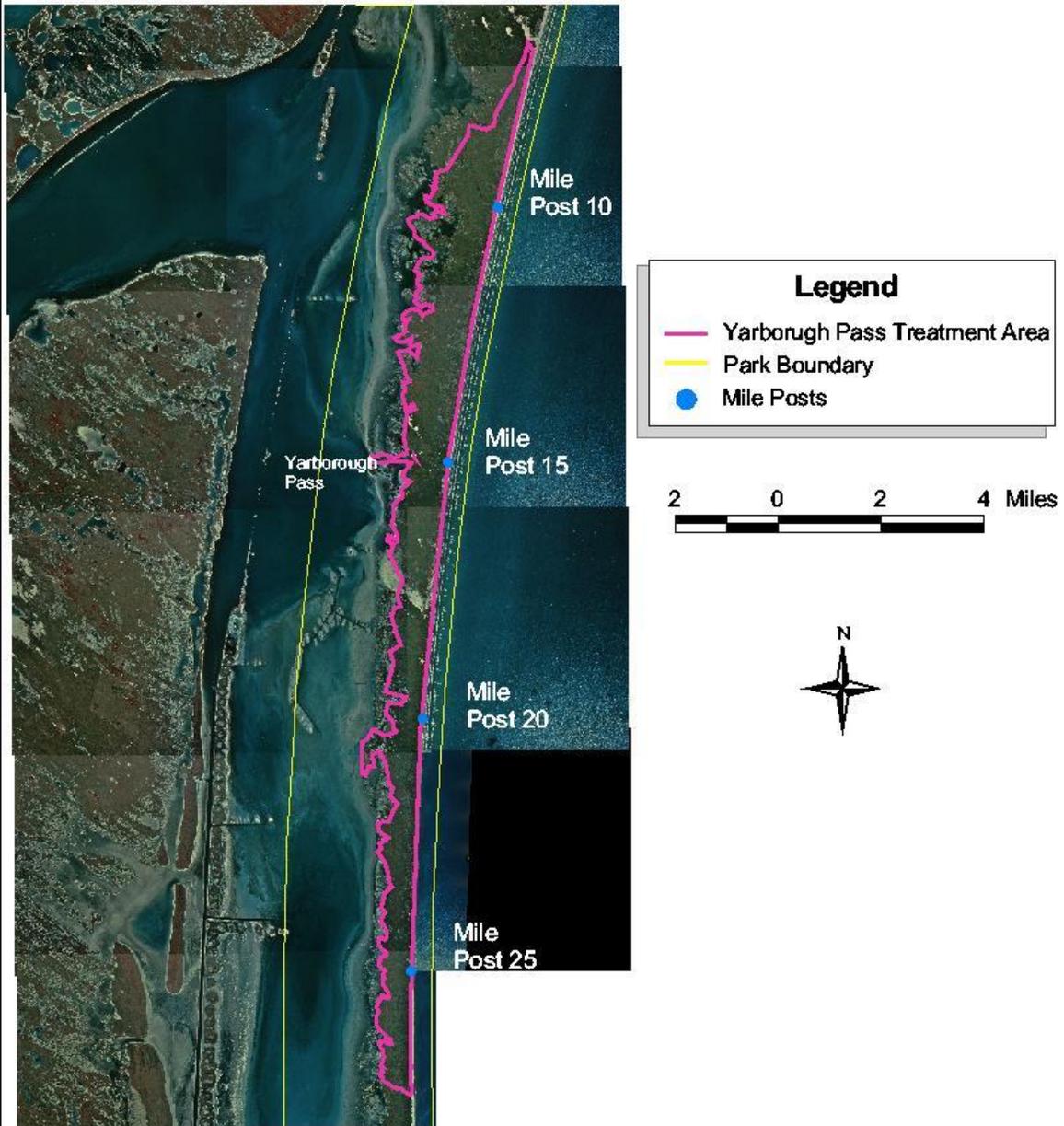


Figure 16. Big Pond Treatment Area.



Yarborough Pass Treatment Area



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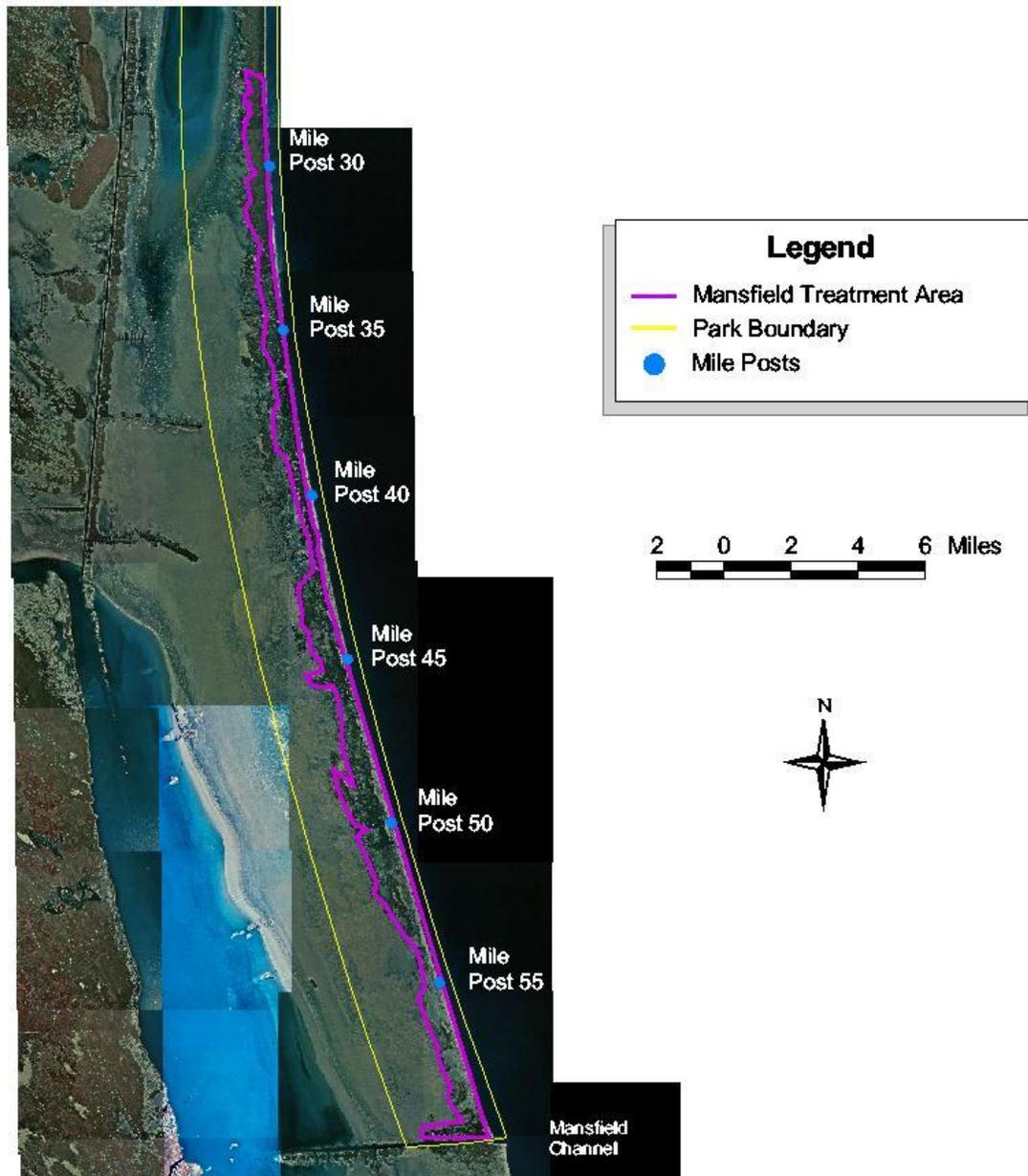
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Figure 17. Yarborough Pass Treatment Area.



Mansfield Treatment Area



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Figure 18. Mansfield Treatment Area.

Climate

The climate is considered more arid than the Malaquite Beach FMU due to a higher rate of evaporation, which results from a higher mean annual temperature of 74°F (Tunnell and Judd 2002). Evaporation rates exceed annual precipitation, which creates the semiarid conditions observed in this FMU. An average of 26" of rainfall occurs annually, which is two inches less than the Malaquite FMU. This amount of rainfall coupled with an average evaporation rate of 62 in/yr, which is observed along the Laguna Madre portion of this FMU (TDWR 1983), further indicate how arid the Down Island FMU is.

Topography

Topography ranges from sea level to dunes reaching a height of 50 feet. The typical topography begins with the beach and Gulf of Mexico on the east, moving westward to the foredune ridge, grassland hummocks, active dunes, unconsolidated shoreline, and wind tidal flats along the Laguna Madre. The topography is dominated by active dune fields interspersed between storm overwash channels and tidal flat habitat, which can provide natural fire barriers (Figure 19). The beaches are steeper and composed of more shell than the fine-grained sands observed on the northern portion of the island. The fore-dune ridge adjacent to Little Shell and Big Shell Beaches in the north end of this FMU is high and continuous, but beginning near mile post 35, the dune ridge becomes segmented due to the storm overwash channels. The highest elevation is reached in the foredunes and back dune environments.

Hydrology

Fewer surface ponds and vegetated wetland environments exist in this FMU. Surface water generally occurs from rainfall, or storm events that open overwash channels allowing tidal flow from the Laguna Madre or Gulf of Mexico. Increased acreage of tidal flat habitat exists affecting water flow and ponding.



Figure 19. Storm Overwash Channel and Unconsolidated Shoreline.

Ecosystems

Natural processes have produced a predictable pattern of ecosystems across the island. The sequence from the Gulf of Mexico to the Laguna Madre includes the sand and shell beach, a primary fore-dune ridge, vegetated grass flats, barren (sandy) back island dune fields, and the wind-tidal flats.

Soils

Six new soil series exist for the Down Island FMU and include the Malaquite and Madre series, which were formerly included in the previous Mustang soils series and the Daggerhill, Greenhill, Padre, and Pan Am series, which were formally included in the Galveston series.

Daggerhill and Greenhill soils are vegetated, and occupy the foredune ridge, as well as vegetated dunal areas. These soils do not have a water table within six feet. Daggerhill soils contain seashell fragments and have a higher pH than Greenhill soils. Padre and Pan Am soils occupy low dunes (mounds) on the grassland portions of the island. These soils have redoximorphic depletions or a depleted matrix (“gray colors”) within 40 inches of the surface and a water table within 40 inches for some time in normal years. Pan Am soils contain seashell fragments and have a higher pH than padre soils.

The Malaquite and Madre series were formerly included in the Mustang series. The Madre series has Sodic soils (soils having a Sodium Absorption Ratio (SAR) of greater than 13 in the 10 to 40 inch control section). Malaquite soils have a Salic horizon (salinity greater than 30mmhos/cm).

Little organic matter is present in the soils except as litter on the surface and living roots penetrating to the fresh water level. Sandy soils respond poorly to mechanical fire suppression methods. Use of equipment on vegetated dunes and coppice dune structures will be avoided. Handlines create trenches, damage vegetation and expose soil to wind erosion. Minimum Impact Suppression Tactics (MIST) handlines will generally require a burnout operation due to the rate of spread of the typical barrier island fire.

Vegetation

This section of the island is also recovering from nearly two centuries of cattle grazing. Vegetation is generally less dense than in the Malaquite Beach FMU, due less rainfall and higher evaporation rates. Seacoast bluestem (*Schizachyrium littorale*) and gulfdune paspalum (*Paspalum monostachyum*) dominate the sparse vegetation and grassland habitats in the Down Island FMU (USGS 1998). Continuity of fuels is critical to fire management activities. A list of vegetation species for Padre Island National Seashore is located in Appendix C.

Salt cedar (*Tamarix ramosissima*) is the only invasive vegetation species known to occur in this FMU. Salt cedar is located near mile post 25 and is associated with the Greenhill Line Camp historic structure.

Archeological Resources

Cultural resources and previous archeological surveys are similar to those described for the Malaquite Beach FMU. Cultural resources include Native American, historic, pre-historic, and maritime archeological resources. In a survey conducted by Rickliss in 1999, attempts were made to re-locate previously identified cultural sites. Previous

sites were located along with a new site that documented a pre-historic camp. Dr. Rickliss noted that the majority of the areas surveyed were buried and protected with sparse vegetation. This FMU includes the Mansfield Cut Underwater Archeological District

The passage of flames over buried archeology sites will have no impact on artifacts that are buried beneath the sand. Generally the most significant risk to archeological sites is disturbance or exposure associated with direct suppression methods. Handline construction will be limited to areas where archeological clearances have been met. A second consideration is the illegal removal of cultural items after the vegetative ground cover is removed. Law enforcement personnel are typically active on fire duty, and will monitor and protect newly exposed sites. The final consideration is possible discovery of new sites as vegetation is removed. The Chief Ranger and Chief of Science and Resources Management will be notified immediately, and an appropriate response initiated.

Historic Structures

The Dunn family established two ranching line camps known as Blackhill and Greenhill, which are located south of the park's Visitor Center. The remnants of these line camps consist of fences, corrals, chutes, and gates, but no buildings. Little historic fabric is left of both Blackhill and Greenhill, but both sites are listed on the National Register of Historic Places since they represent examples of a century of barrier island cattle ranching. Both line camps were surveyed in 1998 by support staff from the Southwest Support Office. Hazardous fuel levels exist at both sites. Greenhill has been subjected to at least four wildfires since 1980, but there is no history of a fire occurring at the Blackhill site.

Fire Effects on Wildlife

The effects of fire on park wildlife resources are similar to those identified in the Malaquite Beach Fire Management Unit and therefore are not re-evaluated in the Down Island Fire Management Unit.

Amphibians and Reptiles

The effects of fire on amphibians and reptiles in the Down Island FMU are similar to those identified in the Malaquite Beach Fire Management Unit and therefore are not re-evaluated.

Birds

The effects of fire on birds in the Down Island FMU are similar to those identified in the Malaquite Beach Fire Management Unit and therefore are not re-evaluated.

Fire Management Objectives

- 95% or higher of all unplanned and unwanted wildland fires are controlled during initial attack (48 hours or 1,000 acres).

- 5% of high priority condition Class 2 acres are moved to a better condition within 10 years.
- 100% of prescribed burns are conducted in a manner consistent with all Federal, State, Tribal, and local smoke management requirements.
- All Treatment Units that contain fire monitoring plots will be monitored and results used to determine appropriate burn intervals.
- Partnerships will be developed with all area agencies interested in assisting the park with its fire program.
- All park facilities and infrastructure including oil and gas locations will be protected by reducing hazardous fuel loading.
- All wildland fires will be mapped and documented.
- All unplanned human-caused fires will be investigated.
- Migratory bird populations and nesting behavior will be considered in all implementation plans.

Management Constraints

In addition to the Wildland Fire Management Goals identified in Section III, the following objectives will apply:

- Minimum-Impact-Suppression-Tactics will be utilized on 100% of all wildland fires. Detrimental impact from suppression actions will be considered when formulating all Incident Action Plans.
- Ensure that all implementation plans include protection of petroleum facilities, and the safety of workers at these sites.
- Ensure that air quality requirements at Corpus Christi are considered in all implementation plans by consulting with Texas Commission on Environmental Quality.
- No unacceptable impact to cultural resources or T&E species will be allowed.
- Ensure socio-political economic impacts, including wildland urban interface, are considered in developing implementation plans

Fire History

The historic role of fire in this FMU is similar to Malaquite FMU. Most fires are 'natural outs' as inaccessibility reduces initial attack effectiveness. Based on the park's fire history from 1972, thirty three fires have been documented in this FMU including five

lightning caused fires, 14 man-caused fires, and 14 fires with an unknown cause. Down island fires have ranged in size from .4 to 4,503 acres. The Back Island Road, Pan Am Road, and Yarborough Pass areas have had a considerable portion of the fires. Few fires are documented in the southern 30 miles of the park, but it is likely that undocumented fires occurred. Despite low recordings of lightning caused fires, it is highly likely that additional lightning caused fires occur, but are not recorded. In a recent overflight following the passage of a northern weather front, 31 lightning strike fires were documented throughout the park. Most of these strikes did not sustain a fire for an extended period of time, but at least one 26 acre fire occurred.

Fire Management Situation

Historical Weather Analysis

The southern end of the island is significantly drier with less average annual rainfall, higher evaporation, and higher average temperatures. Summer temperatures are rarely over 95, while mainland temperatures commonly exceed 100. Dominant winds are from the southeast (15 to 25 mph) unless influenced by a winter cold front (producing north to northeast winds).

Fire Season

The park's peak fire season occurs between February 1st and August 31st, which accounts for 82.5% of all park document fires. The highest fire occurrence happens in the months of July and August, and January having the least number of fires. The principal carrier of wildland fire is grass, which responds quickly to changes in relative humidity and dries quickly in the typical sea breeze. As dead fuels accumulate over time, and are capable of carrying a fire within hours of a rainstorm, a wildfire can occur at any time of the year. An increase in flammability is apparent during the winter due to curing of annual grasses. An increase in fire occurrence begins in late winter during the month of February.

Fire Regime Alteration

The grasses have recovered from grazing, placing this fire management unit in Fire Regime Group 1 [0-35 years, low severity]. Remoteness and inaccessibility has prevented effective initial attack, maintaining the natural fire regime. Natural ignitions and most man-caused ignitions have historically not been suppressed as they burn across the island. This is defined as Condition Class 1 (low departure from historical or natural range of variability).

Control Problems

Padre Island is exposed to a daily 'sea breeze' during the spring, summer, and fall that will quickly push a headfire across the island due to flashy fuels. The beach, open ponds, wind tidal flats, active dune fields, and Mansfield Channel provide natural barriers that should be utilized when possible. Vehicle travel should be limited to existing roads and the beach; however, ATV's could be used to access the center portions of the park due to their ability to cause negligible impacts to park habitats.

Values at Risk

Park resources included in the Down Island Fire Management Unit that are at risk include the sewage treatment facility. All current petroleum facilities are located in this FMU and should be protected by indirect line and burnout.

The Blackhill and Greenhill Line Camps are historic structures composed of salt-cured fence posts and wood. The structures could be protected by clearing fuels with a line trimmer or mower around the posts, bunkhouse, or kitchen if time permits. However, the fast moving fires typical of grassland fires precludes working in front of headfires. The Blackhill structure is at a high risk of loss during a fire given the fuel loading currently present, while Greenhill is at moderate risk of loss during a fire, due to the fact that numerous fires have burned through the site and little historic fabric remains.

The only adjacent landowner is the Texas General Land Office, which owns the land to the west of this FMU. However, these resources are not at risk from fire since the adjacent lands are comprised of wind tidal flat habitat, which cannot support fire. The King Ranch is located on the Texas mainland, across the Laguna Madre from this FMU and is at low risk due to the distance from this FMU.

The closest Class I airshed is Big Bend National Park, over 400 miles west-northwest of the seashore. Due to prevailing winds it will not be affected by any smoke plume.

IV. WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

A. General Implementation Procedures

Implementation of the wildland fire management components must be consistent with fire management capabilities, and should consider the current and predicted conditions affecting fire behavior. Preplanned decisions based on historical fire behavior indices should be considered to most efficiently aid in Stage I decisions requiring appropriate management response. Fire managers will use these strategies for expediting the decision-making process when determining an appropriate level of action.

A Wildland Fire Implementation Plan (WFIP) will be initiated for all wildland fires. The Initial Attack Incident Commander will complete the Stage I: Initial Fire Assessment that provides the decision framework for selecting the appropriate management response. The appropriate management response for human-caused fires will not consider resource benefits, and these fires will be suppressed. Specific WFIP are outlined in Chapter 4 of the Wildland and Prescribed Fire Management Policy Implementation Procedures Reference Guide.

Stage I: Initial Fire Assessment includes the Fire Situation and the Decision Criteria Checklist (Appendix G). The Stage I analysis documents the current and predicted situation, all appropriate administrative information, and aides managers by providing

them with decision criteria to manage the fire. Suppression, using direct attack on small fires within reach of an engine-hose (without cross-country travel), or indirect tactics on large running fires are the only appropriate responses in the Malaquite Beach FMU because of urban interface factors. A limited suppression response in the Down Island FMU could include burnout around petroleum production facilities and historic structures, but safety awareness and risk mitigation are essential.

Stage II: When the fire grows into an extended attack status, the fire overhead and park fire and resource management staff will complete the Short-Term Assessment. It includes estimates of fire size and shape at given times, develops tactical alternatives, determines resource needs, and suppression costs estimates. A numerical complexity analysis is also generated which will guide the determination of overhead needs. Periodic fire assessments should be completed daily in the Malaquite Beach FMU and at least every other day in the Down Island FMU.

Stage III: When fire assessments indicate a long-duration fire situation, the Stage III analysis is used to determine the Maximum Manageable Area, long-term fire behavior predictions and risks, contingency plans and mitigation measures, and the probability of success. This stage must also have periodic fire assessments. The Malaquite Beach FMU does not have sufficient acreage to contain a long-duration fire. The Down Island FMU has sufficient acreage, but fuels and historic weather conditions make the likelihood of a long-duration fire remote.

A Fire Situation Analysis is used to guide fires that have not been controlled by initial attack. Wildland fires moving north out of the park will travel across Texas General Land Office tracts and may reach private lands near the Corpus Christi city limits. Incident Command may transfer to the fire department having jurisdiction on these lands or to the Texas Forest Service, particularly if the fire moves into extended attack (2nd burn period). The Fire Situation Analysis and Incident Action Plan will be developed utilizing the procedures developed by the organization that has command of the fire suppression activities. Padre Island National Seashore may provide a resource advisor to serve as a liaison between the park and the fire department or the Texas Forest Service, and firefighting resources to assist with the suppression effort.

B. Wildland Fire Suppression

The island's grassy ecosystem is fire adapted. Direct attack suppression actions will normally be used to protect park infrastructure, visitor use facilities, and petroleum operations.

1. Fire Behavior

The principal carrier of fire on Padre Island is grass, and fire behavior is easily predicted within the existing computer models. Areas with light fuel loads (<1' high, .7 Tons/acre) are represented by Fuel Model 1, while more productive areas (2 1/2' high, 3 Tons/acre) are predicted by Fuel Model 2. Both consist entirely of 1-hour fuels. This fuel category

responds quickly to changes in relative humidity. It is possible to have a hot running fire several hours after a rain shower, particularly if solar radiation is high. The difference in Moisture of Extinction for FM1 (12%) and FM2 (25%) may permit burning heavy grass stands without adjacent light fuels carrying the fire. This would be accomplished in the evening as relative humidity is rising. Rate of fire spread is more dependent on wind condition than on fuel loading.

2. Preparedness Actions

Fire Prevention Activities

The main objectives of the fire prevention program, is to reduce the threat of human caused fires through visitor and employee education. This can be accomplished by integrating the prevention message into interpretive programs. As the fire danger increases, Park personnel will be advised of the danger and incorporate fire observation in the daily routine. Fire detection will generally be through routine patrols and activities of the park staff. Increased patrols and awareness will be implemented during very high to extreme fire danger periods. Specific actions are outlined in the Staffing Class section.

Prior to each fire season dispatch personnel will be trained in procedures and contacts. The Fire Program Manger or designee will review the Fire Management Plan and Step-up Plan. The park's dispatch office will maintain an updated roster of fire-qualified personnel. Annual inventory and inspection of hand tools, personal fire packs, and equipment and other fire supplies will be conducted.

Training

All employees working on any fire assignment will be qualified for the position assigned according to the National Wildland Fire Qualification System. All fire personnel will meet physical fitness standards required by RM-18. Supervisors will encourage employee participation in fire management activities and develop training plans. Fire personnel will perform the physical fitness test and attend an 8-hour annual safety refresher training, prior to assuming any operational fire duties. The park will provide training on the use of hand tools, fire truck operation and certification, grass fire behavior, safety, fire management concerns, and the Step-up Plan. The Fire Program Manager (FPM) will approve and coordinate interagency training opportunities with the Cluster Fire Management Officer (FMO). The Big Thicket National Preserve's Fire Program Assistant will update fire training and fire experience records annually.

Readiness

The FPM will complete an annual readiness inspection at which time, supplies and equipment will be inspected, serviced, and inventoried. Replacement of stock items will be coordinated with the Cluster FMO. Personal Protective Equipment (PPE) will be issued on an as-needed basis through the cluster fire staff and park FPM.

Fire engine (Type VI): The Park has one Type VI fire engine that is stored in the engine bay at Park Headquarters. The engine will be operated by a qualified Engine Boss or

Engine operator as described in the interagency Standards for Fire and fire Aviation operations 2004. Weekly running, inspection, and preventative maintenance of the engine and slip-on units will be conducted. Hydrants, hoses, and nozzles will be inspected and tested annually.

Fire cache: A selection of issue items (IA gear, Red-bags, helmets, headlamps, canteens, consumables, etc.) and hand tools typically used on local wildland fires will be stocked. Nomex clothing will be requested from the Cluster FMO, as maintaining the necessary size selection is expensive and can be easily shipped.

Fire Weather and Fire Danger

The dominant park fuel type is grass, with several scattered oak mottes near Bird Island Basin and black willows along the western edge of the park near the Laguna Madre. Such fuels ignite readily and spread rapidly under the right conditions. The late winter, after grasses have cured and before greenup can occur, has the potential for wildfires and prescribed fires should be conducted during this period. Mitigation for migrating birds is essential. July and August are typically the hottest months when conditions in the park peak for fire ignitions and fire behavior, and large fire growth is possible.

Padre Island has a fire weather station (#418501) which became operational in 1981 and has been monitored consistently until the mid-1990's. Since that time, data gaps exist for park fire weather observations. Weather data will be collected daily at 1:00 pm by park dispatch staff, so that long-term records can be established, weather patterns predicted, and to aid in planning. Weather analysis has not been conducted due to the inconsistent gathering of fire weather observations. Fire weather information provided for the park's Step-up Staffing Plan is based on historic break points. The park recognizes the need to gather consistent and accurate weather observations and has made the gathering of this data a higher priority.

Dispatch personnel are responsible for maintaining weather equipment and storing climatological data. Weather observations should be entered directly into WIMS daily where they will be automatically archived into the National Fire Weather Data Library. Weather data to be recorded daily includes:

- State of the weather
- Dry and wet Bulb
- Lightning activity level
- Human-caused risk
- Wind direction
- Wind speed
- Fuel stick weight
- Maximum and minimum temperature
- Maximum and minimum relative humidity
- Precipitation (duration & amount)
- Future lightning activity level

Step-up Staffing Plan

The Burning Index generated by the National Fire Danger Rating System, Fuel Model 2 (Tall Grass), is used to indicate daily fire danger and determine "staffing classes." The staffing classes define a particular state of readiness and the specific actions to insure appropriate response to a fire occurrence. Burning Index values coupled with historical fire occurrence data also defines the fire season. The Energy Release Component and Keech-Byron Drought Index (used at forested areas) are not useful prediction tools for wind driven grass fires.

The dispatch office is responsible for insuring that daily Burning Index values are calculated and cataloged. The Fire Program Manager will evaluate fire danger and lightning activity levels and insure that appropriate actions are implemented. Observed lightning ground strikes may warrant moving to the next staffing class.

The Staffing Class (SC) break points are described in Table 1.

Table 1. Staffing Class break points.

Staffing Class I	Burning Index 0 - 14
Staffing Class II	Burning Index 15 - 29
Staffing Class III	Burning Index 30 - 59
Staffing Class IV	Burning Index 60 - 68
Staffing Class V	Burning Index 69 +

Staffing Class I: BURNING INDEX 0 - 14

Routine patrols are conducted and weather is monitored daily. All supplies and equipment are inspected and serviced to insure they are in a safe working order, and firefighting personnel receive training and pass physical fitness test. Planned ignitions for hazardous fuel objectives are conducted.

Staffing Class II: BURNING INDEX 15 - 29

See above; also, all firefighting personnel are required to maintain radio contact with the Dispatch Office during duty hours.

Staffing Class III: BURNING INDEX 30 - 59

See above; also, all firefighting personnel are required to have PPE at headquarters; Division Chiefs are notified of fire danger daily; all park personnel notify visitors of high fire danger (post "Fire Danger" signs) and precautions necessary to prevent fire occurrence; and Fire Program Manager insures that all supplies and equipment are in an immediate state of readiness. Road shoulders and grassy parking areas are maintained to a 4-inch grass height.

If high visitation periods are determined to pose exceptional human-caused risk and have historically displayed increased probabilities of ignition (e.g. the July Fourth weekend) step-up to Staffing Class IV.

Staffing Class IV: BURNING INDEX 60 - 68

See above; also, two initial response personnel may be on-duty daily; firefighting personnel maintain gear readiness; field patrols are conducted during peak burning hours (11 AM - 4 PM); Engine unit may be pre-positioned in high hazard areas; the Cluster Fire Management Officer is notified and a funding justification is prepared for the superintendent's concurrence to establish step-up funding (intended to cover a brief period of time and cost less than \$100,000). The funding justification will be routed to the Intermountain Region Fire Management Officer for authorization. Zone dispatch (Texas Forest Service in Lufkin, Texas) is appraised of status, and prompt communication channels are established.

If high visitation is expected or a history of multiple ignitions/large fire growth, move up to Staffing Class V.

Tours of duty for fire-qualified personnel may be extended. Normally, tours of work-weeks will not be extended unless there is a consistent trend of a minimum of two days in a row of Staffing Class IV or higher. The FPM may choose to bring on AD firefighters to supplement the existing staff.

The Superintendent may impose restrictions including closures, limitations, etc.

The July 4th holiday is historically an active wildfire period, and the following actions will be implemented if fuel conditions warrant:

- Place "No Fireworks" signs at entrance to park and Visitor Center during the holiday period.
- Increase visitor education on dangers of fireworks.
- Notify cooperative fire departments of wildfire potential.
- Conduct fire prevention patrols in high-risk areas.
- Staff a minimum of three firefighters during regular shifts.

Staffing Class V: BURNING INDEX 69 +

See above; also,

Work-weeks and/or daily tours of duty for regular initial response/detection personnel will be expanded. Expanded hours will not normally extend into darkness hours.

A member of the initial response team will be qualified at an IC Type 5 or higher level.

Project work will be continued only if the work area allows the firefighters to remain close to their vehicles.

These actions may be performed under the locally generated account, or severity funds obtained from the Intermountain Regional Office. The Cluster Fire Management Officer

will be notified and a funding justification is prepared with concurrence from the park's superintendent to establish step-up funding of greater than \$100,000. The funding justification will be routed to the Intermountain Regional Fire Management Program Center for authorization and approval. The costs requested are expected to exceed \$100,000 or are expected to last a significant period of time.

Funding Source

The funding source for supplies includes the park's ONPS funds and national fire funds coordinated by the Cluster FMO at Big Thicket National Preserve. Purchase of capitalized property over \$1,500 should be programmed into the following year's budget request. Replacement of the engine will be coordinated with the Working Capital Fund.

The Step-up Plan incorporates specific measures to be taken to provide adequate resources, and severity funding is available during staffing class 4 and 5 (<\$100,000 per episode can be authorized by the superintendent based upon a risk analysis (see RM18, chapter 7, exhibit 2 for an example). Staffing classes 1-3 are park funded as routine operations. Specific requirements exist for the use of severity funds, which can be found in RM-18, Chapter 18.

Emergency preparedness plans are used to deal with periods of extreme fire seasons or extended periods of extreme fire danger within normal seasons. It must be coordinated with the regional and national offices.

3. Pre-attack Plan

The fire management program at Padre Island National Seashore does not have the complexity observed in areas with extensive fire programs or extended fire suppression activities. All extended attack activities will be accomplished in conjunction with local resources including Nueces County Emergency Services District 2, Corpus Christi Fire Department, Aransas Pass Volunteer Fire Department, Ricardo Volunteer Fire Department, Texas Nature Conservancy, and other surrounding fire resources. In addition, fire resources may be obtained through TIC from area U.S. Fish and Wildlife refuges.

Oversight of fire suppression activities will be coordinated with park staff that has expertise and knowledge to provide park, resource, and safety information to all fire suppression staff. NPS staff will provide IC oversight to ensure protection of park resources and the safety of fire personnel.

If a Pre-attack Plan is necessary it will be developed as per guidance provided by RM-18, Chapter 7. An example of a Pre-attack Plan can be found in Appendix G.

4. Initial Attack

Primary suppression strategies for the park will vary according to availability of fire fighting resources, values at risk, and natural barriers and roads that can be utilized to control fire spread. Suppression actions may involve engine and hose tactics from

paved or improved roads, direct attack with hand crews, burnout operations, or other appropriate responses. Direct attack tactics will likely be used in the Malaquite Beach Fire Management Unit whereas limited suppression tactics may be appropriate for the Down Island Fire Management Unit.

Information used to set initial attack priorities.

- Public and firefighter safety. The protection of human life is the single, overriding priority. Once people have been committed to an incident, these human resources become the highest value to be protected.
- Values at Risk (Headquarter Facilities, Visitor Use Facilities, other infrastructure, Petroleum production and transportation equipment, and Historic resources)
- Suppression damage to environment
- Current and forecasted weather (expected nighttime humidity recovery), and potential for a natural out.
- Time of day (peak of burning period)

An initial attack Incident Commander Type 5 (ICT5) will determine the appropriate management strategy and actions based upon a Stage 1 Assessment (risk management, values to be protected, human health & safety, etc., and the cost of protection). The ICT5 will assess the quantity and type of personnel available, equipment needs, and request interagency assistance if necessary.

The first qualified firefighters arriving at the scene have full authority and duty to protect persons and property through the implementation of an appropriate management action. The initial firefighters are relieved of command responsibility upon arrival of a higher qualified individual.

The IC selects the management action employed to extinguish or limit the growth of wildland fires.

Malaquite Beach FMU

Administrative and visitor use facilities can be characterized as Wildland Urban Interface areas. These developed areas can be protected through annual hazardous fuel reduction activities (mechanical or prescribed burning) or management actions on the portions of a wildland fire posing a threat.

During a wildfire with low to moderate fire behavior, the primary strategy will be direct attack. High to extreme fire behavior will warrant utilizing indirect suppression strategies, such as conducting a burn out, that incorporates existing roadways and natural barriers. Various structures (Headquarters, maintenance garages, park residence, etc.) parking areas, and other improvements at risk may also require protection by engine or other available water handling equipment. Handlines or mowed

strips should be routed to avoid areas of high fuel concentrations and maximize use of natural barriers. Fireline width may vary according to fire behavior.

Down Island FMU

Awareness of a wildland fire in the Down Island FMU typically occurs when a smoke plume is noticed. Many fires are extinguished by the typical night-time rise in relative humidity (i.e. natural out), with only post fire mapping and documentation required. Limited suppression actions include indirect line and burn out or other Minimum Impact Suppression Tactics. Petroleum facilities can be protected by indirect line and burnout in advance of the fire. The historic line camps can be protected by clearing fuels (with a line trimmer or mower) around the posts and other structures if time permits.

A limited suppression response utilizing confinement/containment strategies is the appropriate management action in the Down Island FMU when fire behavior, values at risk, and/or fire fighting resources dictate an alternative other than direct attack. Utilize natural and existing barriers to limit spread, allowing diurnal relative humidity changes to increase fuel moisture past the moisture of extinction and cold trail the fire edge before the next burning period. Burn out techniques may be utilized to widen barriers, protect petroleum facilities, or to expedite smoke dispersal during favorable smoke management periods.

The IC will keep the FPM updated through Dispatch. If the fire exceeds the qualifications of the Incident Commander, the FPM will obtain a more qualified individual. The dispatcher will provide frequent weather updates to the IC, particularly if significant wind shifts or frontal activity is expected.

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 strategies are also preferable to maximize firefighter safety and minimize suppression costs when there are no values at risk. Confinement can also be a strategic selection through the Wildland Fire Situation Analysis (WFSA) process when the fire is expected to exceed initial attack capability or planned management capability. A long-term implementation plan is needed to guide the implementation of the confinement strategy. The WFIP prepared in stages, meets this requirement.

Padre Island national Seashore has determined that the appropriate management response in the Down Island FMU is a limited suppression response and/or confinement because risk to human infrastructure is minimal, employee staff time will be conserved, and wildland fire cost reductions goals will be achieved.

Table 2 describes the typical fire response times for employees in the various park management divisions.

Table 2. Typical firefighter response time.

	Malaquite Beach FMU	Down Island FMU
Visitor and Resource Protection Staff	15 to 60 minutes	.5 to 4 hours
Science and Resources Mgt. Staff	0-60 minutes	0 to 4 hours
Other Divisional Staff	45 to 60 minutes	1 to 4 hours

Restrictions and special concerns:

Vehicles

Fire engines may be used on existing roads and parking areas to protect structures or infrastructure. ATV's and four-wheel drive vehicles can also be used on the beach for access. ATV's can be used for direct attack on a backing or flanking fire, but should avoid travel on dunes, swampy areas, or tidal flats.

Visitors

Visitors at the Malaquite Visitor Center can easily be evacuated to the beach or parking lot if needed. Employees at the Headquarters complex can be evacuated east to the beach, south on Park Road 22 to Malaquite Visitor Center Parking area, or north out of the park. Evacuation of visitors from Bird Island Basin will depend upon fire intensity and spread direction. It may be necessary to collect the visitors at the boat launch area, and do a burn out to reduce radiant heat load and smoke impacts. BIB visitors would also be able to enter the shallow waters of the Laguna Madre to avoid wildfire.

Petroleum Facilities

Petroleum facilities are high value sites that must be protected and given priority attention during fire suppression activities.

Cultural Sites

The three historic line camps are a series of ranch sites that include cattle fences, corrals, chutes, and several buildings. The camps could be protected by clearing around the posts if time permits. However, the fast moving fires typical of grass fires precludes working in front of head fires.

Coordination

Local equipment and firefighter resources can be coordinated with the Nueces County Emergency Services District. Volunteer fire department firefighters can be used under a cooperative agreement during initial attack, or hired under the AD pay system if they meet NWCG qualification standards. Air resources can be requested through Texas Interagency Coordination Center (TICC). The U.S. Coast Guard would likely be able to provide helicopter or fixed wing reconnaissance planes.

5. Extended Attack and Large Fire Suppression

Fires burn across the island rapidly and are typically confined by natural barriers. The typical extended attack situation would be a fire moving north toward the boundary and out of the park. In this scenario park resources would be in a support role for either Kleberg County or the Nueces County Emergency Services District once the fire exited the park. If the IC requests outside assistance, it will be activated through the dispatch office.

Extended response occurs when the initial response forces have not controlled a fire during the first 24 hours. This may also be triggered by competition for park resources, law enforcement events, or threats to adjacent values. Generally, if the initial response efforts are not successful within the first burning period, extended response operations should begin. The WFSA is a documented decision process that employees a systematic approach to determine the most reasonable suppression strategy for a particular situation. The Agency Administrator is required to certify daily that the management strategy continues to meet overall management objectives. This daily certification can be delegated to specific incident management positions as appropriate. If selection of a new management alternative is needed, certification will revert to the administrator who initially delegated the certification authority.

Additional staffing and equipment may be required to evacuate visitors and employees, enforce road closures, or assist in the fire suppression effort. This action will be implemented by the IC upon concurrence with the Superintendent or his/her designee, and as defined in the WFSA, Limited Delegation of Authority, and Minimum Impact Suppression Tactics. A list of local fire departments with cooperative agreements is in Appendix E.

Exceptional fire behavior, significant threat to structures, or an extended attack may warrant requesting an interagency fire overhead team. The arriving fire management overhead team will be briefed on the fire situation, management actions performed, critical resources, weather forecast, natural barriers, etc. The Incident Management Team also will receive a formal "Limited Delegation of Authority" from the Superintendent granting authority to manage the fire. An example of a "Delegation of Authority" is located in Appendix E. When multiple fire responses are occurring, and park initial attack resources are becoming committed to extended attack fires, ordering additional firefighting resources may be necessary, which will reduce the commitment of resources, provide rest & recuperation, and restore initial attack capability.

The existing Wildland Fire Implementation Plan is exceeded when the initial suppression response is not being successful (typical causes are weather changes, exceptional fire behavior, competition for resources, etc.). A prescribed burn shall be declared a wildfire if it escapes, or is no longer achieving resource benefits. A WFSA should be prepared to identify a shift to a suppression strategy.

Minimum impact suppression tactics is the policy for all fire management activities on Padre Island National Seashore. Sandy soils are easily damaged by fire suppression activities. Avoid equipment use on vegetated dunes and coppice dune structures as it creates trenches, damages vegetation, and exposes soil to wind erosion. Line construction methods to be considered are: 1) use ATVs to push over the grass and burn out using hand tools and water to hold the line, 2) mowing a path and blowing the cut material clear, and 3) mowing or clearing with hand tools and a handline to dirt <3' wide. Use of handlines will generally require burnout operations to hold a fire due to the rate of spread of the typical barrier island fire. Rehabilitation actions may include raking wheel ruts caused by vehicles or ATVs or planting native grass on trails or firelines that cross dunes. See Appendix M.

6. Records and Reports

The status of all wildland fires will be reported daily to TICC by a faxed ICS-209 form. It details the statistics (size, equipment, staffing, progress, etc.) and details current and potential activities in a short narrative. The cluster fire staff can assist in the submission of the ICS-209.

The park establishes an account code using the park Identifier (7490), followed by a unique national accounting code received from TICC (AA##), followed by an activity class (E11 for wildfires, E12 for prescribed burns, E13 emergency stabilization). The IMR Fire Budget Analyst should be notified of the park, anticipated resource orders, and account number for cost tracking. All resources or charges assigned to this incident will use this account number. Prescribed burn projects will be generated in NFPORS, and account numbers received as part of the annual budget process

A fire report (DI-1202) should be initiated in the SACS system, and then updated daily. This can be accomplished by calling the cluster fire program assistant, who will enter the data online. A paper copy of the fire report (including a narrative & map (GPS data is preferred)) should be completed and entered into the computer system within 10 days of calling the fire out. Fire reports for prescribed burns, and any escape, must be reported in the DI-1201 format on SACS. The park will maintain a file that includes the burn plan, fire report, fire narrative, cost, spread maps, observed weather and fire behavior data, fire monitoring data, any operational or injury review, and any other information that is pertinent. Any significant injury/accident, or escaped fire that has significant impact to adjacent lands, is large in size, or controversial should be reported by phone to the IMR FMO. The park will also maintain a fire atlas (GIS maps) as a historical record.

All entrapments or burn-overs should be reported immediately to the superintendent, and a review process initiated. A preliminary report should be prepared and faxed to the IMR fire office.

All fire records and reports will be maintained in the Visitor and Resource Protection Division. The Fire Program Manager (FPM), or representative, will maintain contact

with the Southeast Texas Cluster - Fire Management Officer. The FPM will approve, and consolidate training requests and equipment requisitions before submitting them to the Cluster FMO.

During the fire season, the dispatch office will record and maintain daily weather observation. Weather observations should be entered directly into WIMS where they will be automatically archived into the National Fire Weather Data Library. Every three years, staff should run the FIREFAMILY program on all years of available weather data, and adjust burn index break points to modify the staffing plan. A FIREFAMILY analysis does not exist for the park due to inconsistent fire weather observations. Park personnel will gather and input weather observations daily in order to establish enough weather data to conduct a FIREFAMILY analysis. The analysis will be conducted on a three year interval, but reviewed annually to ensure that the analysis is accurate. Table 3 identifies additional records and reports necessary for managing the fire program :

Table 3. Additional reports and records.

Record/Report	Frequency	Responsibility	Distribution
Cache Inventory	Annually	FPM	PAIS
NFPORS Submissions	Annually	FPM & FMO	PAIS/BITH
Pre-season Risk Analysis	Annually/Periodically	FPM	PAIS
Red Cards	Annually	FPM & FMO	PAIS/BITH
Fitness Training Experience Records	Annually	FPM	PAIS
Training Needs Assessment	Annually	FPM & FMO	PAIS/BITH
Fire Prevention Analysis	Every 3 Years	FPM	PAIS
FMP Revision	Annually	Superintendent	PAIS

C. Prescribed Fire

Prescribed fire for resource benefit will not be conducted under this plan and will require additional compliance and planning before prescribed fire is used as a management tool in the park. Selected areas of the park may receive prescribed fire treatments.

Prescribed burns of selected areas of the seashore may be planned for every one to three years to meet hazardous fuels reduction.

1. Planning and Documentation

Annual Activities

The park management team, resource staff, and collaborators will determine if prescribed fire treatments can be used to restore and maintain cultural landscapes, manage hazardous fuels, and manage for a variety of resource benefits. Projects will be defined, funded, and tracked in the National Fire Plan and Reporting System (NFPORS) and Fire Program Analysis (FPA). Prescribed burn plans will meet RM-18

guidelines and go through an external review process and external peer review by a qualified Burn Boss. Then the plan, with comments can be approved by the superintendent.

Long-Term Strategy

Prescribed fire may be used to restore & maintain the grassy ecosystem of the seashore, protect Oak Mottes for utilization by migratory birds, and reduce risk to park infrastructure by controlling hazardous fuel loading. Resource management staff will establish long-term goals for specific areas and each treatment.

The Malaquite Beach and Down Island FMU's are in Fire Regime group II [open grasslands maintained or cycled by frequent fire] and are classified as Condition Class 1 [Minimal departure from historic or natural range of variability].

Personnel

The park does not have sufficient wildland fire risk or fire history to justify full-time fire management positions. The park will at a minimum maintain a collateral duty Fire Program Manager, an Engine Boss, an advanced firefighter (FFT1), and two firefighters (FFT2). The Fire Management Officer of the Southeast Texas Fire Cluster (stationed at Big Thicket National Preserve) and staff will provide oversight and assistance. Any prescribed burn will be conducted under the direct supervision of a certified Burn Boss. The Texas Interagency Coordination Center will process requests for additional staffing for wildland fire management actions.

Fire Behavior

The principal carrier of fire on Padre Island is grass, and fire behavior is easily predicted within the existing computer models. Fuel Model 1 represents areas with light fuel loads (<1' high, .7 Tons/acre) are, while more productive areas (2 1/2' high, 3 Tons/acre) are predicted by Fuel Model 2. Both models consist of 1-hour fuels. This fuel category responds quickly to changes in relative humidity. It is possible to have a hot running fire several hours after a rain shower, particularly if solar radiation is high.

Computer Predictions

Utilization of the BEHAVE program will assist park managers with predictions of existing or forecasted fire behavior conditions. Two fuel models for grass characterize the park's vegetation, Fuel Model 1 (short grass) and Fuel Model 2 (tall grass).

Monitoring

All wildland fires will be monitored, and fire behavior documented according to nationally accepted guidelines (RM-18). Cluster fire monitoring staff will collect first order fire effects and pre/post burn data. Fire monitoring activities will include Level 1 (Fire Cause) variables such as fire origin, fire cause, discovery, size, cost, and location and Level 2 (Fire Characteristics) including fuel type, general fire behavior, weather conditions, and threats and program constraints (See Appendix F).

Critiques

The burn boss will conduct an After-Action-Review on-site at the end of each active fire period. While a group meeting is preferred, specific resources that are leaving the fire early may be debriefed individually. All participants will be given the opportunity to discuss equipment status, holding and ignition operations, observed fire behavior, safety issues, any remaining control needs, tomorrow's operations, personnel issues, and other pertinent items.

Reporting and documentation requirements

The initiation, accomplishment, size, and cost of a fire management action are tracked on the NFORS web page. A short description of the treatment and result, as a 'success story', can be submitted to the Public Information Officer at the National Interagency Fire Center. Fire reports for prescribed burns follow the same procedures as wildfires. An escape fire is recorded on a fire report for the prescribed burn, and a separate fire report generated to document the ensuing wildfire. The park fire files should include additional monitoring data, and accomplishments. Fire reports, burn narrative, maps, etc., will be submitted within the time frames required by RM-18 (see IV-B-9). Prescribed Burn Plans will be approved and ready for implementation by January 1st of each year. Each plan will meet RM-18 guidelines. Pre and post burn data will be entered into the NIFC computer system within the time frames required by RM-18.

2. *Converting a Prescribed Fire to a Wildfire*

A prescribed fire should be converted to a wildfire if weather conditions or fire behavior exceed prescription parameters, goals are not being met, or an escape occurs. A Wildland Fire Situation Analysis should be prepared (see RM-18, chapter 9) to guide suppression efforts after initial attack. If the escaped fire has the potential to cross the park's boundary Nueces County Emergency Services District will be notified. Trigger points are identified in the transition section of the prescribed burn plan.

3. *Air Quality and Smoke Management*

The light fuels on Padre Island will produce a short duration fire that may put up a smoke plume or convection column. Minimal residual smoke production will occur as fuels will quickly be consumed. Planned ignitions will occur when atmospheric mixing and transport winds favor rapid dispersal and avoid Corpus Christi. Particulate emissions will be mitigated by using the following methods when appropriate: use of low-intensity backing or flanking fires because they burn more slowly and achieve better consumption, burn with low fuel moisture to maximize combustion, and burn during favorable dispersal conditions to minimize visibility problems.

Big Bend National Park is a Class I airshed located 375 miles northwest of the seashore, along the Texas/Mexico border. Guadalupe Mountains National Park is the second Class 1 airshed, located 500 miles northwest of the seashore on the Texas/New Mexico state line. As prevailing winds are from the southeast fire management

activities will not affect these Class I areas. There are no Class I airsheds within close proximity to the park.

Corpus Christi is a large city with public schools, hospitals, and a retirement communities. Smoke plumes from prescribed burning activities will be planned and implemented to avoid the metropolitan area. While grass produces copious quantities of smoke in a brief period, the plume is usually a short duration event as grass burns out rapidly. The Corpus Christi office of the Texas Commission on Environmental Quality (TCEQ) should be contacted (361-825-3100) during the development of prescribed burn plans, and prior to ignition.

D. Mechanical Fuel Treatments

Road shoulders, building perimeters, and the Novillo Line Camp area are currently mechanically treated (mowed) by the park's maintenance program. Additional mowing may be deemed appropriate and scheduled for areas around the Blackhill and Greenhill Line Camps to reduce fuel loading in and around these structures.

V. ORGANIZATIONAL AND BUDGETARY PARAMETERS

Fire Organization

The Superintendent (agency administrator) is responsible and accountable for all fire management actions, approves annual updates of the fire management plan, and administers the fire management program.

The Fire Program Manager (FPM) confers with the Superintendent to develop suppression priorities, issue press releases, approve cooperative agreements with other agencies, and clarify policy considerations. The FPM reviews and updates the Fire Management Plan, oversees and coordinates fire operations within the park, and provides liaison with other agencies.

As stated in Article II of the Interpark Agreement between Big Thicket National Preserve and Padre Island National Seashore (See Appendix E), the duties of the BITH Fire Management Staff will include providing professional and technical support for the fire management programs of Padre Island N.S.

A Prescribed Fire Burn Boss Type 2 (RXB2) will be provided by Big Thicket National Preserve and certified in accordance with the interagency qualification standard. The RXB2 will be responsible for implementing all prescribed fires.

The Engine Boss and Firefighters will be certified in accordance with the interagency qualification standard, and will be available for suppression assignments on local and interagency fires. All firefighters will be trained to use and maintain the park's fire equipment and perform prescribed fire duties.

Fire Monitors will be certified in accordance with the interagency qualification standard, and will be available for suppression assignments on local and interagency fires. All monitors will be trained, equipped, and qualified as basic firefighters.

A Type 5 Incident Commander will be certified in accordance with the interagency qualification standard and oversee initial attack activities on local fires.

Fire management duties are collateral duties for Seashore personnel. Mobilization of resources for fire duty will be commensurate with local, regional, and national staffing levels, and least disruptive to normal operations when practical. A list of current red-card or other fire personnel is located in Appendix E.

Fire Program Analysis Funding

Park staff will develop projects in consultation with the Cluster FMO and fire ecologist. The projects will be entered into NFPORS for funding, with the Cluster FMO functioning as the project's advocate during the budget process.

Periodic Assessments

The superintendent is responsible for periodically assessing and certifying, by signature, that current wildland fire actions are acceptable. This responsibility may be delegated to the Chief Ranger if the action is not controversial, resource losses are minimal, or no damage to private property has [or is likely to] occur. Periodic assessments by the Superintendent will also occur for all Wildland Fire Situation Analyses (WFSA).

Interagency Contacts and Coordination

The park cooperatively interfaces with several local, state, and federal entities such as the Texas Commission on Environmental Quality (TCEQ), Texas Forest Service, Texas Interagency Coordination Center, Texas Parks & Wildlife, U.S. Fish and Wildlife Service, the Nueces County Emergency Services District, and the City of Corpus Christi.

Interagency contacts

Dispatch availability, fire status, project numbers, etc.:

Joe Perez, Texas Interagency Coordination Center, (936) 875-4786

Initial Attack:

Nueces County Emergency Services District (911)

Extended Attack:

Texas Forest, (361) 595-5118

U.S. Fish and Wildlife Service, Lower Rio Grande Valley NWR (956) 787-3079

U.S. Fish and Wildlife Service, Aransas NWR (361) 286-3559

Agreements

The park will maintain a cooperative agreement with the Nueces County Emergency Services District, provide rural funding assistance when appropriate, and actively seek collaborative opportunities in training and fire management activities.

An Memorandum of Understanding between the US Forest Service, National Park Service, US Fish and Wildlife Service, Texas Nature Conservancy was approved in 2004 (See Appendix E).

VI. MONITORING AND EVALUATION

Monitoring of wildland fire will utilize the Park's Fire Effects Monitoring Plan identified in Appendix F.

VII. FIRE RESEARCH

Research into the recovery of natural grass communities after the removal of high impact cattle grazing began in 1972 by Dr. Lynn Drawe (Director of Welder Wildlife Refuge and Adjunct Professor at the Texas A&M Range Science Department). He developed a permanent set of transects (5) sampling the vegetation from the Gulf of Mexico across the island to Laguna Madre. Approximately 70 sampling sites along the five transects have been sampled every 5 years, with the last survey completed in 1993. These plots will be incorporated into some management ignited prescribed burns so that long-term changes can be documented. Dr. Drawe also conducted a series of research burns & mowed plots targeting vegetational changes in 1978, and completed fuel-modeling analysis in 1994.

The Big Thicket National Preserve's fire monitors will assist the seashore's resource management staff in monitoring wildland fire activity, collecting data, conducting short-term research to determine the optimum burn season and fire interval, and conduct photo surveys of representative fire sites.

Research Documents

Species specific information is located on the description of fire effects on park natural and cultural resources. A chronological list of research papers, checklists, and conservation documents relating to the Ecology of Padre Island.

An Analysis of the Vegetation of the Padre Island National Seashore

A paper presented in partial fulfillment of the requirements for the course GNA 595 at Texas A&I University
Ira Higginbotham, Jr., July 1972

Effect of Burning and Mowing on Vegetation of Padre Island

The first study of fire effects on Padre Island, this paper recommends burning during winter or late summer to increase production, plant vigor, and decrease detrimental accumulations of litter within the low coastal sands.

Dr. Lynn Drawe and Kenneth Kattner
The Southwestern Naturalist 23 (2): 273-278, March 20, 1978

Progress Report of Succession of Vegetation on Padre Island National Seashore

After the removal of cattle, vegetation transects were installed and sampled over 15 years in five different vegetation communities. The study indicates that the expected trend toward a climax community had not occurred. Observations also indicated that production has declined due to the amount of litter buildup which stagnates vegetation and ties up nutrients that could be available for plant growth. Burning is reported to increase plant productivity.

Dr. Lynn Drawe
Welder Wildlife Foundation, April 12, 1990

Notes on the Vegetation and Flora of North Padre Island, Texas

E. Glenn Carls, Robert I. Lonard, and Dennis B. Fenn

This paper reports vegetation data collected in 1987 on the Northern third of Padre Island National Seashore near areas of petroleum activity. From the data, relative frequency, relative cover, and an importance value (sum of relative frequency and relative cover) were calculated for five different vegetative communities.

The Southwestern Naturalist Vol. 36, No. 1, March 1991

Conservation Plan for the Texas Portion of the Laguna Madre

Describes the Ecology of the Laguna Madre Conservation Area of the Nature Conservancy, which includes Padre Island. Conservation visions and goals are stated and their conditions and threats are assessed. Species and habitats of concern are discussed in great detail.

Lacey Halstead, Conservation Area Planner, The Nature Conservancy, December 2001

Species and Communities of Conservation Concern Known to Occur in the Laguna Madre Conservation Area

Conservation areas and species within those areas are listed and given a global rank/federal status, viability rank, and counties in which documented.

The Nature Conservancy of Texas, March 2002

Secondary Succession on the Margins of Tidal Flats Following Fire on Padre Island National Seashore, Texas, USA

Following a wildfire in December 1999, the recovery of vegetation is studied on Padre Island over a period of 26 months. Species richness, species diversity, and vegetation abundance and importance were evaluated between burned and unburned sites. They estimate it may take 10 years for the litter to return to pre-fire conditions.

Dr. Robert I. Lonard and Frank W. Judd
Department of Biology, University of Texas-Pan American
Dr. Elizabeth Smith
Center for Coastal Studies, Texas A&M University-Corpus Christi

Recovery of Vegetation Following a Wildfire in a Barrier Island Grassland, Padre Island National Seashore, Texas

This paper provides a detailed discussion of the effects of a wildfire on Padre Island. It is the most thorough study of fire effects for a Texas barrier island. They found the major difference between burned and unburned sites was the amount of cover and biomass of standing dead plant material. Two years post fire, the amount of dead plant material in the burned section was 26.1% of the unburned areas.

Robert I. Lonard, Frank W. Judd, Elizabeth H. Smith, and Chenghai Yang, 2004

The Resource Management Plan, summarize fire research needed to implement or refine the fire management program. Note other fire research needed but not included in the Resource Management Plan.

VIII. PUBLIC SAFETY

Evacuation

Visitors at the Malaquite Visitor Center can easily be evacuated to the beach or parking lot if needed. Employees at the park Headquarters complex can be evacuated east to the beach, south on Park Road 22 to Malaquite Visitor Center's parking area or north out of the park. Evacuation of visitors from Bird Island Basin will depend upon fire intensity and spread direction. It may be necessary to collect the visitors at the boat launch area or shoreline, and do a burn out to reduce radiant heat load and smoke impacts. BIB visitors could avoid wildfire by entering the shallow waters of the Laguna Madre if necessary.

Roadside and Firebreak Mowing

The Facility Management Division will maintain road shoulder vegetation and vegetation around park buildings below six inches in height during the fire season; especially when there has been no rain for two or more weeks. A swath of 8 feet will be mowed around park structures and the Bird Island Basin boat ramp parking lot. Hazardous fuel reduction burns will be utilized to reduce fuel accumulation and fire intensity.

Patrols

Visitor and Resource Protection staff is responsible for wildland fire patrols during New Year's and July 4th holidays, especially in the Malaquite Beach FMU. Ranger patrols are always on the alert for fire or smoke inside or outside park boundaries. Other park staff routinely patrolling the beach will provide additional information on the presence of potential wildfires.

Petroleum Production Safety

Petroleum operators are required to prepare a Plan of Operations that will address fire risk reduction.

IX. PUBLIC INFORMATION AND EDUCATION

Public Involvement

Informing the public about Padre Island's fire management program will be an ongoing process involving several methods. Formal interpretive programs, both on-site and off-site, address the ecological relationship of fire to the preservation of natural biological communities. These programs stress the importance of fire in maintaining biological diversity, and also include information on the detrimental effects of catastrophic wildland fires to resources and property. Interpretive brochures will be placed at high use locations following wildland fires in the area. Public news media will be alerted to periods of high fire danger, and will be invited to conduct video taped interviews with management personnel during planned prescribed burns for hazardous fuel reduction.

During wildland or prescribed fires, the media will be briefed regularly by the public affairs, or designated spokesperson. Every effort will be made to keep the media informed through press releases, interviews, park web site, and other means as determined by park officials still maintaining firefighter safety. When possible, members of the media will be escorted to view the fire/mechanical treatment or other activity to explain the role of fire in the park.

Local compliance and environmental organizations and universities, will be sent copies of the fire management plan for review and comment.

Visitor Education

The Interpretation staff shares the responsibility of educating the public on the natural and human-caused forces shaping the island and its ecosystems, including fire. Specific interpretive programs should stress fire prevention during New Year's and July 4th holidays.

X. PROTECTION OF SENSITIVE RESOURCES

Natural and cultural resources will be protected from the adverse effects of unwanted fire and fire management activities. Flame passage poses little risk to buried archeological sites, but they are vulnerable to disturbance by scraping firelines or heavy equipment. A Resource Advisor will be on hand during all activities to help protect sensitive resources. During all suppression activities, MIST will be incorporated to the greatest extent feasible, employing methods least damaging to park resources for the situation. While there is potential to see threatened or endangered species in the park, they will not require special treatment.

XI. AIR QUALITY

Air pollution from forest fires has been a natural ecosystem output for thousands of years, cycling carbon and other materials into the atmosphere (Komarek 1970). Forest fires, and natural hydrocarbon emissions from plants, are considered as major sources of natural air pollution.

Burning of forest fuels commonly produces various emissions including carbon dioxide, water, particulates, carbon monoxide, and occasionally low amounts of nitrogen oxides. Carbon dioxide and water are not considered air pollutants.

Airborne particulates are the primary pollutant of wildfires and management ignited prescribed burns (Komarek 1970). Particulate emissions generally range from 0.001 to 10 microns in size, the average smoke particle being about 0.1 microns in diameter. Most of the larger particles gravitate out of the air (Agee 1974). Larger smoke particles, especially those around six microns in diameter, scatter light and produce opaque fogs (Agee 1974). As the size decreases below 5.0 microns in diameter, increasing numbers are deposited in the lower respiratory tract, including over 50 percent of those between 0.01 and 0.1 micron. Many forest fire smoke particles have a potential for being deposited deep in the lungs.

The concentration and size of particulates emitted during forest fires depends on the amount and types of fuel consumed, fuel moisture content, and rate of fire spread. Particulate production from low-intensity fires is significantly less compared to high-intensity wildfires. Low-intensity fires consume less fuel per unit area and produce less particulate per unit weight of fuel. Particulate production from intense wildfire may be ten-times higher than that associated with low-intensity management ignited prescribed fire (Agee 1974). High-intensity fires often produce very small particulates; low-intensity fires tend to produce large particulates. Methods suggested to reduce particulate emissions include 1) use of low-intensity backfires or flank fires because they tend to burn more slowly and consume more fuel, 2) burn when fuel moisture is low to maximize combustion, and 3) conduct burning under favorable dispersal conditions to minimize visibility problems.

Carbon monoxide is given off in substantial quantities (60 lb./ton) when forest fuel is burned, but seems to oxidize quite readily and does not pose a threat to people, plants, or animals (Wright and Bailey 1982). Carbon monoxide emissions also increase with fuel moisture; burning dry fuels produce much less carbon monoxide than wet fuels (Agee 1974).

The light fuels on Padre Island will produce a short duration fire that may put up a smoke plume or convection column. It will be of short duration, and minimal residual smoke production will occur. Planned ignitions will occur when atmospheric mixing and transport winds favor rapid dispersal and avoid Corpus Christi. Given the distance between the park and the city of Corpus Christi, impacts to air quality are not likely. Based on a recent prescribed burn of approximately 400 acres, smoke effects to air quality could not be observed in Flour Bluff along Laguna Shores Road, which is the closest road to the park on the mainland of Texas.

The TCEQ will be notified of pending planned ignitions of wildland fires in the park and their comments and suggestions solicited. While the particulate matter in smoke has

not been shown to be detrimental to ozone in the atmosphere, particular sensitivity will be given to the TCEQ and its management of Ozone Action Days in Corpus Christi.

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

IMR fire staff may conduct a fire program review on a three to five year cycle, or audit specific projects as needed. The park superintendent may also request or conduct a review. All entrapments, deployments, other serious incidents, or potentially serious incidents will be investigated and reviewed. Reviews will be conducted so as to provide constructive critiques not as a faultfinding process.

The Fire Management Committee will review the Fire Management Plan annually. Minor "pen and ink" changes may be made with the park superintendent's concurrence. The Cluster FMO will assist park staff in making substantive changes, and review the plan every four years.

An interagency group of fire staff will conduct an annual Fire Readiness Review utilizing the Interagency Fire Readiness Review Guide adapted for the preserves specific needs.

Each wildland fire will have an 'After Action Review' conducted by the Incident Commander or Burn Boss, with recommendations added to the fire record. Each class C wildfire (>10 acres) will have a formal critique hosted by the Fire Management Committee and documented in writing. All entrapments, deployments, other serious incidents, or potentially serious incidents will be reported, investigated, and reviewed.

Fire Reviews will be conducted in accordance with RM18.

The purpose of the review will be the following:

- Examine progress of ongoing fires
- Identify new or improved techniques or tactics.
- Compile consistent and complete information to improve or refine park fire management programs and to ensure cost effectiveness of the program.
- Examine unusual fire related incidents

Hotline Reviews: These reviews will examine the progress of an ongoing fire incident. They will be conducted by the Fire Management Officer or Superintendents designee with the Incident Commander. The review will provide for conformation of daily decisions in the Wildland Fire Situation Analysis or determine faulty decision process and provide corrective action.

Park-level Reviews: The Superintendent or their designated representative, the FMO plus other qualified personnel appointed by the Superintendent will make up the review board. This review will provide the Superintendent with information to recognize commendable actions and to take corrective actions if necessary. The report generated from this review will be forwarded to the Regional FMO.

Entrapment and Fire Shelter Deployment Review: Any entrapment or deployment will be reviewed as soon as possible after the incident and a report will be made to the Regional FMO.

XIII. CONSULTATION AND COORDINATION

Colin Campbell, Superintendent, PAIS

Darrell Echols, Chief of Science and Resources Management, PAIS

Randy Larson, Chief Ranger, PAIS

Arlene Wimer, Environmental Protection Specialist, PAIS

Katie Morris, Biological Technician, PAIS

David McHugh, Fire Management Officer, BITH

Fulton Jeansonne, Fire Ecologist, BITH

Deanna Fusco, Lead Fire Effects Monitor, BITH

D.W. Ivans, Prescribed Fire Specialist, BITH

XIV. APPENDICES

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APPENDIX B. Definitions.

Appropriate Management Action: Specific actions taken to implement a management strategy.

Appropriate Management Strategy: A plan or direction selected by agency administrator which guide wildland fire management actions intended to meet protection and fire use objectives.

Contain/Control: These terms are used to report the condition of the fire, and relate to fire time keeping, but do not have tactical meaning.

Fire Management Plan: A strategic plan that defines a program to manage wildland fires. The plan is supplemented by operational procedures such as preparedness plans, preplanned dispatch plans, burn plans, and prevention plans.

Initial Actions: Action taken by first resources to arrive at a wildland fire to meet protection and fire use objectives.

Planned ignition: A wildland fire ignited by management actions to meet specific objectives.

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

Prescription: Measurable criteria that guide selection of appropriate management strategies and actions. Prescription criteria may include safety, economic, public health, and environmental, geographic, administrative, social, or legal considerations.

Suppression: A management action intended to protect identified values from a fire, extinguish a fire, or alter a fire's direction of spread.

Unplanned Ignition: A wildland fire not ignited by management actions.

Wildland: Any area under fire management jurisdiction of a land management agency.

Wildland fire: Any fire that occurs in the wildland.

Wildland Fire Situation Analysis (WFSA): A decision-making process that evaluates alternative management strategies against selected safety, environmental, social, political, and economic criteria.

APPENDIX C. Species Lists for Padre Island National Seashore.

List of Birds.

Common Name	Scientific Name
Acadian Flycatcher	<i>Empidonax vireescens</i>
Alder Flycatcher	<i>Empidonax alnorum</i>
American Avocet	<i>Recurvirostra americana</i>
American Bittern	<i>Botaurus lentiginosus</i>
American Black Duck	<i>Anas rubripes</i>
American Coot	<i>Fulica americana</i>
American Golden-Plover	<i>Pluvialis dominica</i>
American Goldfinch	<i>Carduelis tristis</i>
American Kestrel	<i>Falco sparverius</i>
American Oystercatcher	<i>Haematopus palliatus</i>
American Pipit	<i>Anthus rubescens</i>
American Redstart	<i>Setophaga ruticilla</i>
American Robin	<i>Turdus migratorius</i>
American Swallow-tailed Kite	<i>Elanoides forficatus</i>
American White Pelican	<i>Pelecanus erythrorhynchos</i>
American Wigeon	<i>Anas americana</i>
American Woodcock	<i>Scolopax minor</i>
Anhinga	<i>Anhinga anhinga</i>
Arctic Loon	<i>Gavia arctica</i>
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Baird's Sandpiper	<i>Calidris bairdii</i>
Bald Eagle	<i>Haliaeetus leucocephalus</i>
Baltimore Oriole	<i>Icterus galbula</i>
Bank Swallow	<i>Riparia riparia</i>
Barn Owl	<i>Tyto alba</i>
Barn Swallow	<i>Hirundo rustica</i>
Barrow's Goldeneye	<i>Bucephala islandica</i>
Bay-breasted Warbler	<i>Dendroica castanea</i>
Bell's Vireo	<i>Vireo bellii</i>
Belted Kingfisher	<i>Ceryle alcyon</i>
Bewick's Wren	<i>Thryomanes bewckii</i>
Black Noddy	<i>Anous minutus</i>
Black Scoter	<i>Melanitta nigra</i>
Black Skimmer	<i>Rynchops niger</i>
Black Tern	<i>Chlidonias niger</i>
Black Vulture	<i>Coragyps atratus</i>
Black-and-white Warbler	<i>Mniotilta varia</i>

Common Name

Black-bellied Plover
Black-bellied Whistling-Duck
Black-billed Cuckoo
Blackburnian Warbler
Black-capped Vireo
Black-chinned Hummingbird
Black-chinned Sparrow
Black-crowned Night-Heron
Black-headed Grosbeak
Black-legged Kittiwake
Black-necked Stilt
Blackpoll Warbler
Black-shouldered Kite
Black-throated Blue Warbler
Black-throated Gray Warbler
Black-throated Green Warbler
Blue Grosbeak
Blue-gray Gnatcatcher
Blue-winged Teal
Blue-winged Warbler
Bobolink
Bonaparte's Gull
Brewer's Blackbird
Broad-tailed Hummingbird
Broad-winged Hawk
Bronzed Cowbird
Brown Creeper
Brown Noddy
Brown Pelican
Brown Thrasher
Brown-crested Flycatcher
Brown-headed Cowbird
Buff-bellied Hummingbird
Buff-breasted Sandpiper
Bufflehead
Bullock's Oriole
Burrowing Owl
Cactus Wren
California Gull
Canada Goose

Scientific Name

Pluvialis squatarola
Dendrocygna autumnalis
Coccyzus erythrophthalmus
Dendroica fusca
Vireo atricapillus
Archilochus alexandri
Spizella atrogularis
Nycticorax nycticorax
Pheucticus melanocephalus
Rissa tridactyla
Himantopus mexicanus
Dendroica striata
Elanus caeruleus
Dendroica caerulescens
Dendroica nigrescens
Dendroica virens
Cuiraca caerulea
Polioptila caerulea
Anas discors
Vermivora pinus
Dolichonyx oryzivorus
Larus philadelphia
Euphagus cyanocephalus
Selaspharus platycercus
Buteo platypterus
Molothrus aeneus
Certhia americana
Anous stolidus
Pelecanus occidentalis
Toxostoma rufum
Myiarchus tyrannulus
Molothrus ater
Amazilia yucatanensis
Tryngites subruficollis
Bucephala albeola
Icterus bullockii
Athene cunicularia
Campylorhynchus brunneicapillus
Larus californicus
Branta canadensis

Common Name

Canada Warbler
Canvasback
Cape May Warbler
Carolina Wren
Caspian Tern
Cassin's Kingbird
Cassin's Sparrow
Cattle Egret
Cedar Waxwing
Cerulean Warbler
Chestnut-sided Warbler
Chimney Swift
Chipping Sparrow
Chuck-will's-widow
Cinnamon Teal
Clapper Rail
Clay-colored Sparrow
Cliff Swallow
Common Goldeneye
Common Grackle
Common Ground-Dove
Common Loon
Common Moorhen
Common Nighthawk
Common Poorwill
Common Snipe
Common Tern
Common Yellowthroat
Connecticut Warbler
Cooper's Hawk
Couch's Kingbird
Crested Caracara
Curve-billed Thrasher
Dickcissel
Double-crested Cormorant
Dunlin
Eared Grebe
Eastern Bluebird
Eastern Kingbird
Eastern Meadowlark

Scientific Name

Wilsonia canadensis
Aythya valisineria
Dendroica tigrina
Thryothorus ludovicianus
Sterna caspia
Tyrannus vociferans
Aimophila cassinii
Bubulcus ibis
Bombycilla cedrorum
Dendroica cerulea
Dendroica pensylvanica
Chaetura pelagica
Spizella passerina
Caprimulgus carolinensis
Anas cyanoptera
Rallus longirostris
Spizella pallida
Hirundo pyrrhonota
Bucephala clangula
Quiscalus quiscula
Columbina passerina
Gavia immer
Gallinula chloropus
Chordeiles minor
Phalaenoptilus nuttallii
Gallinago gallinago
Sterna hirundo
Geothlypis trichas
Oporornis agilis
Accipiter cooperii
Tyrannus couchii
Polyborus plancus
Toxostoma curvirostre
Spiza americana
Phalacrocorax auritus
Calidris alpina
Policeps nigricollis
Sialia sialis
Tyrannus tyrannus
Sturnella magna

Common Name

Eastern Phoebe
Eastern Wood-Pewee
European Starling
Ferruginous Hawk
Field Sparrow
Forster's Tern
Franklin's Gull
Fulvous Whistling-Duck
Gadwall
Glaucous Gull
Golden-crowned Kinglet
Golden-fronted Woodpecker
Golden-winged Warbler
Grasshopper Sparrow
Gray Catbird
Gray-cheeked Thrush
Great Black-backed Gull
Great Blue Heron
Great Crested Flycatcher
Great Egret
Great Horned Owl
Greater Flamingo
Greater Roadrunner
Greater Scaup
Greater White-fronted Goose
Greater Yellowlegs
Great-tailed Grackle
Green Kingfisher
Green-backed Heron
Green-tailed Towhee
Green-winged Teal
Groove-billed Ani
Gull-billed Tern
Harris' Hawk
Hepatic Tanager
Hermit Thrush
Herring Gull
Hooded Merganser
Hooded Oriole
Hooded Warbler

Scientific Name

Sayornis phoebe
Contopus virens
Sturnus vulgaris
Buteo regalis
Spizella pusilla
Sterna forsteri
Larus pipixcan
Dendrocygna bicolor
Anas strepera
Larus hyperboreus
Regulus satrapa
Melanerpes aurifrons
Vermivora chrysoptera
Ammodramus savannarum
Dumetella carolinensis
Catharus minimus
Larus marinus
Ardea herodias
Myiarchus crinitus
Casmerodius albus
Bubo virginianus
Phoenicopterus ruber
Geococcyx californianus
Aythya marila
Anser albifrons
Tringa melanoleuca
Quiscalus mexicanus
Chloroceryle americana
Butorides striatus
Pipilo chlorurus
Anas crecca
Cratophaga sulcirostris
Sterna nilotica
Parabuteo unicinctus
Piranga flava
Catharus guttatus
Larus argentatus
Lopholytes cucullatus
Icterus cucullatus
Wilsonia citrina

Common Name

Horned Grebe
Horned Lark
House Sparrow
House Wren
Hudsonian Godwit
Inca Dove
Indigo Bunting
Kentucky Warbler
Killdeer
King Rail
Ladder-backed Woodpecker
Lark Bunting
Lark Sparrow
Laughing Gull
Lazuli Bunting
Le Conte's Sparrow
Least Bittern
Least Flycatcher
Least Grebe
Least Sandpiper
Least Tern
Lesser Black-backed Gull
Lesser Nighthawk
Lesser Scaup
Lesser Yellowlegs
Lincoln's Sparrow
Little Blue Heron
Loggerhead Shrike
Long-billed Curlew
Long-billed Dowitcher
Long-billed Thrasher
Louisiana Waterthrush
Magnificent Frigatebird
Magnolia Warbler
Mallard
Marbled Godwit
Marsh Wren
Masked Duck
Merlin
Mississippi Kite

Scientific Name

Podiceps auritus
Eremophila alpestris
Passer domesticus
Troglodytes aedon
Limosa haemastica
Columbina inca
Passerina cyanea
Oporornis formosus
Charadrius vociferus
Rallus elegans
Piroides scalaris
Calamospiza melanocorys
Chondestes grammacus
Larus atricilla
Passerina amoena
Ammodramus leconteii
Ixobrychus exilis
Empidonax minimus
Tachybaptus dominicus
Calidris minutilla
Sterna antillarum
Larus fuscus
Chordeiles acutipennis
Aythya affinis
Tringa flavipes
Melospiza lincolnii
Egretta caerulea
Lanius ludovicianus
Numenius americanus
Limnodromus scolopaceus
Toxostoma longirostre
Seiurus motacilla
Fregata magnificens
Dendroica magnolia
Anas platyrhynchos
Limosa fedoa
Cistothorus palustris
Oxyura dominica
Falco columbarius
Ictinia mississippiensis

Common Name

Mottled Duck
Mourning Dove
Mourning Warbler
Nashville Warbler
Neotropical Cormorant
Northern Aplomado Falcon
Northern Bobwhite
Northern Cardinal
Northern Flicker
Northern Gannet
Northern Harrier
Northern Mockingbird
Northern Oriole
Northern Parula
Northern Pintail
Northern Rough-winged Swallow
Northern Shoveler
Northern Waterthrush
Oldsquaw
Olivaceous Cormorant
Olive Sparrow
Olive-sided Flycatcher
Orange-crowned Warbler
Orchard Oriole
Osprey
Ovenbird
Painted Bunting
Palm Warbler
Pectoral Sandpiper
Peregrine Falcon
Philadelphia Vireo
Pied-billed Grebe
Piping Plover
Prothonotary Warbler
Purple Gallinule
Purple Martin
Pyrrhuloxia
Red Knot
Red-breasted Merganser
Reddish Egret

Scientific Name

Anas fulvigula
Zenaidura macroura
Oporornis philadelphia
Vermivora ruficapilla
Phalacrocorax brasilianus
Falco femoralis
Colinus virginianus
Cardinalis cardinalis
Colaptes auratus
Morus bassanus
Circus cyaneus
Mimus polyglottos
Icterus galbula
Parula americana
Anas acuta
Stelgidopteryx serripennis
Anas clypeata
Seiurus noveboracensis
Clangula hyemalis
Phalacrocorax olivaceus
Arremonops rufivirgatus
Contopus borealis
Vermivora celata
Icterus spurius
Pandion haliaetus
Seiurus aurocapillus
Passerina ciris
Dendroica palmarum
Calidris melanotos
Falco peregrinus
Vireo philadelphicus
Podilymbus podiceps
Charadrius melodus
Protonotaria citrea
Porphyryula martinica
Progne subis
Cardinalis sinuatus
Calidris canutus
Mergus serrator
Egretta rufescens

Common Name

Red-eyed Vireo
Redhead
Red-headed Woodpecker
Red-shouldered Hawk
Red-tailed Hawk
Red-throated Loon
Red-winged Blackbird
Ring-billed Gull
Ring-necked Duck
Rock Dove
Roseate Spoonbill
Rose-breasted Grosbeak
Rough-legged Hawk
Royal Tern
Ruby-crowned Kinglet
Ruby-throated Hummingbird
Ruddy Duck
Ruddy Turnstone
Rufous-sided Towhee
Rusty Blackbird
Sabine's Gull
Sage Thrasher
Sanderling
Sandhill Crane
Sandwich Tern
Savannah Sparrow
Say's Phoebe
Scarlet Tanager
Scissor-tailed Flycatcher
Seaside Sparrow
Sedge Wren
Semipalmated Plover
Semipalmated Sandpiper
Sharp-shinned Hawk
Sharp-tailed Sparrow
Short-billed Dowitcher
Short-eared Owl
Snow Goose
Snowy Egret
Snowy Plover

Scientific Name

Vireo olivaceus
Aythya americana
Melanerpes erythrocephalus
Buteo lineatus
Buteo jamaicensis
Gavia stellata
Agelaius phoeniceus
Larus delawarensis
Aythya collaris
Columba livia
Ajaia ajaja
Pheucticus ludovicianus
Butero lagopus
Sterna maxima
Regulus calendula
Archilochus colubris
Oxyura jamaicensis
Arenaria interpres
Pipilo erythrophthalmus
Euphagus carolinus
Xema sabini
Oreoscoptes montanus
Calidris alba
Grus canadensis
Sterna sandvicensis
Passerculus sandwichensis
Sayornis saya
Piranga olivacea
Tyrannus forficatus
Ammodramus maritimus
Cistothorus platensis
Charadrius semipalmatus
Caidris pusilla
Accipter striatus
Ammodramus caudacutus
Limnodromus griseus
Asio flammeus
Chen caerulescens
Egretta thula
Charadrius alexandrinus

Common Name

Solitary Plumbeus Vireo
Solitary Sandpiper
Solitary Vireo
Song Sparrow
Sooty Tern
Sora
Spotted Sandpiper
Sprague's Pipit
Stilt Sandpiper
Summer Tanager
Surf Scoter
Surfbird
Swainson's Hawk
Swainson's Thrush
Swainson's Warbler
Swamp Sparrow
Tennessee Warbler
Tree Swallow
Tricolored Heron
Tropical Parula
Tufted Titmouse
Tundra Swan
Turkey Vulture
Upland Sandpiper
Varied Bunting
Veery
Verdin
Vermilion Flycatcher
Vesper Sparrow
Virginia Rail
Virginia's Warbler
Warbling Vireo
Western Grebe
Western Kingbird
Western Meadowlark
Western Sandpiper
Western tanager
Western Wood-Pewee
Whimbrel
Whip-poor-will

Scientific Name

Vireo solitarius plumbeus
Tringa solitaria
Vireo solitarius
Melospiza melodia
Sterna fuscata
Porzana carolina
Actitis macularia
Anthus spragueii
Calidris himantopus
Piranga rubra
Melanitta perspicillata
Aphriza virgata
Buteo swainsoni
Catharus ustulatus
Limnothlypis swainsonii
Melospiza georgiana
Vermivora peregrina
Tachycineta bicolor
Egretta tricolor
Parula pitiayumi
Parus bicolor
Cygnus columbianus
Cathartes aura
Bartramia longicauda
Passerina versicolor
Catharus fuscescens
Auriparus flauiceps
Pyrocephalus rubinus
Pooecetes gramineus
Rallus limicola
Vermivora virginiae
Vireo gilvus
Aechmophorus occidentalis
Tyrannus verticalis
Sturnella neglecta
Calidris mauri
Piranga ludoviciana
Contopus sordidulus
Numenius phaeopus
Caprimulgus vociferus

Common Name

White Ibis
White-crowned Sparrow
White-eyed Vireo
White-faced Ibis
White-rumped Sandpiper
White-tailed Hawk
White-throated Sparrow
White-winged Dove
White-winged Scoter
Wild Turkey
Willet
Willow Flycatcher
Wilson's Phalarope
Wilson's Plover
Wilson's Warbler
Winter Wren
Wood Duck
Wood Stork
Wood Thrush
Worm-eating Warbler
Yellow Warbler
Yellow-bellied Flycatcher
Yellow-bellied Sapsucker
Yellow-billed Cuckoo
Yellow-breasted Chat
Yellow-crowned Night-Heron
Yellow-headed Blackbird
Yellow-rumped Warbler
Yellow-throated Vireo
Yellow-throated Warbler

Scientific Name

Eudocimus albus
Zonotrichia leucophrys
Vireo griseus
Plegadis chihi
Calidris fuscicollis
Buteo albicaudatus
Zonotrichia albicollis
Zenaida asiatica
Melanitta fusca
Meleagris gallopavo
Catoptrophorus semipalmatus
Empidonax traillii
Phalaropus tricolor
Charadrius wilsonia
Wilsonia pusilla
Troglodytes troglodytes
Aix sponsa
Mycteria americana
Hylocichla mustelina
Helmitheros vermivorus
Dendroica petechia
Empidonax flaviventris
Sphyrapicus varius
Coccyzus americanus
Icteria virens
Nyctanassa violaceus
Xanthocephalus xanthocephalus
Dendroica coronata
Vireo flavifrons
Dendroica dominica

List of Terrestrial Mammals.

Common Name

Badger
Black Rat
Black-tailed Jack Rabbit
Bobcat
Coyote
Eastern Cottontail
Eastern Mole
Eastern Spotted Skunk
Evening Bat
Fulvous Harvest Mouse
Georgia Bat
Gray Fox
Greater Yellow Bat
Gulf Coast Hog-nosed Skunk
Hispid Cotton Rat
Hispid Pocket Mouse
House Mouse
Javelina
Kangaroo Rat
Least Shrew
Marsh Rice Rat
Merriam Pocket Mouse
Mexican Free-Tailed Bat
Mexican Ground Squirrel
Mountain Lion
Nilgia
Nine-Banded Armadillo
Norway Rat
Nutria
Pygmy Mouse
Raccoon
Red Bat
Short-Tailed Grasshopper Mouse
Spotted Ground Squirrel
Striped Skunk
Texas Pocket Gopher
Virginia Opossum
White-Footed mouse
White-tailed Deer

Scientific Name

Taxidea taxus berlandieri
Rattus rattus
Lepus californicus merriami
Lynx rufus
Canis latrans
Sylvilagus floridanus
Scalopus aquaticus
Spilogale putorius
Nycticeius humeralis humeralis
Reithrodontomys flavescens
Pipistrellus subflavus subflavus
Urocyon cinereoargenteus
Lasiurus intermedius
Conepatus leuconotus
Sigmodon hispidus berlandieri
Perognathus hispidus
Mus musculus
Pecari tajacu
Dipodomys compactus
Cryptotis parva berlandieri
Oryzomys palustris
Perognathus flavus merriami
Tadarida brasiliensis mexicana
Spermophilus mexicanus
Felis concolor
Boselaphus tragocamelus
Dasypus novemcinctus
Rattus norvegicus
Myocaster coypus
Baiomys taylori
Procyon lotor
Lasiurus borealis borealis
Onychomys leucogaster
Spermophilus pilosoma annectens
Mephitis mephitis varians
Geomys personatus
Didelphis virginianatexensis
Peromyscus leucopus
Odcoileus virginianus

Common Name

Wild Boar

Scientific Name

Sus scrofa

List of Terrestrial Reptiles and Amphibians.

Common Name	Scientific Name
Mexican Racer	<i>Coluber constrictor oaxaca</i>
American Alligator	<i>Alligator mississippiensis</i>
Bullsnake	<i>Pituophis catenifer sayi</i>
Clark's Chorus Frog	<i>Pseudacris clarkii</i>
Common Snapping Turtle	<i>Chelydra s serpentina</i>
Couch's Spadefoot	<i>Scaphiopus couchii</i>
Desert Kingsnake	<i>Lampropeltis getula splendida</i>
Desert Massasauga	<i>Sistrurus catenatus edwardsi</i>
Desert Massasauga	<i>Sistrurus catenatus edwards</i>
Diamondback Water Snake	<i>Nerodia rhombifera</i>
Eastern Hognose Snake	<i>Heterodon platirhinos</i>
Flat Head Snake	<i>Tantilla gracilis</i>
Great Plains Narrowmouth Toad	<i>Gastrophryne olivacea</i>
Great Plains Rat Snake	<i>Elaphe guttata emoryi</i>
Great Plains Skink	<i>Eumeces obsoletus</i>
Green Treefrog	<i>Hyla cinerea</i>
Ground Skink	<i>Scincella lateralis</i>
Ground Snake	<i>Sonora semiannulata</i>
Gulf Coast Ribbon Snake	<i>Thamnophis proximus orarius</i>
Gulf Coast Toad	<i>Bufo valliceps</i>
Gulf Salt Marsh Snake	<i>Nerodia clarkii clarkii</i>
Hurter's Spadefoot	<i>Scaphiopus hurterii</i>
Keeled Earless Lizard	<i>Holbrookia propinqua</i>
Lined Snake	<i>Tropidclonion lineatum</i>
Marcy's Checkered Garter Snake	<i>Thamnophis marcianus</i>
Marsh Brown Snake	<i>Storeria dekayi limnetes</i>
Mediterranean Gecko	<i>Hemidactylus tursicus</i>
Mexican Milk Snake	<i>Lampropeltis triangulum annulata</i>
Ornate Box Turtle	<i>Terrapene ornata</i>
Red-eared Slider	<i>Trachemys scripta elegans</i>
Rio Grande Leopard Frog	<i>Rana berlandieri</i>
Rosebelly Lizard	<i>Sceloporus variabilis marmoratus</i>
Rough Earth Snake	<i>Virginia striatula</i>
Six-lined Racerunner	<i>Aspidoscelis sexlineatus sexlineatus</i>
Slender Grass Lizard	<i>Ophisaurus a attenuatus</i>
Spot-tailed Earless Lizard	<i>Holbrookia laceretus</i>
Texas Blind Snake	<i>Leptotyphlops dulcis</i>
Texas Brown Snake	<i>Storeria dekayi texana</i>
Texas Coral Snake	<i>Micrurus tener</i>

Common Name

Texas Diamondback Terrapin
Texas Glossy Snake
Texas Horned Lizard
Texas Indigo Snake
Texas Patch Nose Snake
Texas Rat Snake
Texas Scarlet Snake
Texas Spiny Lizard
Texas Spotted Whiptail
Texas Toad
Texas Tortoise
Western Coachwhip
Western Diamondback Rattlesnake
Woodhouse's Toad
Yellow-faced Race Runner
Yellow Mud Turtle

Scientific Name

Malaclemys terrapin littoralis
Arizona elegans arenicola
Phrynosoma cornutum
Drymarchon corais erebennus
Salvadora grahamiae lineata
Elaphe obsoleta lindheimerii
Cemphora coccinea lineri
Sceloporus olivaceus
Cnemidophorus gularis
Bufo speciosus
Gopherus berlandieri
Masticophis flagellum testaceus
Crotalus atrox
Bufo woodhousii woodhousii
Aspidocelis sexlineatus stephensae
Kinosternon flavescens

List of Vegetation.

COMMON NAME

SCIENTIFIC NAME

Oleander	<i>Nerium oleander</i>
Tropical Amaranth	<i>Amaranthus polygonoides</i>
Purple Amaranth	<i>Amaranthus blitum</i>
Carelessweed	<i>Amaranthus palmeri</i>
Gregg's Amaranth	<i>Amaranthus greggii</i>
Sandhill Amaranth	<i>Amaranthus arenicola</i>
Silverhead	<i>Blutaparon vermiculare</i>
Evening Rainlilly	<i>Cooperia drummondii</i>
Plains Snakecotton	<i>Froelichia floridana</i>
Corzo's Wild Petunia	<i>Ruellia corzoi</i>
Wooly Tidestromia	<i>Tidestromia lanuginosa</i>
Buckley's Yucca	<i>Yucca constricta</i>
Don Quixote's Lace	<i>Yucca treculeana</i>
Black Mangrove	<i>Avicennia germinans</i>
Spadeleaf	<i>Centella asiatica</i>
West Indian Cock's Comb	<i>Celosia nitida</i>
Snake Cotton	<i>Froelichia drummondii</i>
Manyflower Marsh Pennywort	<i>Hydrocotyle umbellata</i>
largeleaf Pennywort	<i>Hydrocotyle bonariensis</i>
Green Carpetweed	<i>Mollugo verticillata</i>
Verrucose Sea Purslane	<i>Sesuvium verrucosum</i>
Sea Purslane	<i>Sesuvium verrucosum</i>
Shoreline Sea Purslane	<i>Sesuvium portulacastrum</i>
Desert Horse Purslane	<i>Trianthema portulacastrum</i>
Zizotes Milkweed	<i>Asclepias oenotheroides</i>
Silkweed	<i>Asclepis viridiflora</i>
Milkweed	<i>Asclepias emoryi</i>
Gulf Coast Swallowwort	<i>Cynanchum angustifolium</i>
Prarie Broomweed	<i>Amphiachyris dracunculoides</i>
Annual Saltmarsh Aster	<i>Aster subulatus var. ligulatus</i>
Cuman Ragweed	<i>Ambrosia psilostachya</i>
Annual Ragweed	<i>Ambrosia artemisiifolia</i>
Arkansas Dozedaisy	<i>Aphanostephus skirrhobasis var. thalassius</i>
Bushy Seaside Tansy	<i>Borrichia frutescens</i>
Rooseveltweed	<i>Baccharis neglecta</i>
Seep Willow	<i>Baccharis salicina</i>
Canadian Horseweed	<i>Conyza canadensis</i>
Texas Thistle	<i>Cirsium texanum</i>
Golden Tickseed	<i>Coreopsis tinctoria</i>
Scratch Daisy	<i>Croptilon divaricatum</i>
Dwarf Horse Weed	<i>Conyza ramoissima</i>
Betonleaf Thoroughwort	<i>Conoclinium betonicifolium</i>

COMMON NAME

Golden Aster
Basketflower
Yellow Thistle
Stiffleaf Scratchdaisy
Dogweed
Parralena
False Daisy
Spring Pygmy Cudweed
Corpus Christi Fleabane
Betonyleaf Thoroughwort
Yankeeweed
Bushy Goldentop
Brown's Yellowtops
Firewheel
Pennsylvania Everlasting
Narrowleaf Purple Everlasting
Cottony Goldenaster
Common Sunflower
Silverleaf Sunflower
Cucumberleaf Sunflower
Runyon's Sunflower
Yellow Dicks
Camphorweed
Camphor Daisy
Sump-weed, Marsh Elder
Seacoast Marsh Elder
Narrowleaf Marsh Elder
Western Dwarf Dandelion
Pinkscale Gayfeather
Spiny Chloracantha
Sand Palafox
Texas Palafox
Cure-for-all
Rosy Palafox
Blackeyed Susan
naked Mexican Hat
Riddell's Ragwort
Anisescented Goldenrod
Seaside Goldenrod
Southern Annual Saltmarsh Aster
Common Sowthistle
Achicoria Dulce
Showy Ververay

SCIENTIFIC NAME

Chryopsis pilosa
Centaurea americana
Cirsium horridulum
Croptilon rigidifolium
Dyssodia tenuiloba
Dyssodia pentacheata var. pentacheata
Eclipta prostrata
Evax verna
Erigeron procumbens
Eupatorium betonicifolium
Eupatorium compositifolium
Euthamia leptcephala
Flaveria brownii
Gaillardia pulchella
Gamochaeta pennsylvania
Gamochaeta falcata
Chrysopsis gossypina ssp. gossypina
Helianthus annuus
Helianthus argophyllus
Helianthus debilis ssp. Cucumerifolius
Helianthus praecox ssp. runyonii
Helenium amarum var. amarum
Heterotheca subaxillaris
Machaeranthera phyllocephala
Iva texensis
Iva imbricata
Iva angustifolia
Krigia occidentalis
Liatris elegans
Chloracantha spinosa
Palafoxia hookeriana
Palafoxia texana var. ambigua
Pluchea carolinensis
Parafoxia rosea var. rosea
Rudbeckia hirta var. angustifolia
Ratibida peduncularis
Senecio riddellii
Solidago odora
Solidago sempervirens var. mexicana
Symphotrichum divaricatum
Sonchus oleraceus
Sonchus asper
Tetragonotheca repanda

COMMON NAME

Stiff Greenthread
Rio Grande Greenthread
Five-needle Pricklyleaf
Bristleleaf Pricklyleaf
Golden Crownbeard
Rough Cocklebur
Upright Burhead
Salt Heliotrope
Coastal Plain Heliotrope
Phlox Heliotrope
Gulf Searocket
Coastal Searocket
Hairypod Pepperweed
Virginia Pepperweed
Watercress
Turtleweed
Clasping Venus' Looking Gass
Buffalo-gourd
Globe Berry
Indian Fig, Tuna Cactus
Texas Pricklypear
Erect Pricklypear
Twistspine Pricklypear
Devil's Tongue
Canteloupe
Manateegrass
Watermelon
Five Angled Dodder
Bigseed Alfalfa Dodder
Shoalweed
Tie Vine
Saltmarsh Morningglory
Beach Morningglory
Brazilian Bayhops
Guadeloupe Cucumber
Texas Saltbrush
Matamoros Saltbrush
Crested Saltbrush
Mexican Tea
Pitseed Goosefoot
Lamb's-quarters, Pigweed
Annual Seepweed
Salt Sandspurry

SCIENTIFIC NAME

Thelesperma filifolium
Thelesperma nuecense
Thymophylla pentachaeta
Thymophylla tenuiloba
Verbesina encelioides
Xanthium strumarium
Echinodorus berteroi
Heliotropium curassavicum
Heliotropium racemosum
Heliotropium convolvulaceum
Cakile geniculata
Cakile lanceolata ssp. *pseudoconstricta*
Lepidium lasiocarpum var. *lasiocarpum*
Lepidium virginicum
Rorippa nasturtium-aquaticum
Batis maritima
Triodanis perfoliata
Cucurbita foetidissima
Ilbervillea lindheimeri
Opuntia ficus-indica
Opuntia englemannii var. *lindheimeri*
Opuntia stricta
Opuntia macrorhiza
Opuntia humifusa var. *humifusa*
Cucumis melo
Cymodocea filiformis
Citrullus lanatus var. *citroides*
Cuscuta pentagona
Cuscuta indecora
Halodule beaudettei
Ipomoea cordatotriloba var. *cordatotriloba*
Ipomoea sagittata
Ipomoea imperati
Ipomoea pes-caprae ssp. *Brasiliensis*
Melothria pendula
Atriplex texana
Atriplex matamorensis
Atriplex pentandra
Chenopodium ambrosioides
Chenopodium berlandieri
Chenopodium album
Suaeda linearis
Spergularia salina var. *salina*

COMMON NAME

Bristleseed Sandspurry
Sleepy Silene
Beach Seepweed
Virginia Glasswort
Glasswort
Coastal Seepweed
Globe Flatsedge
Tropical Flatsedge
Bearded Flatsedge
Oneflower Flatsedge
Manyspike Flatsedge
Chufa Flatsedge
Baldwin's Flatsedge
Whitemouth Dayflower
Unknown
Haspan Flatsedge
Hierba del Pollo
Flatsedge
Nut-grass
Purple Spikerush
Dwarf Spikerush
Sand Spikerush
Small Spikerush
Knotted Spikerush
Yellow Spikerush
White Spikerush
Canada Spikesedge
Gulf Coast Spikerush
Carolina Fimbry
Marsh Fimbry
Southern Umbrellasedge
Western Umbrellasedge
Smallflower Hemicarpha
Georgia Frostweed
Hairy Pinweed
Large Clammyweed
Starrush Whitetop
American Bulrush
Sharpscale Bulrush
Bullrush
Texas Spiderwort
Dwarf Sundew
Cardinal's Feather

SCIENTIFIC NAME

Spergularia echinosperma
Silene antirrhina
Suaeda conferta
Salicornia virginica
Salicornia bigelovii
Suaeda tampicensis
Cyperus echinatus
Cyperus surinamensis
Cyperus squarrosus
Cyperus retroflexus
Cyperus polystachyos var. texensis
Cyperus esculentus
Cyperus croceus
Commelina erecta var. angustifolia
Cyperus pseudothyrisflorus
Cyperus haspan
Commelina erecta var. erecta
Cyperus retrorsus
Cyperus rotundus
Eleocharis atropurpurea
Eleocharis parvula
Eleocharis montevidensis
Eleocharis minima
Eleocharis interstincta
Eleocharis flavescens
Eleocharis albida
Eleocharis geniculata
Eleocharis cellulosa
Fimbristylis caroliniana
Fimbristylis castanea
Fuirena scirpoidea
Fuirena simplex
Lipocarpha micrantha
Helianthemum georgianum
Lechea mucronata
Polanisia erosa ssp. breviglandulosa
Rhynchospora colorata
Scirpus pungens var. pungens
Scirpus erectus
Schoenoplectus saximontanus
Tradescantia humilis
Drosera brevifolia
Acalypha radians

COMMON NAME

Unknown
Texas Bull Nettle
Hogwort
Cory's Croton
Vente Conmingo
Cente Conmingo
Prairie Tea
Park's Croton
Beach Tea, Gulf Croton
Silverleaf Croton, Healing Croton
Eyebane
Spurge
Heartleaf Sandmat
Dixie Sandmat
Hierba de la Golondrina
Velvet Spurge
Birdseed Leaf-flower
Smartweed Leaf-flower
Drummond's Leaf-flower
Queen's Delight
Threestamen Waterwort
Texan Fumewort
Live Oak
Live Oak
Dwarf Live Oak
Rare Loco Milkvetch
Sweet Acacia, Texas Huisache
Sticky Jointvetch
Brazos Mildvetch
Longbract Wild Indigo
Plains Wild Indigo
Arrowhead Rattlebox
Baybean
Spurred Butterfly Pea
Sleeping Plant
Pigeonwing
Wild Tantum
Bearded Dalea
Pussyfoot
Woolly Prarieclover
Wedgeleaf Prarieclover
Redcardinal
Edible Milkpea

SCIENTIFIC NAME

Croton glandulosus var lindheimeri
Cnidocolus texanus
Croton capitatus
Croton coryi
Croton glandulosus var. pubentissimus
Croton glandulosus var. septentrionalis
Croton monanthogynus
Croton parksii
Croton punctatus
Croton argyranthemus
Chamaesyce nutans
Euphorbia corollata
Chamaesyce cordifolia
Chamaesyce bombensis
Euphorbia sepens
Euphorbia innocua
Phyllanthus pudens
Phyllanthus polygonoides
Phyllanthus abnormis
Stillingia sylvatica
Elatine triandra
Corydalis micrantha ssp. texensis
Quercus virginiana
Quercus virginiana var. virginiana
Quercus minima
Astragalus leptocarpus
Acacia farnesiana
Aeschynomene viscidula
Astragalus brazoensis
Baptisia bracteata var. laevicaulis
Baptisia bracteata var. leuphaea
Crotalaria sagittalis
Canavalia rosea
Centrosema virginianum
Chamaecrista fasciculata
Clitoria mariana
Desmanthus virgatus var. depressus
Dalea pogonathera
Dalea obovata
Dalea lanata
Dalea emarginata
Erythrina herbacea
Galactia marginalis

COMMON NAME

Hoary Milkpea
Indigo Bush
West Indigo
Coastal Indigo
White Leadtree
Powderpuff
Annual Yellow Sweetclover
Burclover
Yellow Sweetclover
Tropical Puff
Yellow Puff
Honey Mesquite
Gulf Indian Beadroot
Jerusalum Thorn
Dollar-leaf
Snoutbean
American Snoutbean
Least Snoutbean
Yellow Necklacepod
Poorman's Friend
Slickseed Fuzzybean
Coffeebean
Trailing Fuzzybean
Sensitive-brier
Poisonbean
Bagpod
Hairy owpea
Viperina
Catchfly Prariegentian
Sand Rosegentian
Texas Star
Gullfeed
Engelmann's Seagrass
Turtle Grass
St. Andrew's Cross
Orangegrass
Fewflower St. Johnswort
Bristly Nama
Sand Scorpionweed
Wiry Blue-eyed Grass
Spearbract Blue-eyed Grass
Tapertip Rush
Toad Rush

SCIENTIFIC NAME

Galactia canescens
Indigofera suffruticosa
Indigofera miniata var. *leptosepala*
Indigofera miniata
Leucaena leucocephala
Mimosa strigillosa
Melilotus indicus
Medicago polymorpha
Melilous officinalis
Neptunia pubescens
Neptinia lutea
Prosopis glandulosa
Pediomelum rhombifolium
Parkinsonia aculeata
Rychnchosia reniformis
Rychnchosia senna var. *texana*
Rhynchosia americana
Rhynchosia minima
Sophora tomentosa
Stylosanthes viscosa
Strophostyles leiosperma
Sesbania herbacea
Strophostyles helvula
Mimosa latidens
Sesbania drummondii
Glottidium vesicarium
Vigna luteola
Zornia bracteata
Eustoma exaltatum
Sabatia arenicola
Sabatia campestris
Scaevola plumieri
Halophila engelmannii
Thalassia testudinum
Hypericum hypericoides ssp. *hypericoides*
Hypericum gentianoides
Hypericum pauciflorum
Nama hispidum
Phacelia patuliflora
Sisyrinchium biforme
Sisyrinchium sagittiferum
Juncus acuminatus
Juncus bufonius

COMMON NAME

Grassleaf Rush
Needlepod Rush
Bogrush
Roundhead Rush
Needlegrass Rush
Bogrush
Common Bladderwort
Bladderwort
Foxtail Clubmoss
Tufted Flax
Winged Flax
Bristle Flax
Pink Redstem
Texas Rainlily
California Loosestrife
Winged Lythrum
Crow Poison
Redbay
Lowland Rotala
Cory's Beebalm
Drummond's Scullcap
Rio Grande Scullcap
Small Coastal Germander
Chickenthief
Juniper Leaf
Virginia Saltmarsh Willow
Indian Valley False Mallow
Three-lobed False Mallow
Lima
Showy Fanpetals
Woolly Globemallow
Bracted Fanpetals
Wax Myrtle
Red Spiderling
Scarlet Spiderling
White Four O'clock
Southern Waternymph
Manyflower Broomrape
Yellow Sundrops
Berlander's Sundrops
Longflower Beeblossom
Velvetweed
Cylindric Fruit Primrose Willow

SCIENTIFIC NAME

Juncus marginatus
Juncus scirpoides
Juncus brachycarpus
Juncus validus var. *fascinatus*
Juncus roemerianus
Juncus megacephalus
Utricularia macrorhiza
Utricularia subulata
Lycopodiella alopecuroides
Linum imbricatum
Linum alatum
Linum aristatum
Ammannia latifolia
Cooperia drummondii
Lythrum californicum
Lythrum alatum var. *lanceolatum*
Nothoscordum bivalve
Persea borbonia
Rotala ramosior
Monarda punctata ssp. *punctata* var. *coryi*
Scutellaria drummondii
Scutellaria muriculata
Teucrium cubense var. *cubense*
Mentzelia oligosperma
Polypremum procumbens
Kosteletzkya virginica
Malvastrum americanum
Malvastrum coromandelianum
Sida cordifolia
Sida lindheimeri
Sphaeralcea lindheimeri
Sida ciliaris
Morella cerifera
Boerhavia diffusa
Boerhavia coccinea
Mirabilis albida
Najas guadalupensis
Orobanche ludoviciana ssp. *Multiflora*
Calylophus serrulatus
Calylophus berlandieri ssp. *Pinifolius*
Gaura longiflora
Gaura parviflora
Ludwigia glandulosa

COMMON NAME

Beach Evening Primrose
Showy Evening Primrose
Cut-leaf Evening Primrose
Pinkladies
Spring Ladies Tresses
Dillen's Oxalis
Drummond's Woodsorrel
Longleaf Buckwheat
Heartsepal Buckwheat
October Flower
Giant Reed
Common Oat
Red Threeawn
Broomsedge Bluestem
Splitbeard Bluestem
Bushy Bluestem
Big Bluestem
Purle Three-awn
Prarie three-awn
Beardgrass
Fringed Signalgrass
Rescuegrass
King Ranch Bluestem
(DC) Herter, (Steud.) Hack.
Silver Bluestem
Bufflegrass
Rhodes grass
Windmill grass, Trumble
Multiflower false Rhodesgrass
Hooded Windmillgrass
Paraguayan windmill grass
Slimspike windmill grass
Southern Sandbur
Bermudagrass
Coast Sandbur
Panic Grass
Crabgrass
Asian Crabgrass
Northern Crabgrass
Panic Grass
Inland Saltgrass
Texas Crabgrass
Carolina Crabgrass

SCIENTIFIC NAME

Oenothera drummondii
Oenothera grandis
Oenothera laciniata
Oenothera speciosa
Spiranthes vernalis
Oxalis dillenii ssp. *dillenii*
Oxalis drummondii
Eriogonum longifolium
Eriogonum multiflorum
Polygonella polygama
Arundo donax
Avena sativa
Aristida longespica var. *geniculata*
Andropogon virginicus
Andropogon ternarius
Andropogon glomeratus
Andropogon gerardii
Aristida purpurea var. *purpurea*
Aristida oligantha
Bothriochloa barbinodis var. *barbinodis*
Brachiaria ciliatissima
Bromus catharticus
Bothriochloa ischaemum var. *songarica*
Bothriochloa lagunroides ssp. *Torreyana*
Bothriochloa saccharoides
Pennisetum ciliare
Chloris gayana
Chloris verticillata
Chloris pluriflora
Chloris cucullata
Chloris canterai
Chloris andropogonoides
Cenchrus echinatus
Cynodon dactylon
Cenchrus incertus
Dichantherium nodatum
Digitaria arenicola
Digitaria bicornis
Digitaria sanguinalis
Dichantherium acuminatum var. *acuminatum*
Distichlis spicata
Digitaria texana
Digitaria cognata

COMMON NAME

Durban Crowsfoot Grass
Angleton's Bluestem
Heller's Rosette Grass
Sarita Rosette Grass
Kleberg's Bluestem
Roundseed Panicum
(Pursh) A. Heller
Lace Grass
Gulf Cock Spurgrass
Gummy Lovegrass
Lovegrass
Lovegrass
Large Barnyard Grass
Mourning Lovegrass
Mediterranean Lovegrass
Pinewoods Fingergrass
Red Lovegrass
Purple Lovegrass
Tumble Lovegrass
Little Barley
Southern Cutgrass
Green Sprangletop
Bearded Sprangletop
Perennial Ryegrass
Red Spangletop
Hairawn Muhly
Shoregrass
Beach Panic Grass
Common Reed
Switchgrass
Sicklegrass
Bufflegrass
Unknown
Brownseed Paspalum
Annual Rabbit's Foot Grass
Thin Paspalum
Gulfdune Paspalum
Hemlock Rosette Grass
Woolly Rosette Grass
Slender Panicgrass
Needleleaf Rosette Grass
Bitter Panicgrass
Talquezal

SCIENTIFIC NAME

Dactyloctenium aegyptium
Dichanthium aristatum
Dichantherium oligosanthes var. *oligosanthes*
Dichantherium nodatum
Dichanthium annulatum
Dichantherium sphaerocarpon
Echinochloa walteri
Eragrostis capillaris
Echinochloa crus-pavonis
Eragrostis curtipedicellata
Eragrostis intermedia
Eragrostis pectinaceae
Echinochloa crus-galli var. *crus-galli*
Eragrostis lugens
Eragrostis barrelieri
Eustachys petraea
Eragrostis secundiflora subsp. *oxylepis*
Eragrostis spectabilis
Eragrostis sessilispica
Hordeum pusillum
Leersia hexandra
Leptochloa dubia
Leptochloa fascicularis
Lolium perenne
Leptochloa panicea ssp. *Mucronata*
Muhlenbergia capillaris
Monanthochloe littoralis
Panicum amarulum var. *amarulum*
Phragmites australis
Panicum virgatum
Parapholis incurva
Pennisetum ciliare var. *ciliare*
Pennisetum glaucum
Paspalum plicatulum
Polypogon monspeliensis
Paspalum setaceum
Paspalum monostachyum
Dichantherium sabulorum var. *thinium*
Dichantherium scabriusculum
Panicum capillarioides
Dichantherium aciculare
Panicum amarum
Paspalum vaginatum

COMMON NAME

Saltmeadow Cordgrass
Gulf Cordgrass
Little Bluestem
Yellow Bristlegrass
Streambed Bristlegrass
Tumblegrass
Smooth Cordgrass
Tharp's Dropseed
Alkali Sacaton
Seashore Dropseed
Sand Dropseed
Whorled Dropseed
Tussockgrass
Plains Bristlegrass
Johnsongrass
Prairie Wedgescale
Silveus' grass
Purple Sandgrass
Pink Fluffgrass
Seaoats
Texas Signalgrass
Fringed Signalgrass
Sixweeks Fescue
Texasgrass
Sea Lavender
White Milkwort
Procession Flower
Whorled Milkwort
Red Prickly-poppy
White Prickly-poppy
Scarlet Pimpernel
Chaffweed
Plantain
California Plantain
Virginia Plantain
Annual Phlox
Rio Grande Phlox
Rio Grande Phlox
American Pokeweed
Little Hogweed
Dwarf Plantain
Kiss-me-quick
Limewater Brookweed

SCIENTIFIC NAME

Spartina patens
Spartina spartinae
Schizachyrium scoparium ssp. littorale
Setaria parviflora
Setaria leucopila
Schedonnardus paniculatus
Spartina alterniflora
Sporobolus tharpii
Sporobolus airoides subsp. Airoides
Sporobolus virginicus
Sporobolus cryptandrus
Sporobolus pyramidatus
Nassella leucotricha
Setaria vulpista
Sorghum halepense
Sphenopholis obtusata
Trichoneura elegans
Triplasis purpurea
Tridens congestus
Uniola paniculata
Urochloa texana
Urochloa cilistissima
Vulpia octoflora
Vaseyochloa multinervosa
Limonium carolinianum
Polygala alba
Polygala incarnata
Polygala verticillata
Argemone sanguinea
Argemone albiflora ssp. Texana
Anagallis arvensis
Anagallis minima
Plantago heterophylla
Plantago hookeriana
Plantago virginica
Phlox drummondii
Phlox glabriflora subsp. glabriflora
Phlox glabriflora subsp. littoralis
Phytolacca americana
Portulaca oleracea
Plantago pusilla
Portulaca pilosa
Samolus ebracteatus

COMMON NAME

Sunbright
Common Bottonbush
Poorjoe
Diamond Flowers
Nodding Bluet
Clustered Mille Graines
Bosc's Mille Graines
Bluets
Tropical Mexican Clover
Hercules-club
Texas Hercules-club
Widgeon Grass
Saltmarsh False Foxglove
Stiffleaf False Foxglove
Prarie False Foxglove
Beach False Foxglove
American Bluehearts
Herb-of-grace
Disk Water-hyssop
Blue Hyssop
Yellowseed False Pimpernel
Texas Toadflax
Roving Sailor
Wooly Stemodia
Cayenne Pepper
Carolina Desertthorn
Tree Tobacco
Smallflower Groundcherry
American Black Nightshade
Buffalo Burr, Kansas Thistle
Petiteplant
Black Willow
Southern Cattail
Tamarisk, Fivestamen tamarisk
Athel Tamarisk
Canary Island Tamarisk
Saltcedar
French Tamarisk
Pennsylvania Pellitory
Florida Pellitory
Heartleaf Nettle
Ivy Treebine
Dakota Verbena

SCIENTIFIC NAME

Talinum parviflorum
Cephalanthus occidentalis
Diodia teres
Hedyotis nigricans
Houstonia subviscosa
Oldenlandia uniflora
Oldenlandia boscii
Oldenlandia boscii
Richardia brasiliensis
Zanthoxylum clava-herculis
Zanthoxylum hirsutum
Ruppia maritima
Agalinis maritima var. *grandiflora*
Agalinis strictifolia 1
Agalinis heterophylla
Agalinis fasciculata
Buchnera americana
Bacopa monnieri
Bacopa rotundifolia
Bacopa caroliniana
Lindernia dubia var. *anagallidea*
Nuttallanthus texanus
Maurandella antirrhiniflora
Stemodia lanata
Capsicum annuum var. *glabriusculum*
Lycium carolinianum
Nicotiana glauca
Physalis cinerascens var. *spathulifolia*
Solanum americanum
Solanum rostratum
Lepuropetalon spathulatum
Salix nigra
Typha domingensis
Tamarix chinensis
Tamarix aphylla
Tamarix canariensis
Tamarix ramosissima
Tamarix gallica
Parietaria pensylvanica
Parietaria floridana
Urtica chamaedryoides
Cissus incisa
Glandularia bippinatifida var. *bipinnatifida*

COMMON NAME

Lantana
West Indian Shrubverbena
Turkey Tangle Frogfruit
Texas Vervain
Richard's Yellow-eyed Grass
Hairy Caltrop
Puncture-vine, Goathead

SCIENTIFIC NAME

Lantana camara
Lantana urticoides
Phyla nodiflora
Verbena halei
Xyris jupicai
Kallstroemia hirsutissima
Tribulus terrestris

C. RESOURCE EFFECTS TO CONSIDER

Are any measurable ¹ impacts possible on the following physical, natural, or cultural resources?	Yes	No	Data Needed to Determine
1. Geological resources – soils, bedrock, streambeds, etc.		X	
2. Air quality	X		Not necessary
3. Natural soundscape		X	
4. Water quality or quantity		X	
5. Tide flow characteristics		X	
6. Marine or estuarine resources		X	
7. Floodplains or wetlands		X	
8. Land use, including occupancy, income, values, ownership, type of use		X	
9. Rare or unusual vegetation		X	
10. Species of special concern (plant or animal; state or federally listed or proposed for listing) or their habitat		X	
11. Unique or important wildlife or wildlife habitat		X	
12. Unique or important fish or fish habitat		X	
13. Recreation resources, including supply, demand, visitation, activities, etc.		X	
14. Visitor experience, aesthetic resources		X	
15. Cultural resources including cultural landscapes, ethnographic resources, sacred sites		X	
16. Socioeconomic resources, including employment, occupation, income changes, tax base, infrastructure, concessions		X	
17. Minority and low income populations, ethnography, size, migration patterns, etc.		X	
18. Energy resources		X	
19. Other agency or tribal land use plans or policies		X	
20. Resource, including energy, conservation potential		X	
21. Urban quality, gateway communities, etc.		X	
22. Long-term management of resources or land/resource productivity		X	
23. Pollution prevention (greening the parks)		X	
24. Wilderness – suitability, recommended, potential, designated		X	
25. Other important environment resources (e.g. geothermal, paleontological resources, night skies)?		X	

¹ Measurable impacts are those that the interdisciplinary team determines to be greater than negligible by the analysis process described in DO-12 §2.9 and §4.5(G)(4) to (G)(5).

D. MANDATORY CRITERIA

Mandatory Criteria: If implemented, would the proposal:	Yes	No	Data Needed to Determine
A. Have material adverse effects on public health or safety?		X	
B. Have adverse effects on such unique characteristics as historic or cultural resources; park, recreation, or refuge lands; wilderness areas; wild or scenic rivers; national natural landmarks; sole or principal drinking water aquifers; prime farmlands; wetlands; floodplains; or ecologically significant or critical areas, including those listed on the National Register of Natural Landmarks?		X	
C. Have highly controversial environmental effects?		X	
D. Have highly uncertain and potentially significant environmental effects or involve unique or unknown environmental risks?		X	
E. Establish a precedent for future action or represent a decision in principle about future actions with potentially significant environmental effects?		X	
F. Be directly related to other actions with individually insignificant, but cumulatively significant, environmental effects?		X	
G. Have adverse effects on properties listed or eligible for listing on the National Register of Historic Places?		X	
H. Have adverse effects on species listed or proposed to be listed on the List of Endangered or Threatened Species or have adverse effects on designated Critical Habitat for these species?		X	
I. Require compliance with Executive Order 11988 (Floodplain Management), Executive Order 11990 (Protection of Wetlands), or the Fish and Wildlife Coordination Act?		X	
J. Threaten to violate a federal, state, local, or tribal law or requirement imposed for the protection of the environment?		X	
K. Involve unresolved conflicts concerning alternative uses of available resources (NEPA sec. 102(2)(E))?		X	

Mandatory Criteria: If implemented, would the proposal:	Yes	No	Data Needed to Determine
L. Have a disproportionate, significant adverse effect on low-income or minority populations (EO 12898)?		X	
M. Restrict access to and ceremonial use of Indian sacred sites by Indian religious practitioners or adversely affect the physical integrity of such sacred sites (EO 13007)?		X	
N. Contribute to the introduction, continued existence, or spread of federally listed noxious weeds (Federal Noxious Weed Control Act)?		X	
O. Contribute to the introduction, continued existence, or spread of non-native invasive species or actions that may promote the introduction, growth or expansion of the range of non-native invasive species (EO 13112)?		X	
P. Require a permit from a federal, state, or local agency to proceed, unless the agency from which the permit is required agrees that a CE is appropriate?		X	
Q. Have the potential for significant impact as indicated by a federal, state, or local agency or Indian tribe?		X	
R. Have the potential to be controversial because of disagreement over possible environmental effects?		X	
S. Have the potential to violate the NPS Organic Act by impairing park resources or values?		X	

E. OTHER INFORMATION *(Project Initiator)*

Are personnel preparing this form familiar with the site? Yes No

Did personnel conduct a site visit? Yes No *(If yes, attach meeting notes noting when site visit took place, who attended, etc.)*

Is the project in an approved plan such as a General Management Plan or an Implementation Plan with an accompanying environmental document? Yes No

If so, plan name _____

Is the project still consistent with the approved plan? Yes No *(If no, prepare plan/EA or EIS.)*

Is the environmental document accurate and up-to-date? Yes No *(If no, prepare plan/EA or EIS.)*

FONSI or ROD Date _____

Has the project been reviewed by the Regional Office, WASO, DOI, or other appropriate agency?

Yes Date November 2004 No Not applicable

Are there any interested or affected agencies or parties? Yes No

Did you make a diligent effort to contact them? Yes No

Has consultation with all affected agencies or tribes been completed? Yes No Not applicable
(If so, attach additional pages detailing the consultation, including the name, the dates, and a summary of comments from other agencies or tribal contacts.)

Are there any connected, cumulative, or similar actions as part of the proposed action? Yes No
(If so, attach additional pages detailing the other actions.)

Is assistance needed from other park teams? Yes *(If yes, indicate which teams below)* No

Resources Management (Sections C, D, and F) Sea Turtle (Section G)

Facility Management (Section H)

Visitor and Resources Protection (Section I)

Interpretation (Section J)

Administration (Section K)

F. NATURAL AND CULTURAL RESOURCES *(Science and Resources Management Team)*
 This section may be filled out either as the project progresses or when environmental documentation is complete.

National Environmental Policy Act Chief, Resources Management Samuel E. Edols
 (Choose one and fill in blanks)

- Project already included in current environmental document, no additional compliance is needed
 CE CE Citation from 3-4 of DO-12 _____ (Complete sections A-F before checking this box.)

The proposed action is categorically excluded from further documentation under NEPA in accordance with 516 DM 2, Appendix 1, 1.12 because it meets all the specified criteria for the use of this categorical exclusion as described in the *Federal Register* (Vol 68, No. 108, pages 33814-33824).

- EA Because:
 It is indeterminate whether the proposed action will have a significant impact on the quality of the environment.
 The project is not covered by a Categorical Exclusion under NEPA.
 The project represents an exception to the Categorical Exclusions under NEPA.
- | | | | |
|--|-------|-----------------|-------|
| Public scoping date | _____ | IMR Review date | _____ |
| EA release to public | _____ | FONSI date | _____ |
| <input type="checkbox"/> EIS NOI in FR | _____ | NOA for DEIS | _____ |
| NOA for FEIS | _____ | ROD date | _____ |

Comments:

National Historic Preservation Act Chief, Resources Management Samuel E. Edols

- Has the area been surveyed and NRHP resources identified? Yes No
 Ground disturbance involved? Yes No
 Archeological resources affected? Yes No
 Historic structures affected? Yes No
 Cultural landscapes affected? Yes No
 Ethnographic resources affected? Yes No (If yes, interested parties contacted? Yes No)

- No Historic Properties Affected*
 Programmatic Exclusion (Exclusion # _____)
 No Adverse Effect Date AEF or combined EA/AEF to SHPO _____
 Date back from SHPO/THPO _____
 Date consultation completed _____
 Date mitigation completed _____
 Adverse Effect Date AEF or combined EA/AEF to SHPO _____
 Date to ACHP _____
 MOA Date _____
 Date consultation completed _____
 Date mitigation completed _____

Comments:
Based on recent archeological surveys, archeological resources documented in 1974 can not be located due to the accumulation of sand over these artifacts (Rickliss 1998, 1999, Moore and Warren 2003). Additional archeological surveys have been conducted around the park's Headquarter and Visitor Center areas, and no cultural sites or artifacts were identified (Bradford and Payne 1993, and Labadie 1999). Therefore, no archeological resources will be affected.

Endangered Species Act Chief, Resources Management Danell E. Elsb

Any threatened/endangered species in area? Yes No
 If species in area No effect explain _____
 Not Likely to Adversely Affect (*Initiate Informal Consultation*)
 Likely to Adversely Affect (*Initiate Formal Consultation*)
 Date documentation sent to FWS _____ Approved Date _____
 Denied Date _____

Comments:
On September 4, 2004, park staff contacted the local FWS Ecological Services office to discuss potential affects on endangered species from activities outlined in the FMP. While threatened and endangered species exist in the project area, the scope of the FMP activities will not have an effect on these species. However, if large scale burns greater than 50 acres are proposed for hazardous fuels reduction, additional compliance in the form of a Biological Assessment will be necessary.

Floodplains/Wetlands/§404 Permits Chief, Resources Management Danell E. Elsb

Is project in 100- or 500-year floodplain, flash flood hazard area, or wetlands, and has potential to have an adverse affect? Yes No *If yes, statement of findings approval date _____*
 Corps 404 permit needed? Yes No Date _____
 State 401 certification? Yes No Date _____
 State Water Quality permit? Yes No Date _____
 CZM Consistency determination needed? Yes No Date _____

Other Permits/Laws Chief, Resources Management Danell E. Elsb

Air Quality consult w/State? Yes No Date _____
 Consistent w/Architectural Barriers, Rehabilitation, and Americans with Disabilities Acts? Yes No Date _____
 Collecting permit from State? Yes No Date _____
 Collecting permit from FWS? Yes No Date _____
 Collecting permit from NMFS? Yes No Date _____
 Other _____ Yes No Date _____

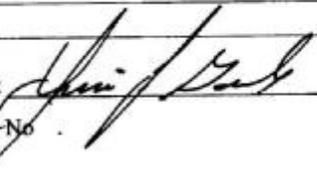
Comments:
The FMP outlines activities that may have an affect on air quality. However, consultation with the Texas Commission on Environmental Quality (TCEQ) occurs prior to any outdoor burning. TCEQ does not generally issue a permit for prescribed burns, but they do request that we comply with Ozone Action Days and notify them of our plans to burn so that they can respond to public inquiries.

G. SEA TURTLE RESOURCES (*Sea Turtle Science and Recovery Team*)

Chief, Sea Turtle Science and Recovery Danell E. Elsb
 Project has potential to affect park sea turtle resources Yes No
 (*If not, complete reason section below.*)
Reasons:

Comments:

H. SCHEDULING (*Facility Management Team*) Chief, Facility Management



Schedule is in concert with Facility Management Scheduling
(If not, complete reason section below.)

Yes No

Reasons:

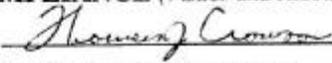
Comments:

None

A requisition is required from the project initiator for the following supplies and materials:

I. VISITOR PROTECTION COMPLIANCE (*Visitor and Resource Protection Team*)

Chief, Visitor and Resource Protection



Project does not interfere with the protection of park visitors or resources
(If project does interfere, complete reason section below.)

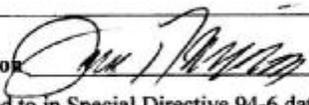
Yes No

Special Use permit required? Yes No Date _____

Comments:

Reasons:

J. INTERPRETATION (*Interpretation Team*) Chief, Interpretation



Yes No NPS cataloging and basic preservation standards referred to in Special Directive 94-6 dated November 22, 1994 are adequately planned for according to the specific directive(s) checked below:

- Special Directive 87-3, "Conservation of Archeological Resources"
- Special Directive 91-4, "Ensuring that Natural Resource Projects Fund the Curation of Collections"

Yes No Project requires only NPS archiving of project documentation be accomplished; requirements for archiving are adequately met in the project description.

Yes No Project does not involve cataloging or basic preservation of collected artifacts, samples, specimens, documents, or other items.

Comments:

K. ADMINISTRATION (*Administration Team*) Chief, Administration _____

Comments:

L. SUPERINTENDENT SIGNATORY

Approved:

Superintendent  _____

Date 1/19/05

Denied:

Superintendent _____

Date _____

2. Decision Memorandum (Environmental Statement Memorandum ESM03-2)

Decision Memorandum on the Action and for the Application of Categorical Exclusion 1.12

Implementation of a Fire Management Program at Padre Island National Seashore

**U.S. Department of the Interior
National Park Service
Padre Island National Seashore
Kleberg County, Texas**

Purpose and Need for the Action

Padre Island National Seashore (PAIS) is located along the southern coast of Texas, approximately 10 miles south of Corpus Christi. Congress established the park in 1962 to preserve a portion of diminishing seashore of the United States that remains undeveloped. The National Park Service (NPS) preserves and protects the park's natural and cultural resources, which include threatened and endangered species, historic properties, waterbird rookeries, and a significant portion of the Laguna Madre of the park for the purposes of public recreation, benefit, and inspiration.

Island vegetation consists predominantly of low-lying grasses, forbs and shrubs, and stunted oak trees that grow on low dunes, but island habitats have changed significantly over the past 200 years. Cattle ranching occurred at the park historically, which altered plant species composition, abundance, and diversity. Vegetation communities are recovering from the cattle-grazing period, which ended in the early 1970's. However for over thirty years, wildland fire has been suppressed at the park causing unnatural accumulations of litter, and minimizing species diversity and abundance. Also, a greater concentration of non-native grasses now exists. The goals of the fire management program are to:

- Provide for employee, public, and firefighter safety,
- Re-establish the natural vegetative regime,
- Reduce the extent of exotic grasses, and
- Preserve and protect park natural and cultural resources.

This plan meets the requirements of the NPS Director's Order 18, which states that "each park with vegetation capable of burning will prepare a wildland fire management plan to guide a fire management program that is responsible to the Park's natural and cultural resource objectives and to safety considerations for Park visitors, employees, and developed facilities." The completion of this fire management plan will satisfy these requirements. This plan and associated categorical exclusion (CE) will establish future management direction for fire-related activities at PAIS to protect park resources and values.

Plan Conformance

The treatment actions, mechanical treatment and prescribed fire, that are described in the fire management program are categorically excluded from further documentation under the National Environmental Policy Act (NEPA) in accordance with 516 DM 2, Appendix 1, 1.12. Hazardous fuels reduction activities using prescribed fire will not exceed 4,500 acres and mechanical methods for crushing, piling, thinning, pruning, cutting, chipping, mulching, and mowing will not exceed 1,000 acres. All activities will be limited to areas in the wildland urban interface and Condition Classes 2 or 3 in Fire Regime Groups I, II, or III outside the wildland urban interface. Activities will be identified through a collaborative framework and be conducted consistent with agency and Departmental procedures and applicable land and resource management plans. Padre Island National Seashore does not contain wilderness. Additionally, the fire management program will not include the use of herbicides or pesticides or the construction of new permanent roads or any other new permanent infrastructure. There will be no sale of vegetative material. The proposed action was designed to conform to all National Park Service standards, and it incorporates the appropriate guides for the required and desired conditions relevant to the project activities. Suppression activities, if needed, would be considered emergency actions and not subject to NEPA requirements.

Compliance with the National Environmental Policy Act

The proposed action is categorically excluded from further documentation under NEPA in accordance with 516 DM 2, Appendix 1, 1.12 because it meets all the specified criteria for the use of this categorical exclusion as described in the *Federal Register* (Vol 68, No. 108, pages 33814-33824).

The application of this categorical exclusion is appropriate in this situation because there are no extraordinary circumstances that potentially have effects that may significantly affect the environment. None of the exceptions to categorical exclusions (Director's Order-12, *Conservation Planning, Environmental Impact Analysis, and Decision-Making Handbook*, §3.5) or other cautions found in §3.6 of the DO-12 Handbook apply.

I considered the level of effects of the proposed action on threatened and endangered species, historic resources, air quality, the visitor's experience, and other appropriate resources and documented the effects using the park's Environmental Screening Form. Based upon the analysis of these effects, the potential for significant effects does not exist.

Persons and Agencies Consulted

Public scoping was initiated on July 15, 2004, for a 30-day period. A notice of scoping, which announced the public comment period, was published in the Sunday edition of the local newspaper and placed on the park's website. The park received only four comments through the public scoping process. All comments obtained were supportive of the proposed action, but also included issues beyond the scope of this action, e.g., the possible elimination of driving on the beach.

Consultation with the U.S. Fish and Wildlife Service occurred on September 4, 2004. The USFWS was notified of the National Park Service's intent to use a categorical exclusion, rather than an Environmental Assessment, for the Fire Management Plan. The Service expressed no

concerns about the proposed action and its affect on park threatened or endangered species. However, if large prescribed burns (greater than 50 acres) were planned, then additional compliance in the form of a Biological Assessment would be necessary prior to the burns taking place. The USFWS concurred that we did not have to take further action at this time.

Consultation with affected Native American tribes was not necessary. The Tonkawa Tribe, which is the only tribe with cultural ties to the park, has notified us that they express no interest in the activities conducted by the National Park Service at Padre Island National Seashore. While they do not prefer to be included in the consultation for this plan, they would like to be kept informed of the decisions that park management make. Therefore a copy of the plan will be provided to them.

Discussions were held with the Texas Commission on Environmental Quality (TCEQ) about the impact of the proposed action on air quality. TCEQ did not express any concern for the potential minimal, impact to air quality based on our distance from Corpus Christi, predominant wind direction, and likely short duration of any prescribed fire.

The park's Interdisciplinary Team examined the effects of the proposed action on the park's limited historic properties on April 16, 2003. The team determined that the activities suggested within the proposed action would have no adverse effect on park cultural resources and therefore further consultation was not necessary.

Decision and Rationale on Action

I have decided to implement the fire management program at Padre Island National Seashore. The Padre Island National Seashore Fire Management Plan contains consideration for the use of suppression, prescribed fire, and manual/mechanical treatments as components for fire management in the park. The plan establishes two fire management units that are based upon fire danger, unit location, and natural barriers to fire spread, safety of suppression forces, and resources at risk. Because of personnel constraints, minimal fire history, and a limited amount of research concerning the role of fire in the park's ecosystem, wildland fire use is not a current option for the fire management program at Padre Island National Seashore and is not addressed in the Fire Management Plan.

Suppression

All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but also minimize the loss of resource values, economic expenditures, and/or the use of critical firefighting resources. The appropriate management response would be used to curtail fire spread and eliminate all identified fire threats. Appropriate management response could include: aggressive suppression, full suppression, or confine and contain strategies. For suppression actions, holding actions could be implemented to prohibit the fire from crossing containment boundaries. Holding actions could include the construction of fire lines, reduction of excessive fuel concentrations, and creation of fuel breaks or barriers around critical or sensitive sites or resources.

Full suppression actions would include all available tools and tactics to suppress the fire. This could include the use of fire retardant and any aviation resources that could be used in an appropriate situation. In extremely rare situations or events the use of bull dozers, graders, or other heavy

equipment could be used, but only after approval on a case-by-case basis by the Superintendent. The use of heavy equipment and fire retardant has not occurred on park fires in the past.

A confine/contain strategy could be used to create a fuel break around the fire. This break may include natural barriers or manually and/or mechanically constructed lines. Active fire suppression actions would probably not be implemented in areas where the fire could be confined or contained within this pre-designated area. Aircraft could be used for fire management activities including: reconnaissance, fire control, or retardant drops.

Prescribed Fire

Prescribed fires are any fire ignited by management to meet specific objectives. Prescribed fire would be used to reduce hazard fuels. Prescribed fire would use prescriptions that define conditions (wind speed and direction, relative humidity, dew point, temperature, rate of fire spread, and flame length) under which the fire could be ignited. These measurable conditions would be monitored to ensure that prescribed conditions are met.

Prescribed fire units would be established so that treatment boundaries are in logical places where the fire could be contained or controlled. These boundaries would use natural fuel breaks or mechanically treated perimeter lines. Each prescribed fire would be managed and monitored by qualified personnel prior, during, and after the fire.

Prescribed fire would be carried out to minimize local effects to visibility and air quality from smoke production. Rehabilitation of areas burned by prescribed fire would be considered, particularly if handlines are installed that remove vegetation to the mineral soil.

Research on the effects of prescribed fire could be used to investigate the effects of prescribed fire treatments. Long-term data collection could be associated with these treatments. Many of the suppression strategies that are described above could be used to manage prescribed fire.

Mechanical

Mechanical equipment could be used as a stand-alone method to reduce fuels, to allow for prescribed fire, or to construct a fire line during a wildland fire.

Mechanical methods could include:

- non-mechanized handheld tools used in suppression activities (e.g., shovels, saws, axes, Pulaski's),
- mechanized handheld tools (e.g., weed trimmers), or
- mechanized wheeled or track equipment (e.g., All Terrain Vehicles, tractors, mowers, or other similar equipment that can be used for fuel removal). Mechanized wheeled or track equipment could be used in wildland urban interface areas, along park boundaries, and in developed infrastructure areas within the park.

Heavy equipment with large tires or tracks designed to have less ground disturbances would be the first choice for use. The use of any heavy ground disturbing equipment would need to be approved by the Superintendent.

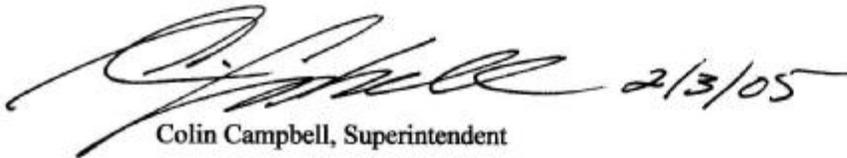
These treatments meet the need for managing fire at Padre Island National Seashore. In addition, I have determined that the proposed action is in conformance with the approved land management plan and no further environmental analysis is required. Padre Island National Seashore's General Management Plan (GMP) was completed in 1983 and addressed fire only in general terms as a component of the natural process. A new GMP is being developed for the park that may address the use of fire to meet park management goals. An Interpark Agreement exists with Big Thicket National Preserve to provide program oversight, technical assistance, funding, and training in order to help the park manage its fire program. The park also has a Cooperative Agreement with the Nueces County Emergency Services District to support fire suppression activities both within and outside of the park.

The NPS Management Policies, and the park's GMP, Resource Management Plan, and Strategic Plan, emphasize the protection and preservation of the park's resources. The overriding concerns are to ensure that fire management activities do not threaten those resources, but instead are used to ensure their continued protection. The fire management program will ensure that ecological processes, including fire, shape vegetative patterns and conditions. The provisions included in the Fire Management Plan and the management considerations that affect operational implementation are consistent with addressing these concerns.

I have determined that no further environmental analysis is required for the proposed action.

Implementation Date

This project will be implemented after the approval of the Fire Management Plan.

A handwritten signature in black ink, appearing to read 'Colin Campbell', followed by the date '2/3/05' written in a similar cursive style.

Colin Campbell, Superintendent

Administrative Review or Appeal Opportunities

This action is not subject to administrative appeal because the NPS does not have a formal appeal process. Concerns about this action should be directed to the Intermountain Regional Director, National Park Service, P.O. Box 25287, Denver, Colorado 80225-0287.

Contact Person

For additional information concerning this decision, contact Colin Campbell, Superintendent, Padre Island National Seashore, P.O. Box 181300, Corpus Christi, Texas 78480-1300 at (361) 949-8173 ext. 222

APPENDIX E. Other Information.

1. Fire Call-up List.

Division of Visitor and Resource Protection

Randy Larson
Jason Litchblau
Patrick Gagnon
Doug Briggs

Division of Science and Resources Management

Darrell Echols
Arlene Wimer
Katie Morris
Michelle Kolar

Division of Interpretation

William Botts

Division of Facility Management

Sam Brown

AD's

Jason Morris
Wayne Wimer

EMTB/ Security

Tom Crowson
Pat Donohue

Equipment Manager

Glenda Hammond
Tony Moreno

Purchasing

Ruby Martin

Dispatch

Sharon Mason

2. Cooperative Agreement.

A cooperative agreement with the Nueces County Emergency Services District for assistance in structure protection and fire suppression will be maintained and is listed below. Rural Fire Assistance grants may also be used to upgrade their wildland fire capability.

**GENERAL AGREEMENT
BETWEEN THE NATIONAL PARK SERVICE
AND
THE NUECES COUNTY RURAL FIRE PROTECTION DISTRICT, STATE OF TEXAS
GA-7499-2002-001**

THIS AGREEMENT, is entered into this 18th day of July 2002, by and between the National Park Service, United States Department of Interior, represented by the Superintendent, Padre Island National Seashore, and the Nueces County Rural Fire Protection District, State of Texas, represented by the Fire Chief.

ARTICLE I

Authority: 16 U.S.C. - 1b.1

WHEREAS, the National Park Service under the laws of the United States administers land and water resources within the boundaries of Padre Island National Seashore, and is recognized as having primary responsibility for providing visitor protection, public health and safety protection and conducting search and rescue efforts on these Federal lands, and

WHEREAS, the Nueces County Rural Fire Protection District, which is located near Padre Island National Seashore, is responsible for citizen protection, public health and safety, conducting search and rescue efforts and structural and wildland fire protection, and

WHEREAS, it is to the mutual advantage of each party and to the public hereto to cooperate closely in providing the above stated services:

NOW THEREFORE, in consideration of the above premises, the parties hereto mutually agree to cooperate as follows:

ARTICLE II

1. THE NATIONAL PARK SERVICE AGREES:

A. To provide the Nueces County Rural Fire Protection District with emergency assistance, upon request, in emergency actions requiring additional uniformed officers in excess of available resources and to the extent permitted by law.

B. To provide the Nueces County Rural Fire Protection District with emergency assistance, upon request, in the search and rescue of injured or missing persons within the area of responsibility of the Department.

C. To provide the Nueces County Rural Fire Protection District with emergency assistance, upon request, in actions concerning the health and safety of the citizens of Nueces County and in the event of natural or human caused disasters.

2. THE NUECES COUNTY RURAL FIRE PROTECTION DISTRICT AGREES:

A. To assist the National Park Service, upon request, in response to wildland and structural fires.

B. To assist the National Park Service, upon request, in the search and rescue of missing or injured persons and in other actions concerning the health and safety of the visitors and general public, including Emergency Medical Services.

IT IS FURTHER MUTUALLY AGREED BETWEEN THE PARTIES THAT:

3. Each and every provision of this agreement is subject to the laws of the United States and the State of Texas and all lawful rules and regulations promulgated thereunder, and shall be interpreted accordingly.

4. Nothing contained herein shall be construed as limiting in any way the responsibility and authority as defined by law of the Superintendent, Padre Island National Seashore, or the Fire Chief, Nueces County Rural Fire Protection District, in connection with the administration and protection of lands and resources under their respective administrations. Primary responsibility for Padre Island National Seashore rests with the Superintendent and cannot be delegated to the State of Texas.

5. Nothing contained herein shall be construed as obligating either party in the expenditure of funds, or for the future payment of money in excess of appropriations authorized by law.

6. All claims against the other for compensation of loss, damage, personal injury, or death occurring in connection with the performance of this agreement are waived, except as provided for by public law 93-498. 88 STAT. 1543 USC 2210, 211 and part 1810.

7. Each party shall provide the necessary equipment for its personnel, but this does not preclude special arrangements being made to furnish certain supplies and equipment from one agency to another.

8. The individual in charge of personnel taking initial action in a situation covered by this agreement will be in charge until relieved by the appropriate official or supervisor under whose jurisdiction the situation has occurred.

9. Cooperative on-site training programs will occur whenever practical and mutually beneficial.

10. Both parties shall furnish the other with names and telephone numbers of persons to call when assistance is necessary.

11. All investigative reports of each shall be provided to the other agency upon request.

12. When incidents reach a level as to attract media attention, news and information releases will be coordinated between the Padre Island National Seashore's Public Information Officer and the Fire Chiefs designated Public Information Officer. News releases should reflect the cooperative efforts by both agencies.

ARTICLE III

This memorandum of agreement shall become effective when signed by the parties hereto and shall continue in force for a period of five years at which time it can be reaffirmed upon the agreement of both parties. The agreement can be terminated at any time by either party upon sixty (60) day notice in writing to the other of their intention to do so. Amendments to this memorandum of agreement may be proposed by either party and shall become effective upon approval by both parties.

ARTICLE IV

During the performance of this agreement, the participants agree to abide by the terms of executive order 11246 on non discrimination and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex, or national origin.

OFFICIALS NOT BENEFIT

No member of Congress, or Resident Commissioner, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this agreement if made with a corporation for its general benefit.

IN WITNESS WHEREOF, the parties hereto have executed this memorandum of agreement as of the day and year first herein written above.

Dated: 7/18/2002

Signed (Jock Whitworth)

Superintendent
Padre Island National Seashore
National Park Service
Department of Interior

Dated: 7/15/2002

Signed (Dale Scott)

Fire Chief
Nueces County Rural Fire Protection District
State of Texas

3. Memorandum of Understanding

Memorandum of Understanding between the US Forest Service, National Park Service, US Fish and Wildlife Service, and the Texas Nature Conservancy was approved in 2004.

**MEMORANDUM OF UNDERSTANDING
BETWEEN**

**U.S. FISH AND WILDLIFE SERVICE
REGION 2**

**AND
NATIONAL PARK SERVICE
INTERMOUNTAIN REGION**

**AND
TEXAS FOREST SERVICE**

**AND
THE NATURE CONSERVANCY,
TEXAS CHAPTER**

**AND
NATIONAL FORESTS AND GRASSLANDS
IN TEXAS**

I. INTRODUCTION:

Federal and State Land management agencies have an obligation to provide for public protection from wildfire, and other "all risk" type incidents such as hurricanes, floods, and acts of terrorism, In turn, private conservation agencies, such as the Nature Conservancy that maintain fire management organizations and equipment, are in a unique position to provide certain assistance in the event of wildfires, floods, and hurricanes. These organizations also have responsibilities to sustain diverse and productive ecosystems. These ecosystems provide cultural, scientific, and recreational needs for a diverse cross-section of Americans. In order to meet these responsibilities, agencies must work together, and when possible, provide support to other agencies in their conservation efforts.

II. PURPOSE:

The purpose of this MOU is to provide mutual support, cooperation, and assistance between the U. S. Fish and Wildlife Service Region 2, Texas Forest Service. National Park Service Intel-mountain Region, National Forests and Grasslands in Texas, and The Nature Conservancy, Texas Chapter for prescribed fire management: lire prevention; fire preparedness; and for emergency management and assistance on incidents such as wildfire, floods, and hurricanes, at no cost to the benefiting agency. Support and assistance in the event of acts of terrorism will apply only to the Federal and State agencies and will not apply to the Nature Conservancy. Texas Chapter, This MOU will also provide for technical support, and will allow each party to obtain equipment and

appropriate personal safety items as necessary to ensure the safety of employees participating interagency incident management efforts.

III. AUTHORITY:

This MOU is entered into under the authority provided in:

Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66; 42 U.S.C. 1856a) (F&WS, NPS, USFS)

Disaster Relief Act of May 22, 1974 (NTS)

Organic Act of August 1916 (16USC1) (NFS)

Federal Grant and Cooperative Agreement Act of 1977 [P.L. 960224, as amended by P. L. 97-258, September 13, 1982 (96 Stat. 1003; 31 U.S.C. 6301 thru 6308)] (NPS)

Yemen's Texas Civil Statutes (Sub Chapter B. Section 88.106) (TFS)

IV. STATEMENT OF MUTUAL BENEFIT:

State and private lands, for which the State of Texas is responsible for protection, Nature Conservancy lands in Texas, for which the Conservancy is responsible, and Federal lands for which the Federal government is responsible, are intermingled and adjacent to each other throughout the State of Texas. Emergency incidents and their management, on these lands for which one agency is responsible for may present a threat to, or affect, lands for which the other agency is responsible.

Management of prescribed fire, wildland fire, or other emergency incidents, on one or another of the parties' land, could require greater resources and expertise than that party can handle. It is in the best interest of each party to have available service from the other party to aid and assist them in management of, preparation for, and response to, these incidents.

It is to the mutual advantage of the U.S. Fish and Wildlife Service, State of Texas, National Park Service, The Nature Conservancy Texas Chapter, and U.S. Forest Service to coordinate efforts for prevention, training for, detection, and suppression of wildfires; and management and training for other incidents and similar projects, to limit duplication and to improve efficiency and effectiveness.

It is the intent of the parties hereto that State, Federal, and Nature Conservancy's Texas Chapter, resources be available to assist in the above activities on each others' lands, and on other lands upon which the Federal government provides fire suppression support including other States, Canada, and Mexico, and with non-fire state and national emergencies and logistical support activities in this state and other states.

Each party will have the benefit of utilizing personnel and equipment of the other party as available at no cost for the first operational period, other than optional reimbursement for use of aircraft, (After the first operational period, costs would be reimbursable if covered in a separate Agreement.) Also, each can obtain training, equipment, and services from the other that may not be otherwise available.

V. RESPONSIBILITIES:

1. Each party will designate a contact person for the implementation of this Memorandum of Understanding.
2. Each party may request prescribed fire management; fire prevention; fire preparedness or other emergency incident management resources from the other as necessary to meet management goals.
3. Each party may, at their discretion and upon mutual consent, participate in prescribed fire management; fire prevention; fire preparedness; and emergency incident management operations of another party, to foster knowledge and experience; and to further cooperation between organizations,
4. Personnel and equipment may be provided from one party to another as requested. Request and dispatch of personnel and equipment shall be at the discretion of the affected agency receiving the request.
5. Each party will provide for salary or wage costs of its own employees and operate and maintain its own equipment.
6. All personnel shall meet the qualification standards of the National Wildfire Coordinating Group for the positions that they will occupy,
7. Each agency may install the others radio frequency in its radios for use in cooperative activities. All federal licensing requirements will be followed.

VI. AGREEMENT TERM:

This MOU will remain in force for a period of five years from the date of execution.

VII. SPECIAL PROVISIONS:

- A. This MOU is for the purpose of creating a cooperative effort among the parties, and shall not be construed as obligating funds, staffer other resources of one party to another party. This MOU is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between parties of this MOU will be handled by separate agreement (except as otherwise provided in this MOU) in accordance with applicable laws, regulations and procedures.
- B. This MOU may be modified or amended as necessary upon written consent of all parties or may be terminated by any party after providing 60 days written notice to the other parties.

- C. Property or equipment provided by one party to another party, pursuant to this agreement, remains the property of the providing party, unless a written agreement to the contrary is prepared.
- D. Each party will be responsible for its actions, and the actions of its employees. The activities performed under this MOU shall be performed entirely at each parties own risk. Each party releases the other parties from the actions of its own employees. Each party waives all claims against every other party to this agreement for compensation from any loss, damage, personal injury, or death occurring as a consequence of the performance of this agreement.
- E. Other fire management organizations, with state level responsibilities, may be added to this MOU upon agreement by the original signing parties, and signature of the responsible official for the new organization.
- F. Modifications to this MOU may be processed by the Texas Forest Service as requested by any of the partner agencies. The Texas Forest Service will promptly communicate any proposed modifications to all parties to this agreement. Changes will not take effect until signed by all parties.
- E. The designated contacts for this MOU are;
 - 1. U.S. Fish and Wildlife Service
Jeff Whitney
Regional Fire Management Coordinator
P.O. Box 1306
Albuquerque, NM 87103
505-248-6865
 - 2. National Park Service
Bob Lineback
Wildland Fire Specialist
P.O. Box 728
Santa Fe, NM 87504
505-988-6018
 - 3. Texas Forest Service
Mark Stanford
Chief Fire Operations
P.O. Box 310
Lufkin, TX 75902
936-639-8130
 - 4. The Nature Conservancy of Texas
Tom Ledbetter
Fire Management Coordinator

11617 FM 2244
Austin, TX 78738
512-263-8878

5. U.S. Forest Service
Ron Haugen
Fire Management Officer
701 N, First Street
Lufkin, TX 75901
936-639-8547

In Witness Whereof, the parties have caused this Memorandum of Understanding to be executed as of the date of last signature below;

APPROVED:

U S. FISH AND WILDLIFE SERVICE
REGION 2

BY: Geoffrey Haskett
Regional Director

// Signed //
Signature

March 5, 2004
Date

NATIONAL PARK SERVICE
INTERMOUNTAIN REGION

BY: Steve Martin
IMR Regional Director

// Signed //
Signature

March 23, 2004
Date

TEXAS FOREST SERVICE

BY: James B. Hull
Director

// Signed //
Signature

May 17, 2004
Date

THE NATURE CONSERVANCY,
TEXAS CHAPTER

BY: Carter Smith
State Director

// Signed //
Signature

July 5, 2004
Date

U.S. FOREST SERVICE

BY: Fred S. Salinas
Forest Supervisor

// Signed //

Signature

May 27, 2004

Date

4. Interpark Agreement

An Interpark Agreement exists between Padre Island National Seashore and Big Thicket National Preserve that outlines how Big Thicket NP will assist Padre Island NS with its fire program.

December 2004

INTERPARK AGREEMENT
Between
Big Thicket National Preserve
and
Padre Island National Seashore

ARTICLE I. PURPOSE

Define the mutual fire responsibilities of Big Thicket National Preserve's fire staff (Preserve) and staff at Padre Island National Seashore (Padre Island).

ARTICLE II. RESPONSIBILITIES

The duties of the Preserve will include providing, as requested and required, professional and technical support to the fire management program of Padre Island. The performance of these responsibilities will be based on communications between the area superintendents, the preserve's Fire Management Officer (FMO), and other staff as appropriate.

A. Specific responsibilities of the Preserve include:

1. Assists in development and implementation of prevention, suppression, rehabilitation, and aviation programs with appropriate staff through site visits, program reviews, inspections, budget formulation, and training.
2. Assists in coordination of reports, correspondence, preparation/review of fire management plans, aviation plans, and participate in fire management planning as requested.
3. Assists in coordination and implementation of planned ignitions, fire effects monitoring, smoke management, fire ecology, and research programs in accordance with park fire management plans.
4. Coordinates mobilization of Padre Island personnel to interagency fire assignments through appropriate zone coordination centers.
5. Develops, coordinates, issues performance task books, and conducts fire-related training as necessary to meet the wildland fire needs of Padre Island and interagency commitments according to approved fire management plans, zone, field area, cluster, and

national guidelines. Assists Intermountain Regional Fire Management Staff in the identification and certification of individuals for development in overhead positions.

6. Manage fire qualification/training records in the National Park Service Wildland Fire Computer System, including: initial record input; updating fitness scores, training, record transfer, experience, and instructor records, and issues incident qualification cards.
7. Communicates with Padre Island on issues and concerns prior to representing Padre Island at meetings, conferences, seminars, and other functions as requested and required.
8. Coordinates Padre Island's role in the 'zone' interagency fire community; developing interagency agreements, cooperative agreements, and other agreements necessary for wildland fire management activities.
9. Provides Padre Island with daily situation and fire weather reports as requested during the identified fire season; or, in support of management ignited bum projects.

B: Specific responsibilities of Padre Island include:

1. The superintendent will designate a collateral duty Fire Management Officer who requests program assistance, budget, supplies, and training needs through the Cluster FMO at Big Thicket with sufficient lead-time to meet due dates, set-up meetings, etc.
2. Submit personnel updates, physical fitness scores, individual fire reports (DI- 1 202), situation reports, physical exam records, and information following established times and due dates. Fire Program Manager will be responsible for maintaining fire readiness to the level identified in the park's fire management plan.
3. Notify the Cluster FMO at Big Thicket as soon as practical of any fire restrictions, closures, fire occurrences, or support actions.
4. Participate in the overall fire management of the Preserve and of the NPS by sharing trained and available personnel upon request.

ARTICLE IV. FUNDING

1. Program costs (travel/per diem, communications, supplies & materials, etc.) incurred by the Preserve will be charged to appropriate FIREPRO accounts. If personnel are working on a project that has been individually funded, the personnel may be paid from appropriate project funds.
2. The Preserve's annual budget request will identify supplemental support for Padre Island - i.e.: physical exams, PPE, training, cache items, travel, hazard fuel reduction projects, etc.

ARTICLE V. REPORTS

The Preserve will supply trip reports, situation and weather reports, personnel file information, or other pertinent reports to Padre Island as requested.

ARTICLE VI. TERM OF AGREEMENT

The term of this Agreement will be five (5) years, beginning in CY 2001. It is renewable at the end of each five-year period by a letter of agreement signed by each superintendent.

Amendments to or cancellation of this Agreement can be made at any time subject to the written concurrence and approval of each superintendent.

Colin Campbell // Signed //

Superintendent, Padre Island National Seashore

Date

Art Hutchison // Signed //

Superintendent, Big Thicket National Preserve

Date

5. Example of a Delegation of Authority Letter

Y14

dd/mm/yyyy

To: Files

From: Superintendent

Subject: Delegation of Authority for Wildland Fire Management

The goal of this delegation is to expedite those decisions needed at the operations level, while retaining administrator oversight and preserving the 'checks and balances' of multi-agency involvement.

Urban interface fires within the Malaquite Beach Fire Management Unit require aggressive initial attack with engine/hose or burn-out tactics due to high-values-at-risk. While the Down Island FMU has several petroleum facilities that require some protection, a limited suppression response over most of the area is appropriate. Resource damage due to the suppression effort should be considered when selecting tactics. The NPS will provide a resource advisor to coordinate with the command team.

The resource management staff, Fire Program Manager, and Incident Commander will complete a Fire Situation Analysis when initial attack is not successful. The superintendent will retain initial approval; however, the Daily Review will be delegated to the Chief of Resources Management and Visitor Protection, with regular briefings to the superintendent. If fire conditions or complexity levels escalate, signature authority will automatically and immediately revert to the superintendent. If the review process dictates selection of a new management alternative, certification authority will also revert to the Superintendent.

// signed //

PADRE ISLAND NATIONAL SEASHORE

FIRE EFFECTS MONITORING PLAN

February 2004

Prepared by: Deanna Fusco _____
Lead Fire Effects Monitor, NP-BITH

Reviewed: Darrell Echols _____
Chief, Science and Resources Management, NP-PAIS

Reviewed: Fulton Jeansonne _____
Fire Ecologist, NP-BITH

Recommended: Linda Kerr _____
Regional Fire Ecologist, NP-IMR

Approved:

I. INTRODUCTION

Padre Island is a primarily undeveloped barrier island along the southern coast of Texas. Its western shore is separated from the mainland by the Laguna Madre, the only hypersaline lagoon in North America, and its eastern shores border the Gulf of Mexico. The dynamic dune system protects the rare coastal prairie and emergent wetland habitats essential for over 350 migratory, overwintering, and resident bird species (NPS Nature & Science Website). The National Park Service established Padre Island National Seashore (PAIS) in 1962, as an effort to preserve the worlds longest undeveloped barrier island. Located on the northern half of Padre Island, PAIS consists of 130,332 acres of land and water that stretches approximately 70 miles, ending at Mansfield Channel, which separates the island (PAIS Strategic Plan).

The enabling legislation stated that the purpose of PAIS was “to save and preserve, for the purposes of public recreation, benefit, and inspiration, a portion of the diminishing seashore of the United States that remains undeveloped...”

Even though Padre Island lacks major development, the island has been disturbed by cattle grazing in the past. The first extensive ranching operation on Padre Island began in 1800, and cattle were not finally removed until 1971. (Weise and White 1980) Therefore, following more than 170 years of grazing, the island has accumulated over 40 years of vegetative growth undisturbed by grazing and fire. Grazing eliminated fuels available for fire and therefore fire has not been allowed to take on its natural role in the ecosystem. Fire suppression of the past has also contributed to significantly reducing the disturbance of fire on the island. Thick layers of dead vegetation have stagnated the marshes and grasslands since the exclusion of fire resulting in decreased species diversity and productivity.

Some of the major threats to the Western Gulf Coast barrier islands are residential and commercial development. The “construction of homes, hotels, artificial channels, and marinas may fragment, degrade, or destroy large portions of habitat” (TNC Laguna Madre Conservation Plan). Concerning the Western Gulf Coastal grasslands, it has been stated that “less than one percent of these grasslands remains in near pristine condition.” Furthermore coastal wetlands are not the best substrate for development, resulting in detrimental channelization projects which alter the hydrological regime essential to a wetland ecosystem. “Subsidence, erosion, and loss of emergent wetlands are serious problems that will continue.” In comparison to intertidal and estuarine marsh habitats of the Gulf Coast, the emergent palustrine wetlands are the most threatened (WWF Profile) These accounts illustrate a need for the fire effects monitoring program at PAIS to focus on the grasslands and the emergent wetlands of the island.

The purpose of this fire effects monitoring plan is to set the objectives and guidelines for monitoring prescribed and wildland fire within Padre Island National Seashore. The

purpose of fire effects monitoring is to determine how fire changes the landscape and report the results back to resource management, who will be able make adjustments with the fire program to accomplish management goals. The resource management goals are to return fire to its natural role in the ecosystem to significantly reduce the thatch buildup, rejuvenate the plant community in terms of diversity and productivity, and to reduce or eliminate exotic and invasive species.

A fire effects monitoring program was established at PAIS in 1999, installing 10 plots in the gulf prairie (grasslands) and 10 plots in the emergent wetland (marsh) communities. The plot locations were established using land cover maps generated by LANDSAT satellite imagery. One complication in selecting plot sites was the small size of vegetation polygons. (FEMP 1999) There was some interest expressed in establishing plots in the dunes, however due to the fragile and shifting habitat, permanent plots will not be established in the dunes. If fire does carry into the dunes, a post-fire effects report will be completed with pictures to document the fire history.

The fire effects program will document the changes in the grassland and marsh habitats with concentration on thatch amount, species diversity, exotic/invasive, and rare/endangered species.

II. DESCRIPTION OF ECOLOGICAL MODEL

Gulf Prairie (Grassland)

The Gulf Prairies have a level topography with slow surface drainage and virtually undivided plains of vegetation. Primary climax grasses are *Spartina spartinae* (gulf cordgrass), *Andropogon gerardii* var. *gerardii* (big bluestem), *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (yellow indiagrass), *Tripsacum dactyloides* (eastern gammagrass), *Muhlenbergia capillaries* (hairy awn muhly), *Heteropogon contortus* (tanglehead), *Nassella leucotricha* (Texas wintergrass), and many different species of *Panicum* and *Paspalum*. *Opuntia*, (pricklypear cactus) species are common and the forbs: *Aster*, *Castilleja indivisa* (Indian paintbrush), *Callirhoe* (poppy mallows), *Phlox*, *Lupinus* (bluebonnets), and *Oenothera* (evening primrose) are all indicative of the gulf prairie community. (Hatch 1999)

“Daimond (1990) described the little bluestem – brownseed paspalum (*Schizachyrium scoparium* – *Paspalum plicatulum*) series, the most representative classification on upland sites, as globally imperiled with only six to twenty occurrences recorded” (WWF NA0701).

Emergent Wetland (Marsh)

The marshes are low lands commonly covered with saline or brackish water. The marshes provide habitat for a variety of *Carex* and *Cyperus* (sedges), *Juncus* (rushes), *Scirpus* (bulrushes), *Spartina* (cordgrass), *Distichlis spicata* var. *spicata* (coastal saltgrass), *Phragmites australis* (common reed), *Zizaniopsis miliacea* (marshmillet),

Paspalum lividum (longtom), *Sporobolus virginicus* (seashore dropseed), and *Setaria parviflora* (knotroot bristlegrass). Aquatic forbs include *Lepidium* (pepperweeds), *Polygonum* (smartweeds), *Rumex* (docks), *Ludwigia alternifolia* (bushy seedbox), *Myriophyllum pinnatum* (green parrotfeather), *Hydrocotyle* (pennyworts), *Nymphaea* (water lilies), *Typha domingensis* (narrowleaf cattail), *Tradescantia* (spiderworts), and *Lemna* (duckweeds). Halophytic herbs and shrubs include *Eleocharis* (spikesedges), *Fimbristylis* (fimbries), *Salicornia* (glassworts), *Cakile* (sea-rockets), *Batis maritima* (maritime saltwort), *Ipomea* (morning glories), and *Borrchia* (bushy sea-ox eye) (Hatch 1999).

III. MANAGEMENT OBJECTIVES

Since the establishment of Padre Island National Seashore, fire has been actively suppressed. A primary goal of the park's fire program is to restore fire as a component of the environment to preserve fire-tolerant species and associations, reduce thatch buildup that creates plant community stagnation, and reduce hazards to park infrastructure, visitors, and cultural resources.

- Reintroduce fire on an appropriate return interval to the fire-tolerant communities
- Maintain fire-tolerant communities and their species richness and diversity
- Maintain vegetative coverage in burned areas
- Reduce fuel loading to promote community production, and reduce risks of hazardous fuel buildup
- Reduce/prevent invasion by species not well-adapted to periodic burning, especially non-native species
- Recycle nutrients in the highly drained soil
- Permit changes in community compositions that are consistent with Resource Management goals

Specific goals and objectives will be defined over time with the analysis of results.

IV. MONITORING DESIGN

Monitoring Objectives

Be 90% sure of detecting a litter cover decrease of 70%, and increase of 60% in native species richness from 2004 to 2010. Be 95% sure of detecting presence of exotic and invasive species in the monitoring plots. Accept a 15% chance of a false change error.

Sampling Design

The sampling design follows the Fire Monitoring Handbook guidelines for monitoring grassland plots. Original plot posts of white PVC pipe will be replaced as plots are re-read for pre-burn measurements. Electrical conduit posts 5 feet in length are preferred because they will tolerate more heat during a fire and are not prone to corrosion. The plot identification tags need to be replaced as often as possible due to the severe corrosion from the atmosphere. In 1999, ten plots for the emergent wetland communities and ten plots for grasslands were installed and sampled. Each plot will consist of two posts placed 30.3 m apart from each other. The beginning post is marked 0P, and 30P is the ending post. A transect tape is placed between the posts and at every 3 decimeters a point-intercept measure is taken. Photos are also taken from 0P-30P and 30P to 0P.

Since PAIS is on a 3-5 year burn rotation, plots will be read for pre-burn, immediate post-burn (photos only), first year, and second year measurements.

Monitoring information will be recorded using the FMH-4 Monitoring Type Description Sheet outlined in the 2003 NPS Fire Monitoring Handbook. An example of this datasheet follows.

Field Measurements

Field measurements will follow the protocol outlined in the 2003 NPS Fire Monitoring Handbook.

FMH-4

MONITORING TYPE DESCRIPTION SHEET

Monitoring Type Code: _____

Date Described: / /

Monitoring Type Name: _____

FGDC Association(s): _____

Preparer(s) (FEMO/RMS/FMO): _____

Burn Prescription (including other treatments: _____

Management Objective(s): _____

Monitoring Objective(s): _____

Objective Variable(s): _____

Physical Description: _____

Biological Description: _____

Rejection Criteria: _____

Notes: _____

PLOT PROTOCOLS

GENERAL PROTOCOLS		(Circle One)		(Circle One)	
Preburn	Control Treatment Plots (Opt)	Y	N	Herb Height (Opt)	Y N
	Herbaceous Density (Opt)	Y	N	Abbreviated Tags (Opt)	Y N
	OP/Origin Buried (Opt)	Y	N	Herb. Fuel Load (Opt)	Y N
	Voucher Specimens (Opt)	Y	N	Brush Fuel Load (Opt)	Y N
	Count Dead Branches of Living Plants as Dead (Opt)				Y N
Width Sample Area Species Not Intercepted But Seen in Vicinity of Herbaceous Transect(s):					
Length/Width Sample Area for Shrubs:			Stakes Installed:		
Herbaceous Frame Dimensions:					
Herbaceous Density Data Collected At:					
Burn	Duff Moisture (Opt)	Y	N	Flame Depth (Opt)	Y N
	100 Pt. Burn Severity (Opt)	Y	N	Herb. Fuel Load (Opt)	Y N
Postburn	Herbaceous/Shrub Data (Opt): FMH- 15/16/17/18				

FOREST PLOT PROTOCOLS		(Circle One)		(Circle One)	
Overstory (>15 cm)	Live Tree Damage (Opt)	Y	N	Live Crown Position (Opt)	Y N
	Dead Tree Damage (Opt)	Y	N	Dead Crown Position (Opt)	Y N
	Record DBH Year-1 (Opt)	Y	N		
Pole-size (≥2.5≤15)	Length/Width of Sample Area:		Quarters Sampled: Subset w Q1 w Q2 w Q3 w Q4		
	Height (Opt)	Y	N	Poles Tagged (Opt)	Y N
	Record DBH Year-1 (Opt)	Y	N	Dead Pole Height (Opt)	Y N
	Length/Width of Sample Area:		Quarters Sampled: Subset w Q1 w Q2 w Q3 w Q4		
Seedling (<2.5 cm)	Height (Opt)	Y	N	Seedlings Mapped (Opt)	Y N
	Dead Seedlings (Opt)	Y	N	Dead Seedling Height (Opt)	Y N
	Length/Width of Sample Area:		Quarters Sampled: Subset w Q1 w Q2 w Q3 w Q4		
Fuel Load	Sampling Plane Lengths: ___ 1 hr w ___ 10 hr w ___ 100 hr w ___ 1,000 hr-s w ___ 1,000 hr-r				
Herbaceous	Cover Data Collected at: Q4-Q1 w Q3-Q2 w 0P-50P w Q4-30 m				
Postburn	Char Height (Opt)	Y	N	Poles in Assessment (Opt)	Y N
	Collect Severity Along: Fuel Transects w Herbaceous Transects				

(Opt) = Optional

APPENDIX G. Preattack Plan (Fire Size-up)

Initial fire Size-up _____ Date/Time _____

Fire Name _____ Ownership _____

I.C. _____ Agency _____

Lat: _____ Long: _____ Jurisdiction: _____

Initiate all actions based upon current and expected fire Behavior

FUEL TYPE(s): Grass Brush Hardwood Pine Mixed Plantation (ht_____)

SPREAD POTENTIAL: Low Moderate High Extreme

CHARACTER: Smoldering Creeping Running Spotting Torching Crowning Erratic

Temperature				
Relative Humidity				
Wind Direction/Speed				

WEATHER Now_____ Peak_____ TONIGHT TOMORROW

Comments: _____

Map Sketch (include north arrow and scale; ANCHOR POINT)



Evaluate Personnel - experienced with local factors?
- distracted from Primary tasks?
- fatigue or stress reaction?
- hazardous Attitude?

Situation – WHAT IS CHANGING?
- Are Strategy and tactics working?

Additional Resource Needs

Needed/Ordered	Resource ID	ETA	Assignment	Released

APPENDIX H. Wildland Fire Prevention Plan.

Wildland Fire Prevention Plan

9/30/04

The superintendent is responsible for:

1. Supporting and encouraging employee involvement in wildland fire prevention / education programs.
2. Developing and implementing wildland fire prevention plans as a component of the fire management plan and/or the resources management plan.
3. Preparing wildland fire prevention plans, which shall be reviewed annually and updates as required.
4. Integrating wildland fire prevention / education into all management functions, including interpretation, visitor protection, maintenance, and administration.
5. Developing cooperative agreements and/or memoranda of understanding with local land management agencies and wildland fire [protection groups to coordinate wildland fire prevention / education programs.
6. Assessing, coordination, and facilitating local wildland fire prevention / education training.
7. Developing and providing prevention/education, which supports resource management, to the public.

APPENDIX I. Risk and Hazard Maps.

Hazard Map

Hazards within both the Malaquite Beach and Down Island Fire Management Units include high hazard areas such as open grasslands and low hazard areas, which include dunes, wetlands, and mud flats (Figures 20, 21, and 22).



Hazard Map

North Boundary to Mile Post 15

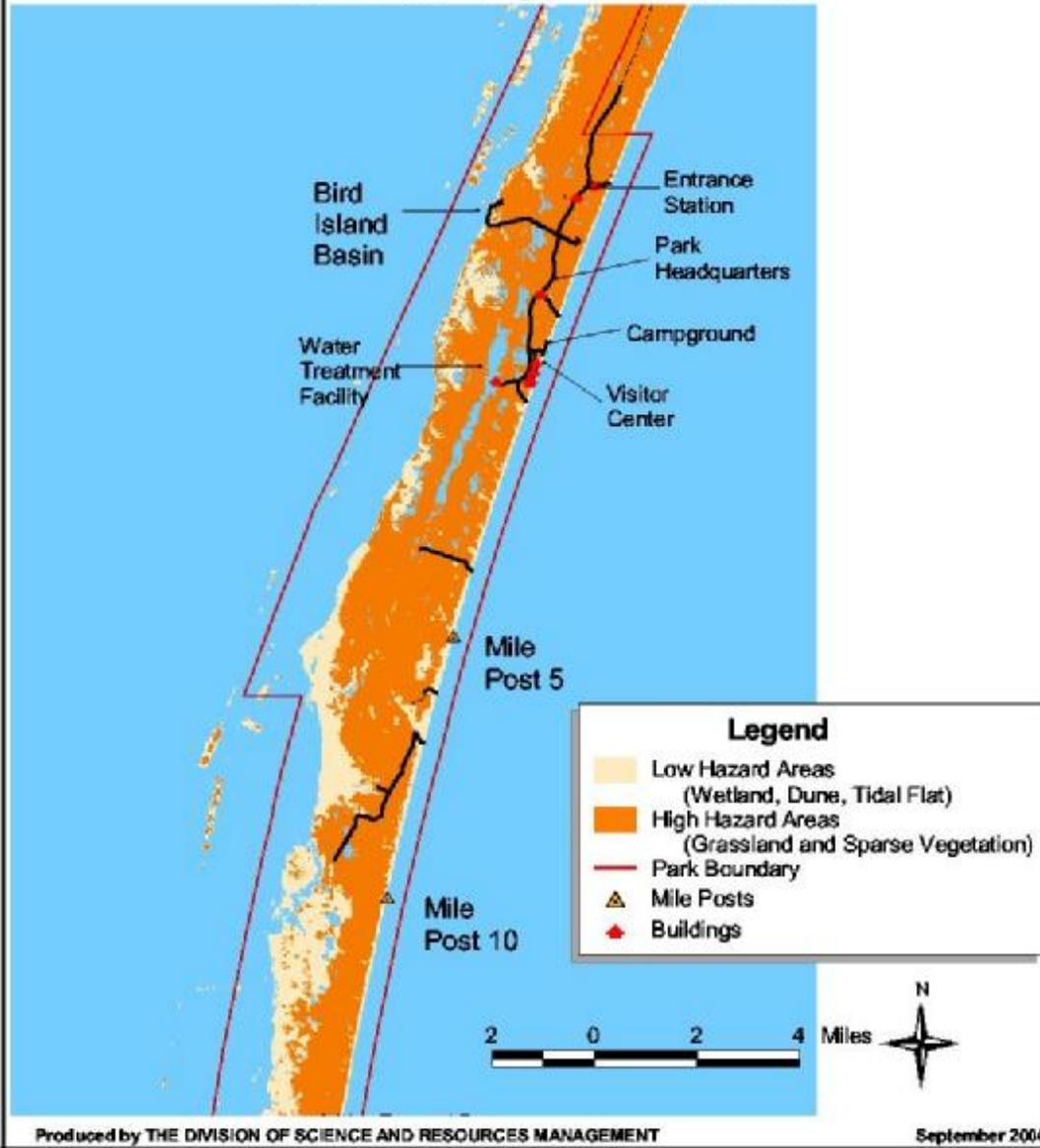
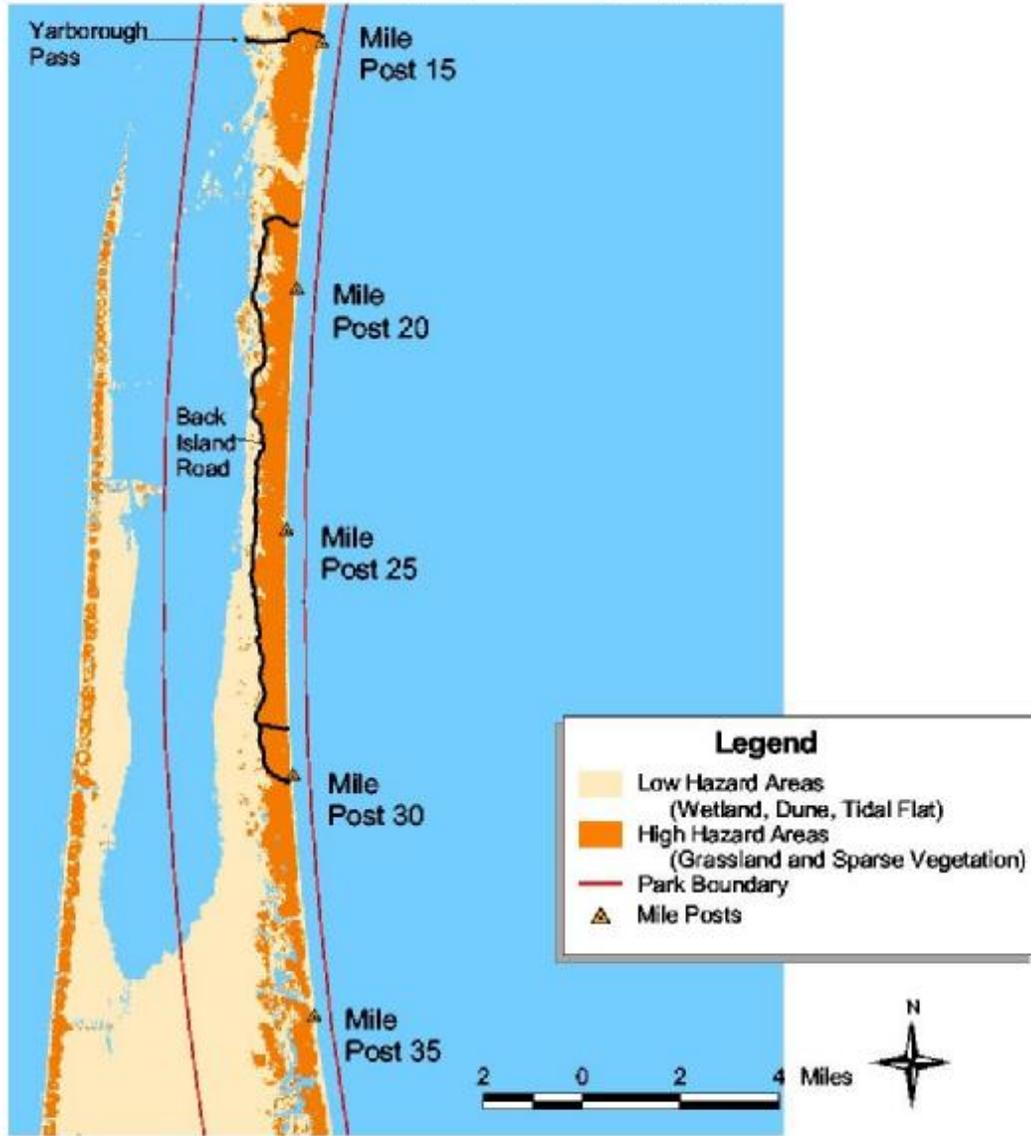


Figure 20. Hazard Map – North boundary to Mile Post 15.



Hazard Map

Mile Post 15 to Mile Post 35



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September 2004

Figure 21. Hazard Map – Mile Post 15 to Mile Post 35.

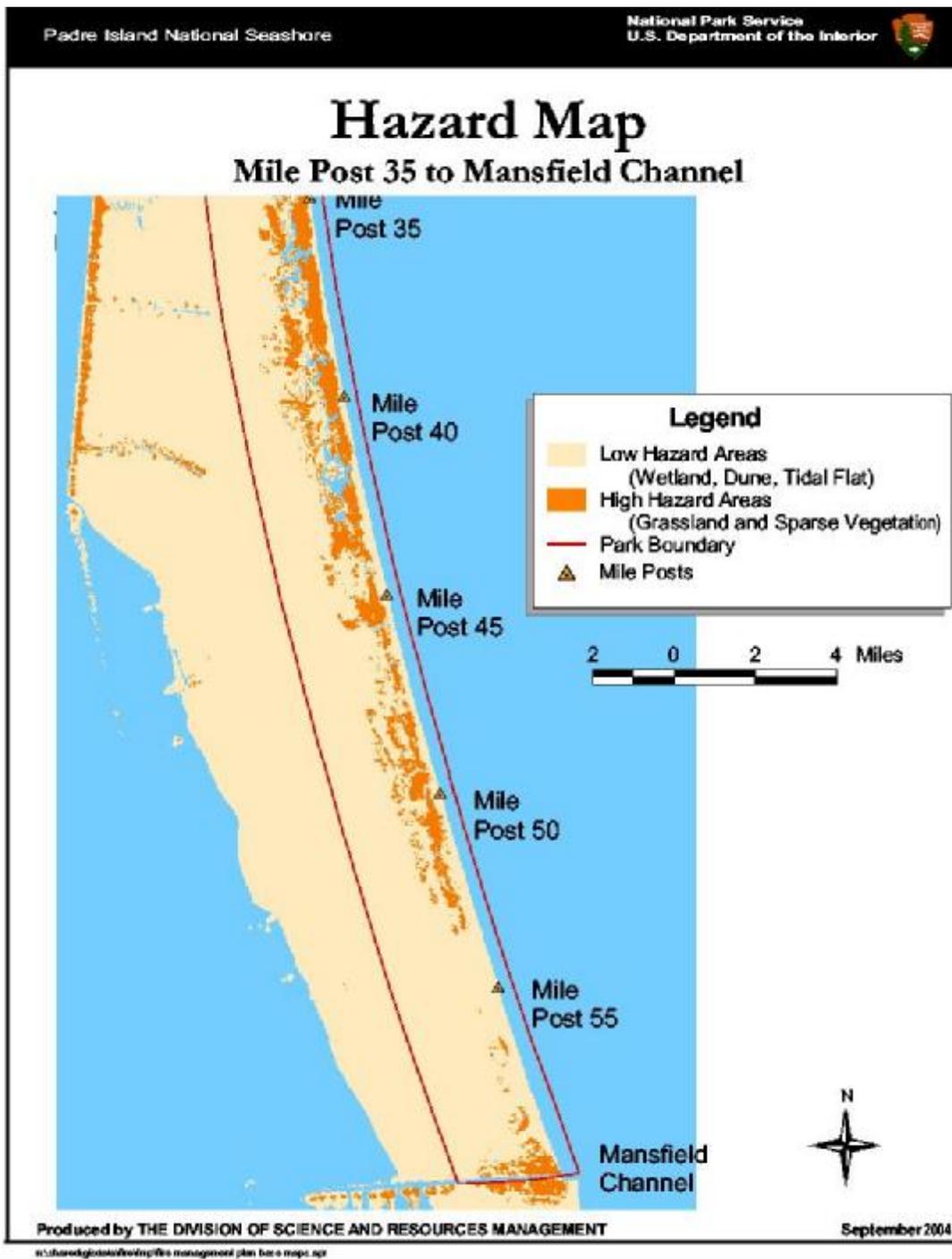


Figure 22. Hazard Map – Mile Post 35 to Mansfield Channel.

Risk Map

High Risk – Headquarter Facilities & Malaquite Beach Visitor Center and Bathhouse (Figure 23)

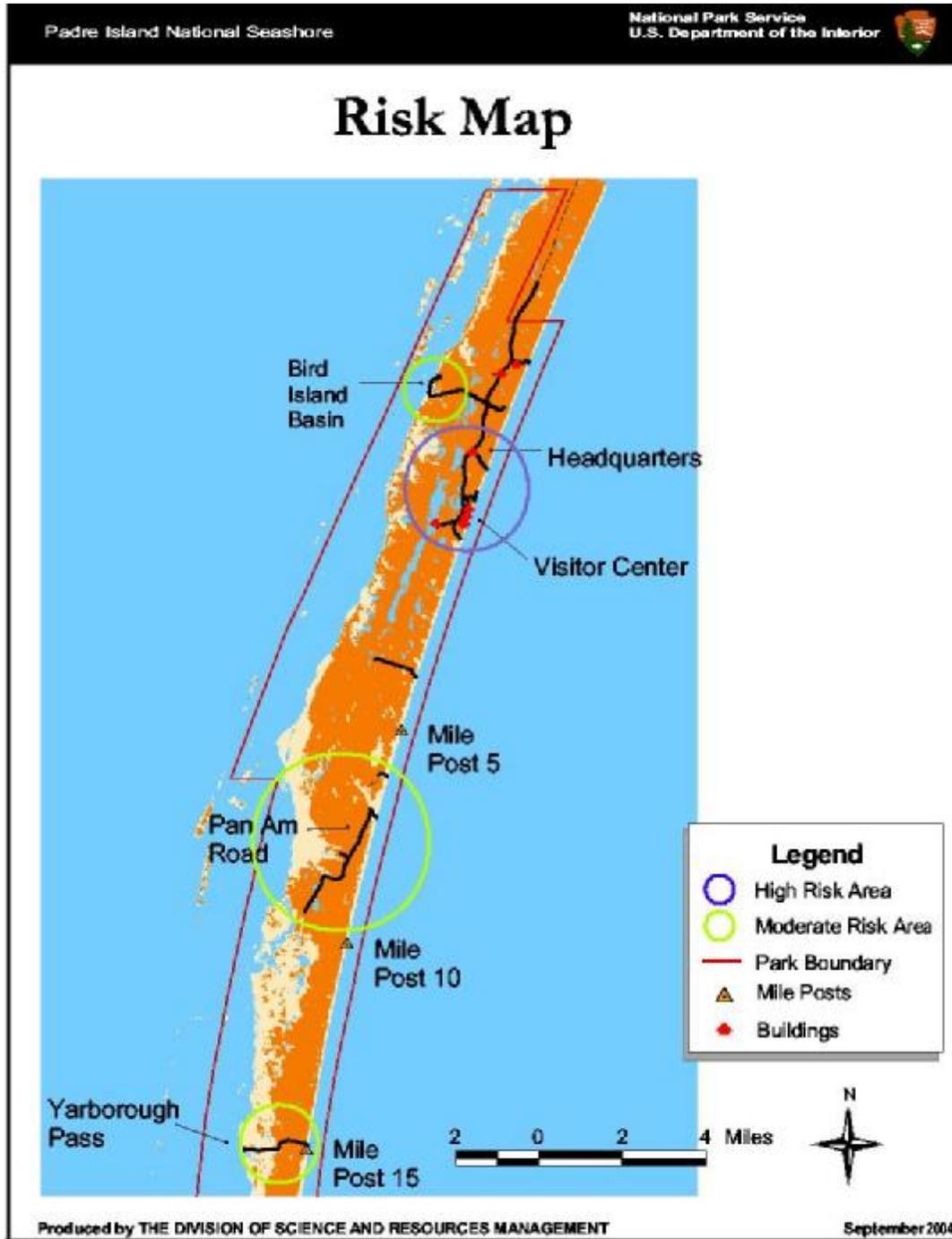


Figure 23. Risk Map.

Moderate Risk – Bird Island Basin Visitor Use Area, Pan Am Road petroleum facilities, and Yarborough Pass petroleum facilities.

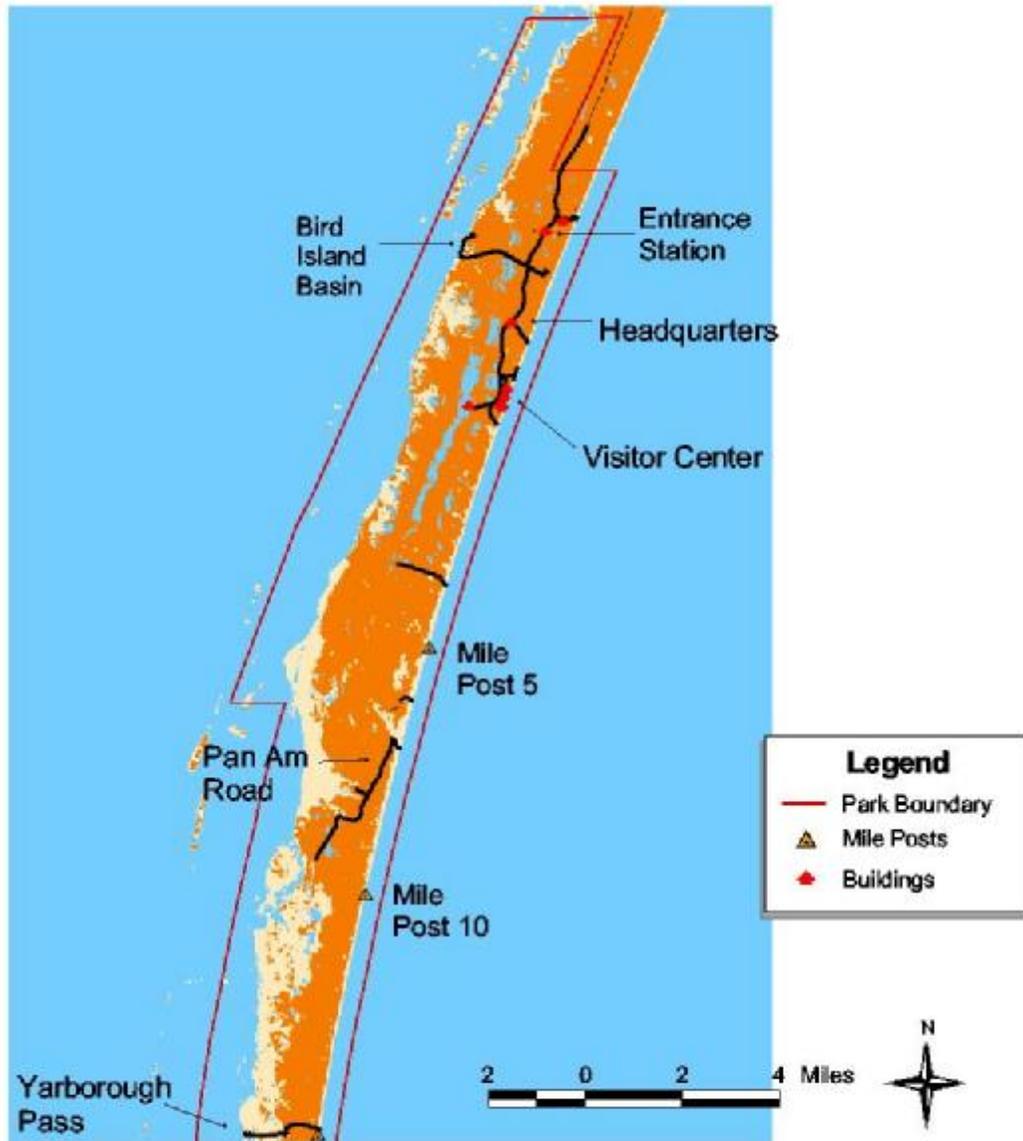
Low Risk – Remainder of Island

Value Map

- The Headquarters and Visitor Facilities have the highest risk due to high visitation and associated visitor activities such as camping and cooking, high hazard because of the vast acres of grassy fuels, and high value since the majority of the park structures are constructed of wood and located in these areas (Figure 24).
- The Pan Am Road area is considered to have moderate risk due to visitor presence on the beach and petroleum field workers, high hazard because of the large acres of grassy fuels, and high value given the number of oil and gas facilities and infrastructure.
- The Bird Island Basin area is considered to be at moderate risk because of concentrated visitor use and camping, high hazard because of the large acres of grassy fuels that surround this area and moderate value due to the concession operation and the number of visitor vehicles located along the shoreline and at the boat ramp parking areas.
- The remaining portions of the island are considered low risk because visitation is confined to the beach environments and little access is provided into the interior of the island, low hazard since the island is narrower with less grassy fuels and sparse vegetation, and low value due to limited development, which includes the Yarborough Pass visitor use area and the park's patrol cabin located at the 40-mile mark.



Value Map



Produced by THE DIVISION OF SCIENCE AND RESOURCES MANAGEMENT

September 2004

Figure 24. Value Map.

APPENDIX J. Rental Equipment Agreements.

Padre Island National Seashore does not have any rental equipment agreements.

APPENDIX K. Contracts for Suppression and Prescribed Fire Resources.
Padre Island National Seashore does not currently have any contracts for suppression and prescribed fire resources.

APPENDIX L. 2001 Federal Wildland Fire Management Policy Compliance

1. SAFETY

Firefighter and public safety is the first priority.

This Fire Management Plan and all activities described within demonstrate a commitment to making firefighter and public safety its first priority.

2. FIRE MANAGEMENT AND ECOSYSTEM SUSTAINABILITY

The full range of fire management activities will be used to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social components.

This Fire Management Plan demonstrates a commitment to ensure that fire is a necessary component of ecosystem sustainability.

3. RESPONSE TO WILDLAND FIRE

The 2001 Federal Wildland Fire Management Policy considers fire a critical natural process to be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries.

The response to wildland fire presented in this Fire Management Plan is limited to suppression activities only.

4. USE OF WILDLAND FIRE

The 2001 Federal Wildland Fire Management Policy states that wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role.

This Fire Management Plan allows for hazardous fuels reduction, but does not allow the use of wildland fire for resource benefit.

5. REHABILITATION AND RESTORATION

Rehabilitation and restoration efforts will be undertaken to protect and sustain ecosystems, public health, and safety, and to help communities protect infrastructure.

Due to the resilient nature of park resources, how quickly natural restoration takes place, and current suppression tactics, it is not likely that active restoration will be necessary. However, this Fire Management Plan identifies the possible need for rehabilitation and restoration efforts in response to restore park resources affected by suppression and hazardous fuels reduction activities.

6. PROTECTION PRIORITIES

The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and

improvements, and natural and cultural resources will be based on the values to be protected, human health and safety, and the costs of protection. Once people have been committed to an incident, these human resources become the highest value to be protected.

This Fire Management Plan identifies the order of priorities for all wildland fire suppression and hazardous fuels reduction activities and demonstrates the parks commitment to the highest priority of human safety.

7. WILDLAND URBAN INTERFACE

The operational roles of federal agencies as partners in the Wildland Urban Interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance.

This Fire Management Plan identifies the role that park staff will have in activities related to wildland urban interface. The park has limited wildland urban interface adjacent to the park's northern boundary. The park's fire management program will support requests for wildland urban interface activities.

8. PLANNING

Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans are strategic plans that define a program to manage wildland and prescribed fires based on the area's approved land management plan. Fire Management Plans must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.

This Fire Management Plan is a strategic plan that provides for firefighter and public safety, addresses values to be protected, public health issues, and is consistent with resource management activities, activities of the area, and is consistent with environmental laws and regulations.

9. SCIENCE

Fire Management Plans and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results must be made available to managers in a timely manner and must be used in the development of land management plans, Fire Management Plans, and implementation plans.

This Fire Management Plan is based upon, and utilizes, the best available science and relevant research available not only for Padre Island National Seashore, but other areas with similar resources and potential affects.

10. PREPAREDNESS

Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight.

This Fire Management Plan provides guidance for safe, cost-effective fire management, supporting land and resource management plans through appropriate preparedness activities.

11. SUPPRESSION

Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.

The wildland fire staff at Padre Island National Seashore take full advantage of partnerships with area fire agencies such as the Nueces County Emergency Services District No. 2 for joint training, operations, and fire reviews to ensure that wildland fire suppression activities are conducted safely, cost effectively, and with minimal impact on park resources.

12. PREVENTION

Padre Island National Seashore coordinates prevention activities with the Texas Forest Service, Kleberg County, and other affected groups and individuals, to prevent unauthorized ignition of wildland fires.

13. STANDARDIZATION

Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values-to-be-protected methodologies, and public education programs for all fire management activities.

Padre Island National Seashore works through the fire management staff at Big Thicket NP to actively participate in interagency planning processes, funding mechanisms, training and qualification requirements, operational procedures, and values-to-be-protected methodologies.

14. INTERAGENCY COOPERATION AND COORDINATION

Fire management planning, preparedness, prevention, suppression, fire use, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners.

Padre Island National Seashore works with the fire management staff at Big Thicket NP to ensure that suppression and hazardous fuels reduction activities are conducted in a manner to meet this goal. In addition, PAIS works with state and area fire agencies

such as the Texas Forest Service, Nueces County Emergency Services District No. 2, the Texas Nature Conservancy, Ricardo Volunteer Fire Department, and others to coordinate fire planning, suppression, and other fire related activities.

15. COMMUNICATION AND EDUCATION

Agencies will enhance knowledge and understanding of wildland fire management policies and practices through internal and external communication and education programs. These programs will be continuously improved through the timely and effective exchange of information among all affected agencies and organizations.

Padre Island National Seashore is developing a public education program to interpret the use of fire and its beneficial affects on park resources. In addition, park staff utilizes interpretive information provided by Big Thicket NP to educate park visitors on the role of fire. Park staff develops press releases prior to each prescribed fire and interact with the local media on each wildland fire event that occurs at the park.

16. AGENCY ADMINISTRATOR AND EMPLOYEE ROLES

Agency administrators will ensure that their employees are trained, certified, and made available to participate in the wildland fire program locally, regionally, and nationally as the situation demands. Employees with operational, administrative, or other skills will support the wildland fire program as necessary. Agency administrators are responsible and will be held accountable for making employees available.

Padre Island National Seashore staff coordinates wildland fire needs such as training, resources, and staffing to support wildland fire suppression and hazardous fuels reduction activities conducted at the park. In addition, the park Fire Program Officer coordinates resource purchases using park funds, supports national fire resource requests, ensures that park staff are adequately trained, builds support for the park's fire management program that crosses all park management divisions, and coordinates response activities within and adjacent to the park to support the park's fire partners..

17. EVALUATION

Agencies will develop and implement a systematic method of evaluation to determine effectiveness of projects through implementation of the 2001 Federal Fire Policy. The evaluation will assure accountability, facilitate resolution of areas of conflict, and identify resource shortages and agency priorities.

Padre Island National Seashore has worked with Big Thicket NP to review the parks implementation of the 2001 Federal Fire Policy. In addition, the park routinely evaluates and reviews its fire program after suppression activities, hazardous fuel reduction projects, and at the annual firefighter refresher.

APPENDIX M. Burned Area Emergency Stabilization and Rehabilitation Plan.

REHABILITATION

Rehabilitation and restoration efforts will be used to protect and sustain ecosystems, public health and safety, and to help communities protect infrastructure. Careful selection of appropriate management actions such as the utilization of natural barriers and roads, and minimizing the use of heavy equipment, will reduce rehabilitation following a fire. Rehabilitation methods will be planned and implemented by Resource Management personnel and assigned firefighters. All restoration actions will begin promptly following suppression of the fire. The FPM is responsible for insuring that rehabilitation actions are conducted properly and expeditiously. The Division of Science and Resources Management will monitor recovery of all rehabilitated areas.

As a general rule, burned areas will not be seeded, and re-vegetation will occur through natural processes. Coastal barrier island habitats tend to re-vegetate quickly depending on environmental factors such as rainfall. Re-vegetation of grassy habitats usually require only a few months before re-growth has obscured most evidence of a previous fire. Constructed fireline will be rehabilitated to remove berms and restore natural slope contours. Constructed firelines may require several years to re-vegetate and be restored to pre-disturbance levels since vegetative cover and roots are removed.

APPENDIX N. Padre Island National Seashore Historical Fire Occurrences.

DATE	CAUSE	ACRES BURNED	LOCATION DESCRIPTION	NORTHERLY UTM	EASTERLY UTM
2/13/1972	Man-Accidental	36	Big Shell	2999627.88	660811.21
2/25/1973	Man-Accidental Fireworks	40	Big Shell	3000606.43	660645.72
2/25/1973	Man-Accidental Fireworks	165	Big Shell	2995361.1	660674.5
3/19/1974	Man-Accidental	15	South Beach	3032006.5	667214.98
5/6/1974	Man-Accidental	4	Near Nature Trail	3040187.5	669085.75
5/25/1974	Man-Accidental	8	South Beach	3029603.29	666452.29
8/16/1974	Man-Accidental	1	Near Novillo line camp	3038813.21	669553.44
3/27/1975	Man-Accidental	6	1/2 mile north of boundary	3043000.85	670460.04
6/4/1975	Man-Accidental	7	Bird Island Basin	3038467.84	668956.24
9/13/1975	Lightning	1	Near Visitor Center	3034306.06	667867.22
2/8/1976	Man-Accidental	1000	N. Beach Dunes	3042007.9	671028.47
2/24/1976	Man-Accidental	5	Pan Am Road & Beach	3021616.56	663905.17
4/16/1976	Man-Accidental	20	North Beach Access Rd.	3040460.92	669531.86
8/19/1977	Man-Accidental	10	BIB & Pk. Rd. 22	3038957.12	668855.5
11/27/1977	Man-Accidental Car	1540	3.5 mi. S. Dunn Beach	2990605.04	659940.59
3/19/1978	Man-Accidental Unknown	475	Roadside	3047217.91	671965.83
3/26/1978	Man-Accidental	1	Malaquite	3033768.67	667876.22
6/17/1978	Man-Accidental Unknown	1040	N. Park Boundary	3044216.84	670776.63
7/1/1978	Man-Accidental Fireworks	4160	South Beach	3033654.22	667833.78
8/11/1978	Man-Accidental	60	Roadside N of Ranger St.	3040640.8	670006.74
11/27/1978	Man-Accidental Gas Compr. Explosion	720	YP	3010219.29	660760.85

DATE	CAUSE	ACRES BURNED	LOCATION DESCRIPTION	NORTHERLY UTM	EASTERLY UTM
4/28/1979	Man-Accidental Fireworks	1	North of N. Beach Access	3040820.69	670582.36
1/12/1980	Man-Accidental	320	Dunn Ranch	2994857.43	660688.89
3/21/1980	Man-Accidental Unknown	8	1/4 mile S. of N. entrance	3041797.81	669838.99
4/12/1980	Man-Accidental Unknown	640	Grassland Nature Trail	3038424.67	668891.48
7/3/1980	Man-Accidental Fireworks	2000	North Boundary	3043231.09	670891.76
7/9/1980	Man-Accidental Smoking	5	Sewage Lagoon & Pk. Rd.22	3034208.25	667351.69
9/14/1980	Man-Accidental Fireworks	2	Park Entrance	3041246.2	670028.33
12/31/1980	Unknown	3	1/2 mile N. of Ranger St.	3038243.4	668789.85
10/11/1981	Unknown	1	N. of Ranger Station	3037431.72	668718.79
4/29/1982	Unknown	1	N. of Novillo Line camp	3039331.93	669598.61
5/6/1982	Unknown	3	Novillo Line Camp	3039331.93	669598.61
5/13/1982	Unknown	1	500 yds. NE of Ranger St.	3024492.48	664855.15
8/20/1982	Unknown	0.2	E. of Grassland Nat. Trail	3024492.48	664855.14
2/6/1984	Unknown	25	Between campgrd & Ranger St.	3036189.05	668031.22
5/26/1984	Unknown	3200	B/w MM20 & MM25	2992735.15	660498.55
7/1/1984	Unknown	7	Roadside of N. Boundary	3040262.81	670134.84
7/9/1984	Unknown	20	W. of N. Beach access	3040540.98	670266.79
8/21/1984	Unknown	1	N. Beach access road	3040768.18	670396.26
8/29/1984	Unknown	23	N. Beach access road	3041191.82	670533.74
8/29/1984	Unknown	58	N. Park Boundary	3046839.88	671768.63
3/23/1986	Unknown	0.4	1.5 mile N. of Ranger St.	3037462.7	667976.73

DATE	CAUSE	ACRES BURNED	LOCATION DESCRIPTION	NORTHERLY UTM	EASTERLY UTM
7/4/1986	Unknown	1200	Along Pan Am Road	3018931.11	663279.31
7/5/1986	Unknown	800	Back Island Rd. N. Entrance	3001446.58	660170.45
7/5/1986	Unknown	4023	S. of EOG Road	3028251.24	666071.24
7/9/1986	Unknown	940	Roadside near N. Boundary	3047219.78 671587.14	27 32' 15.35'
10/21/1986	Unknown	283	MM1 to sewage lagoons	3031900.67	666404.39
4/18/1987	Unknown	57.6	N. Yarborough Pass	3010547.85	661719.17
6/19/1987	Unknown	1.3	N. of N. Beach Access Rd.	3044894.5	671168.32
8/2/1988	Unknown	3	N. of Back Island Rd.	3004138	661822
8/28/1988	Unknown	120	Across dunes from 30MM	2985947.55	660099.28
6/4/1989	Unknown	529	1/2 mile N. of Gas Facility	3030054.16	666429.38
6/10/1989	Unknown	2.7	Prk Rd 22, 5 mi from boundary	3038352.93	667799.79
7/6/1989	Unknown	9.3	WTF area S. of Yarborough Pass	3009655.79	660099
9/16/1989	Unknown	0.3	Park Rd 22	3040994.21	669775.37
3/7/1993	Unknown	600	American Exploration Rd.	3018931.11	663279.31
4/25/1995	Unknown	950	27 MM to the 32 MM	2990211.02	660652.51
5/6/1996	Unknown	24.9	3 mi N. of Park, near NE corner bound.	3046298.75	671225.35
7/2/1996	Unknown	2.3	1500' South of Entrance St.	3039739.67	669306.63
7/2/1996	Unknown	268	1.5 mile N. of Entrance Sign	3043512.39	669810.59
7/8/1996	Unknown	330	BIB Entrance Rd.	3039877.74	667551.95
11/19/1996	Lightning	3.9	NE of BIB boat ramp	3041170.34	668751.38
7/3/1997	Man-Accidental Car	0.4	BIB Rd.	3039429.71	667757.58

DATE	CAUSE	ACRES BURNED	LOCATION DESCRIPTION	NORTHERLY UTM	EASTERLY UTM
7/3/1997	Unknown	1.59	1 mi outside of north boundary	3043553.39	670867.15
5/2/1998	Man-Accidental Flare	689	25 MM	2993553.89	660302.41
2/19/1999	Man-Accidental Car	9.479	N. of Entrance St.	3040562.97	669581.56
5/4/1999	Man-Accidental Flare	97	S. of Ranger St.	3036233.55	668130.89
7/21/1999	Lightning	119.5	29.5 MM	2986120.17	660516.83
10/27/1999	Lightning	0.385	1.6 mi N. of Park Entrance	3044173.64	670245.19
12/20/1999	Man-Suspected arson	196	North Beach Access Rd.	3040566.73	670172.73
12/29/1999	Man-Suspected arson	900	2.4 mi. N. of BIB Rd.	3042157.19	669296.26
2/7/2000	Man-Accidental Campfire set by immigrants	194	B/w Ranger Rd. & Campground	3035786.83	668571.41
5/21/2001	Lightning	0.5	North Beach Access Rd.	3040664.81	670266.53
10/11/2001	Lightning	9.202	.9 km S. of BIB Rd.	3038289.83	667134.04
7/24/2002	Man-Accidental Fireworks	833.29	NB access rd. to La Playa well rd.	3040533	670513
3/25/2004	Man-Accidental Flare	40	5mm on SB	3026361.13	666479.32
6/22/2004	Lightning	26	Change of speed limit sign on SB	3030076.57	668077.77
7/25/2004	Man-Accidental Bonfire	652.87	North of Park Boundary/Kleberg Beach	3044917.66	672814.75
7/29/2004	Man-Prescribed Burn	375	Novillo Line Camp	3039354.83	671245.77
8/15/2004	Man-Accidental Fireworks	4503	18-mile mark	3050139	661140