

**National Park Service**

National Park Service  
U.S. Department of the Interior



**EVERGLADES NATIONAL PARK  
2015 FIRE MANAGEMENT PLAN**



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**Everglades National Park  
2015 Fire Management Plan**

**Prepared by**

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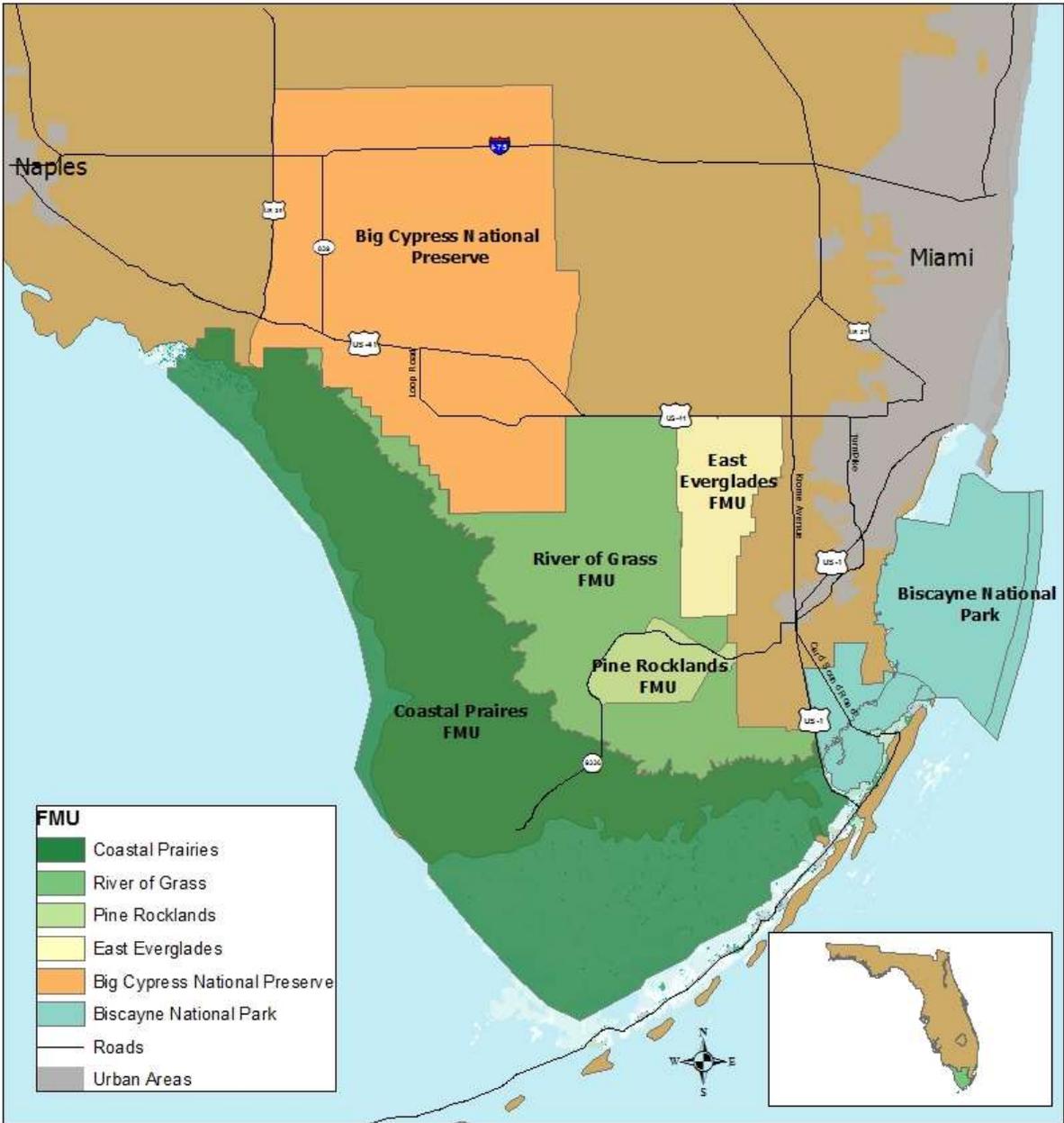
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## Everglades National Park Fire Management Units (FMU) and Vicinity



ENP Fire and Aviation Management  
2014

0 10 20 40  
Miles

Figure 1: Everglades National Park Map

## 1.0 INTRODUCTION

The Everglades has a long history of fire. The historic Everglades ecosystem stretched from south of Lake Okeechobee to Florida bay. The unique combination of climate and vegetation creates a landscape shaped by fire. Frequent spring and summer thunderstorms have ignited fires for as long as flammable vegetation has been present. Historically, fire would have flowed unimpeded across a sea of flammable, fire adapted vegetation much as water flows through the ecosystem. Throughout the documented 5,600 years of occupation, humans have used fire for a variety of reasons, and historic fire regimes in the Everglades reflect natural as well as anthropogenic influences (Schwadron, 2010). The Everglades has been greatly altered for development and urban expansion and along with the flow of water, the flow of fire has been altered over the past century. Changes in the ecosystem, the surrounding areas, and human uses and values have resulted in changes in the fire environment and fire regime. This document will guide managers in the appropriate use of fire in the modern Everglades landscape.

Everglades National Park (ENP) was authorized by Congress in 1934 and formally established in 1947. The original boundaries contained 460,000 acres. Subsequent increases have expanded its size to 1,509,000 acres. The Everglades National Park Protection and Expansion Act of 1989, (Pub.L. 101-229) added approximately 109,506 acres, commonly known as “East Everglades”.

The park enabling legislation states that the lands “shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people”... “The said areas shall be permanently reserved as wilderness, and no development of the project or plan for the entertainment of visitors shall be undertaken which will interfere with the preservation intact of the unique flora and fauna and the essential primitive natural conditions now prevailing in the area (Title 16, USC Chapter 1).” In addition, this legislation, as amended over the years, states “The Secretary [of Interior] shall manage the park in order to maintain the natural abundance, diversity, and ecological integrity of native plants and animals, as well as the behavior of native animals, as a part of their ecosystem (Title 16, USC Chapter 1, Section 410).”

Everglades NP represents significant importance to our country’s natural and cultural heritage.

- ENP is a unique subtropical wetland that is the hydrological connection between central Florida’s freshwater ecosystem and the marine systems of Florida Bay and the Gulf of Mexico. It is the only place in the US jointly designated as an International Biosphere Reserve, a World Heritage Site, and a Wetland of National Importance.
- ENP comprises the largest subtropical wilderness in North America. The park contains vast ecosystems including freshwater marshes, tropical hardwoods, pine rocklands, extensive mangrove estuaries, and sea grasses, which support a diverse mixture of tropical and temperate plants and animals.
- ENP serves as a sanctuary for the protection of more than 20 federal and 70 state-listed threatened and endangered species as well as numerous species of special concern. Many of these species face tremendous pressure from natural forces and human influences while trying to survive in the limited geographic area of the South Florida Ecosystem.
- ENP provides important foraging and breeding habitat for more than 400 species of birds (including homeland to world-renowned wading bird populations), and functions as a primary

corridor and refuge for migratory and wintering wildlife populations.

- ENP includes archeological and historical resources spanning approximately 5,600 years of human history revealing adaptation to and exploitation of its unique environment.
- ENP preserves natural and cultural resources associated with the homeland of American Indians of Florida (including Miccosukee Tribe of Indians of Florida, the Independent Traditional Seminole Nation of Florida, the Seminole Tribe of Florida, and the Seminole Nation of Oklahoma).
- ENP preserves the remnants of a nationally significant hydrologic resource that sustains South Florida's human population and serves as a global experiment in restoration.
- ENP provides the public with the opportunity to experience Everglades wilderness for recreation, reflection and solitude in proximity to a major metropolitan sector.

National Park Service Director's Order 18 requires all parks with burnable vegetation that can sustain fire must have a written Fire Management Plan (FMP). NPS Management policies refer to the role of fire in natural ecosystem processes.

"Naturally ignited fire is a process that is part of many of the natural systems that are being sustained in parks. Such natural systems contain plant and animal communities that are characterized as fire-adapted or fire dependent. They require periodic episodes of fire to retain their ecological integrity and, in the human-caused absence of fire, they can experience undesirable impacts that diminish their integrity—such as unnatural successional trends, loss of habitat for fire-adapted plant and animal species, or vulnerability to unnaturally intense wildland fire." (National Park Service Management Policies 2006)

Federal wildland fire policy addresses the management and analysis of wildland fire and directs programs to consider the long-term benefits in relation to risks both in the short and long term:

"Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale, and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected dictate the appropriate management response to fire." (1995/2001 Federal Wildland Management Policy)

The Everglades National Park Fire Management Plan (FMP) is a programmatic planning and operational document that fulfills Federal Wildland Fire and National Park service requirements and provides guidance and direction to meet park goals and objectives. This FMP seeks to perpetuate the use of fire upon the landscape.

## 2.0 POLICY, LAND MANAGEMENT PLANNING, PARTNERSHIPS

### 2.1 FIRE POLICY

The FMP will implement fire management policies and help achieve resource management and fire management goals defined in the following:

- **Federal Wildland Fire Policy and Program Review (2001)**  
This plan was written to implement those resource and fire management goals identified in the 1995 Federal Fire Management Policy and Program Review as revised by the 2001 Federal Fire Management Policy update.
- **Managing the Impact of Wildfires on Communities and the Environment (USDO/USDA 2000)**  
Managing Impacts of Wildfires on Communities and the Environment and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (USDO/USDA) is designed to address management of wildland fire impacts on communities and to sustain resources in fire adapted ecosystems.
- **The National Cohesive Wildland Fire Management Strategy**  
This is a three phase strategy led by federal agencies. The main goals of this collaborative effort include restoring and maintaining fire resilient landscapes, creating fire adapted communities, and responding to wildfire. The vision of The National Cohesive Wildland Fire Management Strategy is “To safely and effectively extinguish fire when needed; use fire where allowable; manage our natural resources; and, as a Nation, live with wildland fire.”
- **A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy (2001)**  
This plan was written to reduce the risk of wildland fire to communities and the environment by improving fire prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance.
- **Guidance for Implementation of Federal Wildland Fire Management Policy (2009)**  
This provides guidance to each of the federal wildland fire agencies to work together through development of unified direction to improve the effectiveness, efficiency, and safety of wildland fire operations.

An Environmental Assessment (EA) accompanies this Fire Management Plan (FMP) which meets the requirements of the National Environmental Policy Act (NEPA) and National Park Service policy. A Finding of No Significant Impact (FONSI) is located in Appendix A. This plan complies with Section 106 of the National Historic Preservation Act of 1996 (amended 1980) and Section 7 of the Endangered Species Act (amended 1973).

The following are authorities for the management of wildland fire on NPS lands:

1. United States Department of the Interior, Department Manual 620
2. The National Park Service Management Policies, (2006)
3. Director’s Order 18/Reference Manual 18, Fire and Aviation Management, (2008)
4. Interagency Standards for Fire and Fire Aviation Operations
5. Interagency Incident Business Management Handbook
6. Interagency Prescribed Fire Planning and Implementation Procedures Reference Guide, (2008)

7. Interagency Fire Program Management Qualifications Standards Guide
8. The National Park Service Organic Act of 1916 (Title 16 U.S.C. Chapters 1, 2, 3 and 4)

## **2.2 GENERAL/RESOURCE MANAGEMENT PLANNING**

The General Management Plan (GMP) provides a blueprint for management direction for Everglades National Park. The National Park Service is currently developing a new general management plan that will guide park management for the next 20 years or more.

Natural Processes and Cultural Resource Stewardship objectives for Everglades NP:  
ENP is restored and protected in ways that allow natural processes, functions, cycles, and biota to be reestablished and maintained in perpetuity and that allow cultural resources to be appropriately protected and preserved.

As evidenced from the above Management direction, natural and cultural resource stewardship goals are directly related to fire management goals and objectives.

Fire management objectives related to natural and cultural resource stewardship:

- Protect natural and cultural resources from adverse effects of fire and fire management activities.
- Use science based fire management to maintain and restore a healthy and sustainable ecosystem to the greatest extent practicable.
- Allow natural processes to continue by managing fires through monitoring with little or no suppression action to the maximum extent feasible to achieve resource benefits.
- Use planned ignitions to maintain cultural landscapes and reduce fuel loads in areas where cultural resources may be threatened.

Implementation of the FMP will support the Everglades National Park General Management Plan goals and objectives and natural and cultural resource stewardship goals by outlining fire management strategies designed to allow natural processes, functions, cycles, and biota to be reestablished and by appropriately protecting and preserving natural and cultural resources. These fire management strategies are designed to help establish natural fire regimes and conditions on the landscape, and to enhance and/or maintain the ecological, cultural, and social integrity of the park while reducing the risk and impacts of unwanted wildland fires. This plan describes a comprehensive program of action designed to implement fire management policies and objectives of the Park.

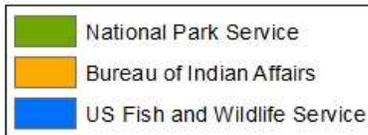
## **2.3 PARTNERSHIPS**



# South Florida Interagency Cooperators



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Figure 2. Interagency Cooperators Map

### **2.3.1 Interagency Coordination**

#### **2.3.1.1 Interagency Fire Coordination**

The NPS, US Fish and Wildlife Service (USFWS), and Florida Forest Service (FFS) have a state-wide Cooperative Agreement (Appendix B) specific to the management of wildland fire. FFS also maintains state-wide agreements with structural fire suppression organizations. Under the umbrella of these agreements, annual operating plans are established at the local level. Such an annual operating plan coordinates wildland fire management between ENP, the Everglades District of FFS, and Miami-Dade Fire Rescue. The annual operating plan establishes a Mutual Response Zone (MRZ; Appendix C) along the eastern boundary of the park that enables all participating agencies to take initial attack actions. The annual operating plan also establishes procedures for agencies to provide assistance anywhere in Miami-Dade County, outside of the MRZ. ENP coordinates with the Miccosukee Tribe of Indians of Florida to minimize threats of wildland fire to the Miccosukee Reserved Area and greater Miccosukee Community, a nationally recognized Wildland Urban Interface Community at Risk. Refer to Appendix D for a table of Key Interagency Contacts.

#### **2.3.1.2 Interagency Resource Coordination**

ENP has developed a fire management interdisciplinary team (IDT) that is comprised of subject matter experts from a variety of fields and divisions. Members of this team represent the South Florida Natural Resources Center (SFNRC) biological sciences branch, cultural resource division, environmental compliance division, and fire and aviation management. Additional representation may be included in the future. Coordination will occur with members of the IDT during planning, implementation, and response operations as appropriate. Annually, the IDT will review fire management's scope of work for the coming year.

Coordination with subject matter experts will occur related to specific resources of concern including but not limited to the Cape Sable seaside sparrow (CSSS), Florida panther, indigo snakes, wading birds, snail kites, wood storks, imperiled butterflies, listed plants, additional federally listed species, reintroduced species, species of special concern, sensitive hardwood hammocks, exotic vegetation, cultural resources, visitor use and experience, and wilderness resources.

Several interagency interdisciplinary working groups and learning networks have been formed to assist managers, researchers, and concerned public in sharing information, ideas and, best management practices regarding specific resource values. The Cape Sable Seaside Sparrow Working Group meets annually at ENP to provide updates on the status of the sparrow, share new research, identify management concerns, and provide feedback in the development and updating of the Cape Sable Seaside Sparrow Fire Management Strategy (Appendix E). The Pine Rocklands Working Group meets periodically around South Florida, the Florida Keys, and in the Caribbean to share management practices, research, and additional information related to pine rocklands. The Imperiled Butterfly Working Group South Florida chapter meets throughout south Florida and the Keys to discuss the status of imperiled butterflies and to develop best management practices and recommendations for future research and management. The Florida and Caribbean Fire and Invasives learning network brings together land managers and researchers in the U.S. and the Caribbean to share information, lessons learned and resources between developing and established programs. Coordination with specific state and federal agencies include USFWS, the State Historic Preservation Office (SHPO), and tribal consultation with the Miccosukee Tribe of Indians of Florida, the Seminole Tribe of Florida, and the

Seminole Nation of Oklahoma.

### 3.0 FIRE MANAGEMENT UNIT CHARACTERISTICS

#### 3.1 PARK WIDE CHARACTERISTICS

ENP is located in South Florida, spanning the southern tip of the Florida Peninsula and Florida Bay. The 1,509,000 acre park extends into portions of three counties: Miami-Dade, Monroe, and Collier and borders several major cities including Miami, FL (Figure 1).

##### 3.1.1 Environmental characteristics

**Historically, the Everglades extended south from the southern shore of Lake Okeechobee to the mangrove fringe of Florida Bay and the Gulf of Mexico west to the Big Cypress Swamp, and east to the coastal ridge (Gunderson 1994). Urban and agricultural development have greatly altered the Everglades ecosystem throughout the last century. Demands for water and land for agriculture and urban development, have resulted in drainage of over half of the historical extent of the Everglades since the turn of the century (Davis and Ogden 1994). ENP protects the southernmost remaining area of the historic everglades ecosystem.**

The Everglades are notably flat. The elevation changes approximately 3 cm/km moving from north to south (Kushlan 1990, Gunderson 1994). As in most areas of south Florida, subtle changes in elevation affect hydrology and result in dramatic changes in vegetation communities.

The major soils in ENP are geological and biological products that have not had sufficient time to develop into true soils. Marl (calclitic mud), organic matter (peat), sand and limestone rock outcrops are the four common substrates (NPS 2006). Organic peat soils are common in the long hydroperiod sawgrass prairies, where the limited seasonal drying promotes the formation and build-up of peat (Kushlan 1990). Marls are mixtures of calcium bearing fine sediments with calcite particles, sand, and/or shell fragments (NPS 2006). Marl soils formed in the short hydroperiod prairies with seasonal drying (NPS 2006, Kushlan 1990). Marl soils are the most wide-spread soil type in the park. They cover peat deposits throughout the central portions of ENP (NPS 2006). Periphyton, comprised of algae, bacteria, and other associated microorganisms, occurs at the surface of marl soils and can also be found in the long hydroperiod prairies (FNAI 2009).

The Everglades is a herbaceous-dominated wetland of slowly moving water which has been appropriately described as the “River of Grass” by Marjory Stoneman Douglass. Under a natural hydrologic regime, water flows across the vast flat expanses of the Everglades (Gunderson and Loftus 1993). The largest historic influences on water levels in the Everglades are rainfall and transpiration. High water levels throughout the wetter summer months, with a declining water table through winter and a rapid decline in spring, describe the natural pattern of water level changes in ENP (Duever et al. 1994, Gunderson 1994). Hydroperiod and water levels are a determining factor in vegetation communities within ENP. The wettest communities are generally wet all year (Gunderson 1994, Wade et al. 1980). The driest grass-dominated wetland communities are wet approximately two to seven months per year (Gunderson 1994, Lockwood et al. 2003).

### 3.1.2 Major Vegetation Communities

Approximately eight major vegetation communities occur in ENP: sawgrass prairies, marl prairies, pine rocklands, hardwood hammocks/tree islands, cypress swamps, mangrove/buttonwood forest, coastal prairies, and freshwater sloughs.

Fire adapted vegetation communities have evolved with and are maintained by periodic fire. Non-fire adapted communities often occur embedded within or adjacent to the fire adapted communities. However these areas experience very infrequent fire and are a management consideration regarding wildland fire protection, suppression and exclusion (Table 2).

#### 3.1.2.1 Fire Adapted Vegetation Communities

Sawgrass Prairies (FMU's 1, 2, 3, and 4)

The sawgrass (*Cladium jamaicense*) prairies are one of the most extensive plant communities in ENP. Associated habitats include tree islands, fresh water sloughs, and emergent plant communities. Sawgrass prairies are frequently flooded with slow moving water flowing in a general northeast to southwest direction (Kushlan 1990). Dense, nearly monotypic stands of sawgrass, reaching 3m (10ft) in height are located on deeper peat soils. In shallower marl soils, sawgrass stands are shorter and less dense, and intermixed with a variety of other species (Olmstead and Loope 1984). Woody vegetation is sparse and generally found around “gator holes” or near the edges of tree islands (FNAI 2009). The hydroperiod of the sawgrass prairies is typically at least six months (Olmstead and Loope 1984). This near constant flooding creates a ridge and slough effect where dense sawgrass grows on the ridges and water lilies (*Nymphaea spp.*) are present in the lowest sloughs (FNAI 2009).

Fire is a natural component of sawgrass prairies. Robertson (1953) documented early observations of lightning strikes that frequently started wildfires in the sawgrass prairies and tree islands. Sawgrass evolved with frequent fire and requires fire to maintain dominance. Most dominant herbaceous plants in Everglades, particularly sawgrass, grow vigorously following fire under normal conditions, when water levels are still near the soil surface (Loveless 1959). Generally, for most of the year sawgrass rhizomes are buried in soil under water, where they cannot be impacted by heat from fires. When water levels are low and marsh soils are exposed, sawgrass meristems remain insulated by surrounding overlapping leaves. These attached leaves also may act as wicks when soils are moist, keeping the base of the culm moist. When above ground foliage is consumed by fire, sawgrass quickly initiates new top growth, often within a day, from surviving rhizomes. In the absence of fire, leaf litter continually builds. Within three to five years, dead biomass will surpass live biomass, and after many years without burning, plant vigor declines. After a few years without burning, dead sawgrass leaves accumulate, and this fuel promotes increased fire spread (Uchytel 1992). Dense sawgrass stands can ignite easily and burn hot, at times within hours after rain. In areas with a shortened hydroperiod and lack of fire, wax myrtle (*Myrica cerifera*), dahoon (*Ilex cassine*), coastal plain willow (*Salix caroliniana*), and groundsel tree (*Baccharis halimifolia*) are common invaders which may colonize areas of decadent sawgrass (Alexander and Crook 1984). Generally fires carry well in both drained and flooded sawgrass prairies consuming most of the above ground or above water biomass. On flooded sites, plants are burned down to a uniform height, usually several inches above the water surface. Under normal conditions sawgrass typically sprouts rapidly after fire. However, if water levels rise rapidly, keeping the new growth completely submerged, sawgrass mortality will be experienced (Uchytel 1992). These fire-flood interactions can kill sawgrass

stands by preventing plant regeneration. Under extreme dry conditions severe fires may occur, which can consume the peat layer and kill sawgrass stands, allowing emergent herbaceous vegetation to invade or converting these areas to deeper water sloughs (Uchytel 1992, FNAI 2009). Fires will generally not carry in sparse sawgrass stands when water is present or soils are saturated (Uchytel 1992).

#### Marl Prairies (FMU's 2, 3, and 4)

Marl prairies (Short hydroperiod prairie) are named for the shallow marl soils on which they occur. Periphyton, comprised of algae, bacteria and other associated microorganisms, is a characteristic and important component of this community (McPherson 2008, Gunderson 1986). Marl prairies typically occur on the periphery of sawgrass marshes and pine rockland habitats and in the finger glades within the pine rocklands (FNAI 2009). Dwarf cypress (*Taxodium spp.*) is found in some marl prairies and not in others; the reason for this is unknown (FNAI 2009). Marl prairies are a diverse community which may contain approximately 200 species. The majority of vegetation is generally less than one meter in height, and dominant species may include Muhly grass (*Muhlenbergia filipes*), beak rushes (*Rhynchospora spp.*), Florida bluestem (*Schizachyrium rhizomatum*), black bogrush (*Schonenus nigricans*), and sawgrass (*Cladium jamaicense*; LANDFIRE 2007). Hydroperiods are short, with seasonal flooding for approximately two to seven months per year resulting in seasonal drying of soils (Lockwood et al 2003). Longer hydroperiods push the system towards sawgrass dominated prairies with organic soil build up (LANDFIRE 2007).

Marl prairies are fire maintained. However there is no consensus as to the specific mechanisms (LANDFIRE 2007). It is thought that prescribed fire is needed in marl prairie to control shrub invasion by native species as well as woody invasive species such as Brazilian pepper (*Schinus terebinthifolius*), Australian pine (*Casuarina equisetifolia*) and Melaleuca (*Melaleuca quinquenervia*; Hilsenbeck et al 1979; Gunderson and Snyder 1994). Shrubs can also displace rare plant species, such as few-flowered finger grass (*Digitaria pauciflora*; Bradley and Gann 1999). The herbaceous species that comprise the marl prairies recover rapidly following fire (FNAI 2009). Herndon and Taylor (1986) found that biomass reaches pre-fire levels at the end of two years. However Lockwood and LaPuma (2004) found that prairies did not return to a pre-burn condition for at least two years post fire (LANDFIRE 2007) and up to six years after a fire may be needed before marl prairie vegetation is again suitable for nesting by the Cape Sable seaside sparrow (Taylor 1983). Vegetation recovery may be influenced by timing and severity of wildland fire occurrences. For the first two years after fire, this community will only burn in patches, if at all (Herndon and Taylor 1986). Flooding too soon after fire can kill re-sprouting grasses (USFWS 1999), altering the community vegetation. In addition to being vulnerable to fire flood interactions, the soft marl soils during the wet season are subject to scarring from off-road vehicles (ORV) tracks (FNAI 2009).

#### Pine Rocklands (FMU 3)

The pine rockland ecosystem is globally imperiled and extremely limited in distribution (FNAI 2009). The largest remnant of pine rockland in South Florida is located in ENP on Long Pine Key. This fire-maintained community is perhaps one of the most diverse plant communities of South Florida (McPherson 2008). Hardwood hammocks and marl prairie finger glades form a mosaic of community types within the pine rocklands. Pine rocklands are open canopy forests with a South Florida slash pine (*Pinus elliottii var. densa*) overstory, generally with multiple age classes (FNAI 2009). The understory is a patchy mix of tropical and temperate shrubs and palms and a species rich herbaceous layer with numerous rare and endemic species (FNAI 2009). The open shrub-subcanopy layer is composed of more

than 100 species of palms and hardwoods (Gann et al 2009) and many of these species vary in height depending on fire frequency, getting taller as time since fire increases (FNAI 2009). Pine rocklands occur on relatively flat, moderately to well-drained terrain between two to seven meters above sea level (Snyder, et al 1990). Oolitic limestone substrate known as pinnacle rock, is at or very near the surface with solution holes present. There is very little soil development. The small accumulations of soil that are present are composed of nutrient-poor sand, marl, clayey loam, and organic debris in depressions and cervices in the rock surface (FNAI 2009). Drainage is generally rapid and most sites are wet for only short periods following heavy rains. Some sites may be shallowly inundated for up to sixty days during the rainy season (FNAI 2009).

The pine rockland community is maintained by regular fire, and prescribed fire must be periodically introduced to prevent succession to hardwood hammock, sustain community structure, and maintain the high herbaceous diversity (Loope and Dunevitz 1981). Snag trees and hardwood shrub diversity are also important components in pine rocklands. Prescribed fire also plays an important role in the nutrient cycling process (URS Corporation Southern et al. 2007). The amount of woody and herbaceous undergrowth (fuel loading) is directly related to the length of time since the last fire. Although hardwood species presence is natural, in the pine rocklands, without fire these species tend to increase in cover and reduce the amount of light penetrating to the forest floor (Wade et al. 1980). Over time shading from hardwood species will reduce understory herbaceous diversity (FNAI 2009). Additionally, fire intensity and severity increase as fuel loading increases, creating an unnatural fire situation making severe crown fires more likely. The ecotone between pine rocklands and hardwood hammocks is more defined when regular fire is present, however the ecotone becomes more gradual and subtle as hardwood hammock species encroach into the pine rocklands in the absence of fire (Wade et al 1980). Pine rocklands are also susceptible to other natural disturbances, such as hurricanes and frost events (Ross et al. 1994). High winds significantly affect community structure and composition by causing canopy and subcanopy mortality, with subsequent stimulation of shrub or herbaceous growth. Rare frost events can damage tropical and subtropical plants in the exposed open understory of the pine rocklands (FNAI 2009). Exotic plant invasions can also be a problem in pine rocklands. Brazilian pepper (*Schinus terebinthifolius*), Burma reed (*Neyraudia reynaudiana*), natal grass (*Rhynchelytrum repens*), and more than 100 other non-native species have invaded many pine rocklands throughout Miami-Dade county (Possley and Maschinski 2006, URS Corporation Southern et al 2007) and prescribed fire can be a useful tool in controlling invasive exotic plants (FNAI 2009).

#### Coastal prairies (FMU 1)

Coastal prairies occur in saline-brackish zones on the western portion of ENP, adjacent to Florida Bay. A natural mosaic of fire adapted coastal prairie mixed with mangrove and buttonwood, this ecosystem typically occurs on tidal flats of the marine terrestrial interface with anaerobic sediments and low wave energy (LANDFIRE 2007). Principal species dominating the coastal prairies include cordgrass (*Spartina spartinae* and *S. bakeri*), black needle-rush (*Juncus roemerianus*), saltgrass (*Distichlis spicata*), or sawgrass (*Cladium jamaicense*; LANDFIRE 2007). These areas have distinct zones of vegetation dominated by a single graminoid species (FNAI 2009).

Fires in the coastal prairies have periodically killed back mangrove fringes, but would quickly go out in the sparse shaded mangrove litter before penetrating more than a few meters into the adjacent closed canopy mangrove forest. A closed mangrove forest provides an effective natural barrier to fire spread, except under the most extreme drought conditions. Tidal creeks, pools, and bare hypersaline soil areas

further limit fire size and spread. In the absence of fire, mangrove forests tend to invade further inland into open marsh and prairie (LANDFIRE 2007).

### 3.1.2.2 Non-fire adapted vegetation communities

#### Hammocks/Tree Islands

Hardwood hammocks and tree islands can be found throughout the Everglades ecosystems in the sloughs and freshwater prairies, pine rocklands, and coastal ecosystems. These communities are composed of dense stands of broad-leafed trees that grow on a natural rise of only a few inches in elevation. The soils in tropical hardwood hammocks are composed of primarily organic material on top of mineral substrate (USFWS 1999) In marsh habitats, tree islands formed on peat soil accumulations over limestone bedrock (Kloor n.d.). Many tropical species such as mahogany (*Swietenia mahogoni*), gumbo limbo (*Bursera simaruba*), cocoplum (*Chrysobalanus icaco*) lysiloma (*Lysiloma latisiliquum*), and poisonwood (*Metopium toxiferum*) grow alongside temperate species such as live oak (*Quercus virginiana*), and hackberry (*Celtis laevigata*). Because of their slightly higher elevation, hammocks rarely flood (NPS 2010). Under most circumstances, fire will extinguish at the edge of hammocks and tree islands. Under extreme conditions, fires may cause tree mortality and consume organic soils. Total recovery following fire can range between 25 to more than 100 years (FNAI 2010).

#### Cypress swamps

Cypress (*Taxodium spp.*) is a deciduous conifer that can survive in standing water. These trees often grow in one of three distinct formations. These include domes, strands, or sparse dwarf cypress. Cypress domes, with larger trees in the center and smaller trees on the periphery are commonly found around solution holes. Cypress strands occur where the cypress trees grow in an elongate and linear shape that is parallel to the flow of water. In less-favorable growing conditions, stunted cypress trees, called dwarf cypress, grow on drier land (NPS 2010), often scattered within fire adapted prairies. Fires may burn the edges of cypress domes and strands, with the centers burning infrequently. This pattern of fire is thought to maintain cypress dominance by preventing hardwood invasion and peat accumulation. Severe fire can kill cypress trees and consume the peat soil, thus altering the natural community structure and composition (FNAI 2010).

#### Mangrove/Buttonwood

Extensive mangrove forests occur in the estuarine and saline habitats of the southern half of ENP. Red mangrove (*Rhizophora mangle*), white mangrove (*Laguncularia racemosa*) and black mangrove (*Avicennia germinans*) occur in nearly monocultural or mixed stands and often form closed canopy forests (LANDFIRE 2007). Within mangrove forests, hardwood dominated uplands including shell mounds and buttonwood hammocks occur in some locations. In addition, coastal wetlands dominated by halophytic succulents including saltwort (*Batis maritima*) and perennial glasswort (*Sarcocornia perennis*) and coastal prairies dominated by cordgrass and sawgrass are frequently interspersed within mangrove forests. Mangrove forests in ENP provide important habitat for feeding and breeding birds and serve as nursery grounds for a variety of marine species. Exotic species including Brazilian pepper (*Schinus terebinthifolius*), and Old-world climbing fern (*Lygodium microphyllum*) form extensive stands in some mangrove forests of ENP and prescribed fire may be an effective tool in managing invasions before they spread to mangrove forests. Fire is extremely rare in mangroves forests while the adjacent coastal prairie ecosystem experiences frequent fire. Fire will burn mangrove fringes but will not penetrate (LANDFIRE 2007). This fire regime may prevent mangrove encroachment into the coastal

prairies.

#### Slough

A slough is an area of lower elevation and deeper water. These marshy rivers remain flooded almost year-round. ENP contains two distinct sloughs. The larger of the two is Shark River Slough, also known as the "River of Grass". The smaller, narrower Taylor Slough lies to the east of Shark River Slough (NPS 2010). Sloughs are dominated by emergent vegetation such as marsh bladderwort, white water lily, floating hearts, and yellow cow lily (USFWS 1999). Fires in sloughs are rare but these areas may burn during extreme drought consuming peat soils. Some sloughs have formed as a result of extreme fire consuming peat soil in marsh and prairie followed by flooding. In other areas sloughs have never experience fire based on evidence from soil cores (FNAI 2010).

### 3.1.3 Historic Weather Analysis

Everglades NP is classified as having a humid subtropical climate. The summer months are hot and humid, and the winter months are usually mild, with occasional freezing conditions. During the dry winter season, the weather is often influenced by frequent cold fronts. These cold fronts may bring showers, cloud lightning, and strong winds. Strong northerly winds and low relative humidity often follow post frontal passage. In the summer the Atlantic and Gulf of Mexico sea breezes often collide in a convergence zone that may produce strong bands of thunderstorm activity permeated with frequent lightning strikes. The dynamic weather conditions described produce a wide range of atmospheric instability which is an important factor in fire management decision making. The following results have been developed from 20-year averages taken from the Park's Remote Automated Weather Stations (RAWS).

#### Temperature

Mean annual temperature is 76 degrees Fahrenheit and mean monthly temperatures range from 67 degrees Fahrenheit in January to 84 degrees Fahrenheit in August. Average monthly temperatures have peaked in the upper 90's in July and August and dropped to the low 40's in January, with occasional freezing temperatures possible throughout the winter months.

#### Humidity

The average midday minimum relative humidity ranges from around 54 percent during the spring dry season to approximately 77 percent in the summer wet season. Average maximum relative humidity ranges from 96 percent to 100 percent throughout the year. Daytime relative humidity is generally high with full recovery nightly to 100 percent.

#### Rainfall

Precipitation amounts vary throughout the year. Lower averages are common during the winter months and higher averages are generally experienced in the spring and summer months. On average, the peak of the rainfall occurs between the months of June through September. Average annual rainfall ranges from 56 to 62 inches. During the wet season, approximately 37 inches accumulate. Afternoon thunderstorms are common during the wet season and transitional times, which have resulted in lightning ignited fires.

## Wind

Prevailing winds vary throughout the year and are often dependent upon the prevailing local sea breeze. During the summer (wet season), frequent thunderstorms form in the convergence zones generated by battling Atlantic and Gulf of Mexico sea breezes. The collisions produce strong bands of thunderstorm activity usually accompanied by strong winds.

During the fall and winter months, the winds are generally south, southeast, north or northeast. In the spring, winds are generally from the east. In the summer months, winds are predominately southeast or north. Sea breezes and erratic winds created by thunderstorms are also common. High winds above 20 miles per hour are common in the winter and spring months and wind speeds in excess of 43 miles per hour occur occasionally.

## Weather Stations

The Park maintains 2 Remote Automated Weather Stations (RAWS), which are compliant with National Fire Danger Rating System (NFDRS) standards (Figure 3). These stations collect year-round data that includes: air temperature, relative humidity, wind speed and direction, rainfall, and solar radiation. This data is transmitted on an hourly basis via the Geostationary Operational Environmental Satellite (GOES). Table 1 contains the basic information for each station.

Surface water level readings are monitored daily at hydrology station NP44 and, as needed, at other hydrology stations. Current and past weather is monitored on a custom Doppler radar website and on public websites. Lightning strike data is accessed through a national NPS contract with the Bureau of Land Management.

Station ID	Station Name	Location	Type	Period of Record
086702	Cache	Fire Cache in Pine Island District	RAWS	1975 - present
086704	Chekika	Chekika Day Use Area	RAWS	1993 - present

*Table1: Everglades Fire Weather Stations*



# Everglades NP Remote Automated Weather Stations (RAWS)

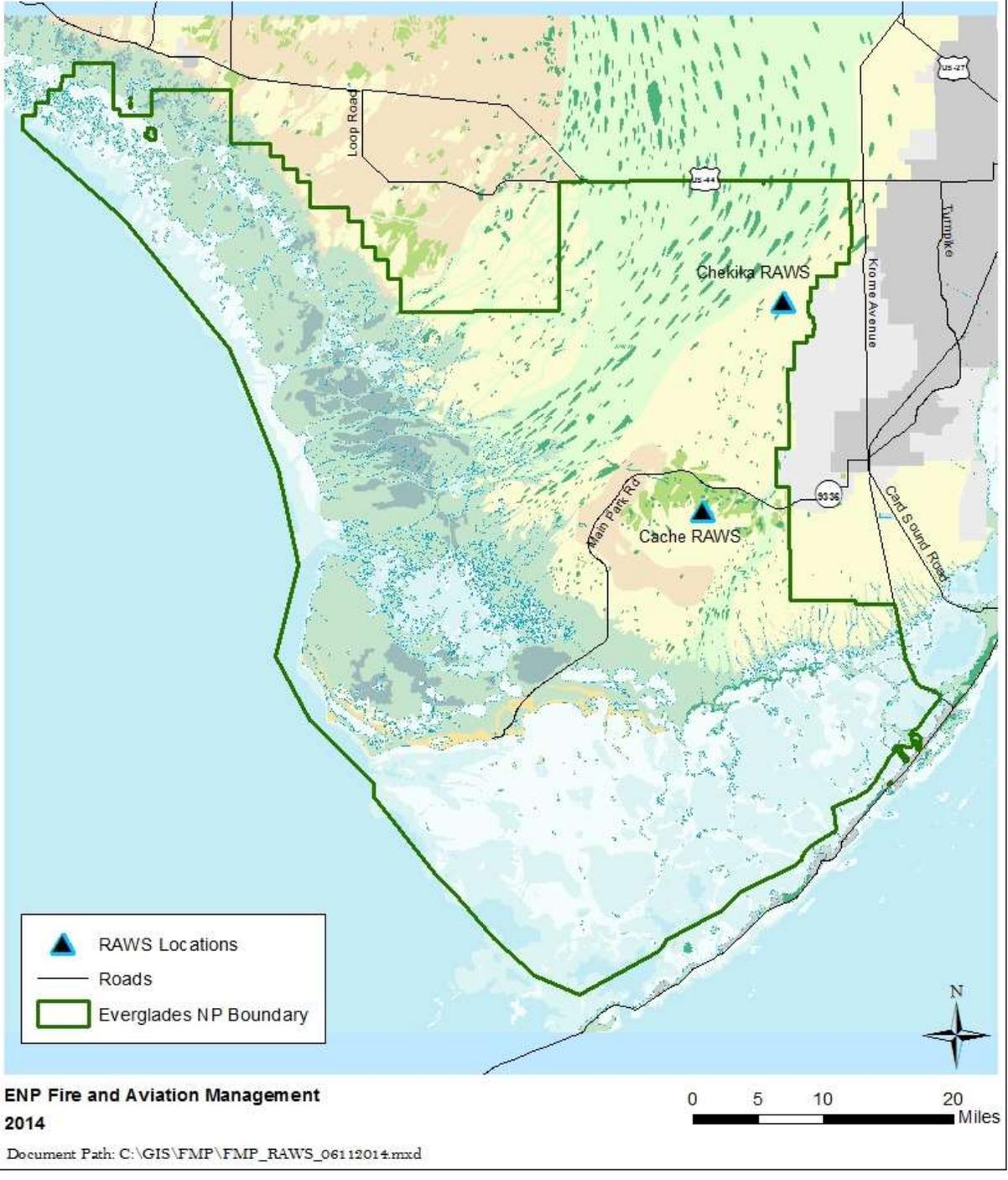


Figure 3. Everglades NP RAWS locations Map

### 3.1.4 Fire Behavior

Fuels in the park can be divided into three broad categories: Grasses, shrubs, and timber (Table 2). The dominant fuel type is grass which encompasses approximately 80% of the landscape and the remaining 20% consists of a combination of timber and shrub fuel types.

#### Grass

Scott and Burgan's (2005) standard fire behavior fuel model classifies wildland fuels into fuel model categories and describes the expected fire behavior associated with the specific fuel model. Fire behavior fuel models GR5, GR6, GR8, and GR9 represent grass fuels found within the park. These fuel models demonstrate high to very high rates of spread and high flame lengths, under the influence of wind (Figures 4 & 5).

The primary carrier of fire in GR5 is humid-climate grass, which is characterized by short and long hydroperiod prairies in the Coastal Prairies, River of Grass, and the East Everglades FMUs. The primary carrier of fire in GR6 is continuous humid-climate grass, which is characterized by black needle-rush (*Juncus roemerianus*) and short hydroperiod prairies, found in the Coastal Prairies and River of Grass FMUs. These fuel models average 1-2 foot tall grasses, with an average depth of 1-2 feet.

The taller grasses are classified in GR8 and GR9. The primary carrier of fire in GR8 is continuous, very coarse humid-climate grass, which consists of long hydroperiod prairies. This grass is primarily found in the River of Grass and East Everglades FMUs. The primary carrier of fire in GR9 is dense, tall humid-climate grass that consists of cordgrass prairies and long hydroperiod prairies found throughout the park. These grass models consist of a heavy continuous grass ranging from 3 to 8 feet tall. Spread rates and flame lengths are usually classified as extreme (Figures 4 & 5).

#### Shrubs and Timber

Fire behavior fuel models TL2, TU3, and SH6 make up the remaining 20% of the park's landscape. These fuel models demonstrate low to high rates of spread and are accompanied by low to high flame lengths (Figures 6 & 7).

The primary carrier of fire in TL2 is hardwood litter. TL2 represents hardwood hammocks and tree islands. These areas are not targeted for fuel treatments; however wildfires may ignite these areas. Hardwood hammocks and tree islands experience infrequent fire, but when they do, fires range from low intensity creeping and smoldering to high severity ground fires. The TU3 and SH6 models represent the pine rocklands. The primary carrier of fire in TU3 is moderate forest litter with grass and shrub components. This fuel type is commonly found in pine rocklands within the lower range of the fire return interval (3-7 year FRI), usually less than 3 years or areas that consist of a less dense understory, characterized with light to moderate fuel loads. Spread rates are high, with low to medium flame lengths (Figures 6 & 7).

The primary carrier of fire in SH6 is woody shrubs and shrub litter. This fuel type consists of dense shrubs, and the fire behavior is much more intense with high spread rates and flame lengths (Figures 6 & 7). The shrubs may act as ladder fuels, which result in passive torching of the overstory of South Florida slash pine (*Pinus elliottii* var. *densa*).

This type of fire behavior has been observed by Everglades Fire Management in areas of the pine

rocklands that are more than 5 years post fire and/or consist of a dense shrub layer. In these areas, fire behavior is expected to be high to extreme, with high spread rates and flame lengths (Figures 6 & 7).

Periphyton

Periphyton is a complex community consisting of a variety of algae diatoms, microorganisms, and invertebrates. Periphyton is prevalent throughout the short and long hydroperiod wetlands where it can form a continuous surface above the soil. Periphyton is an important consideration in wildland fire, as it is a receptive fuel source for spot fires and, when dry, will sustain smoldering fires.

Vegetation	Fuel Type	FMU
Sawgrass	GR8 & GR9	1,2,3,4
Marl Prairie	GR5 & GR6	2,3,4
Coastal Prairie	GR5, GR6, GR8 & GR9	1
Pine Rocklands	TU3 & SH6	3
Hammocks/Tree Islands	TL2	2,3,4

Table 2. Vegetation and Fuel Types

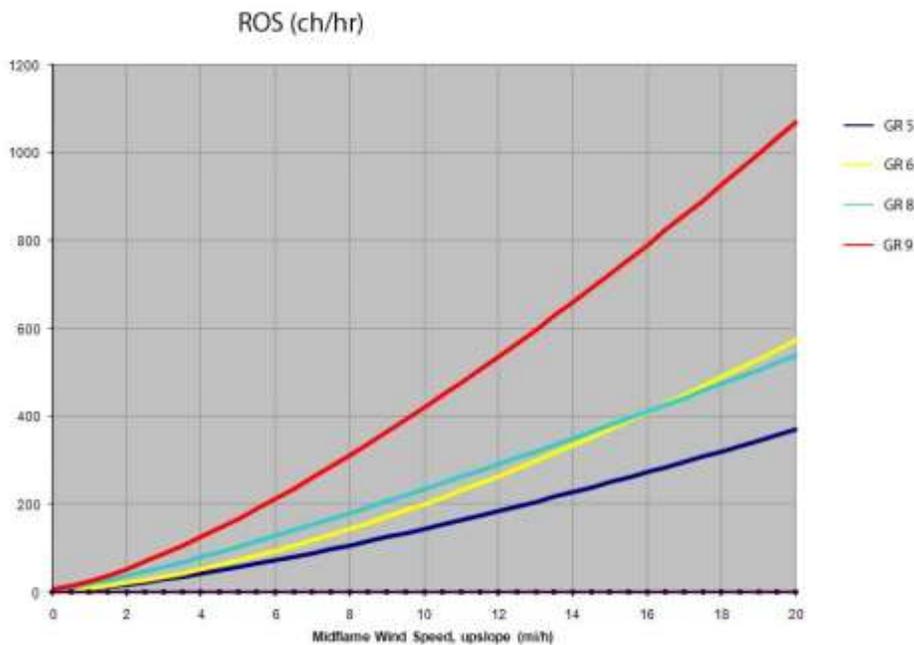


Figure 4. Rate of spread (ROS) for grass fuel models (chains/hour \*chain=66 feet)

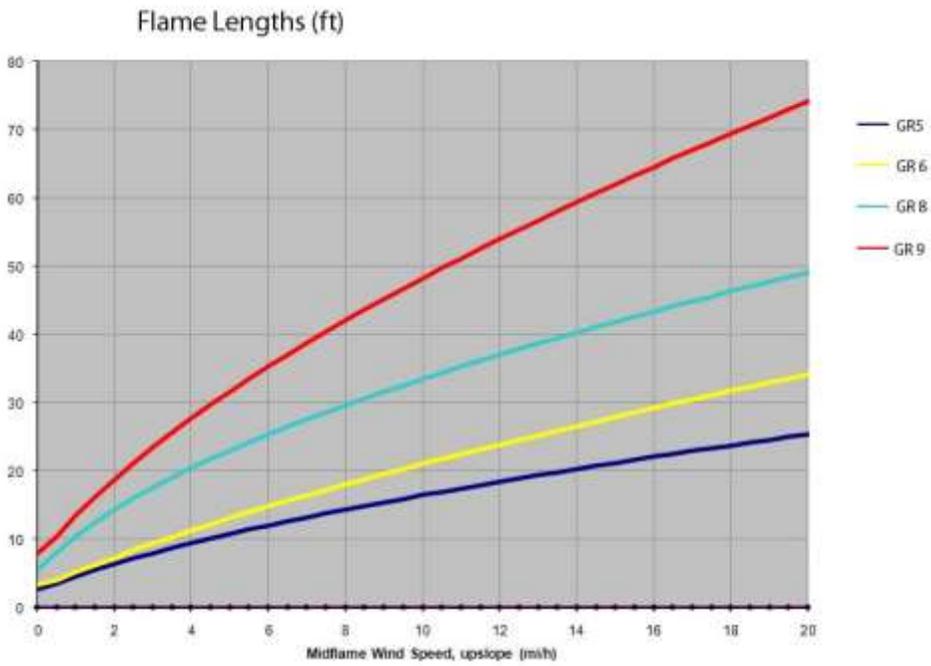


Figure 5. Flame lengths for grass fuel models

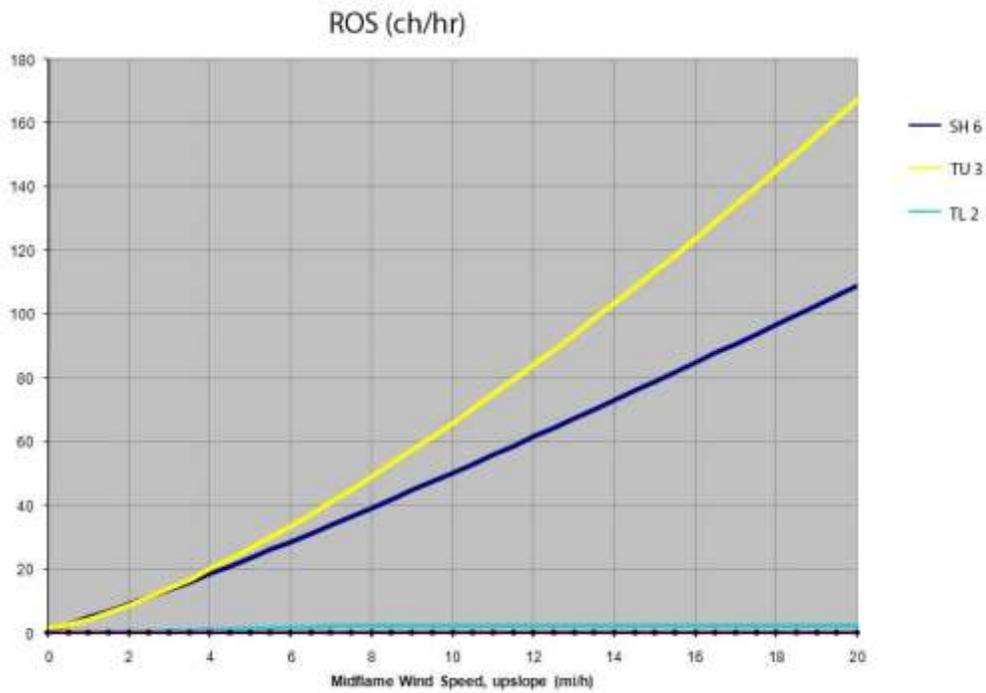


Figure 6. Rate of spread (ROS) for shrub and timber fuel models (chains/hour \*chain=66 feet)

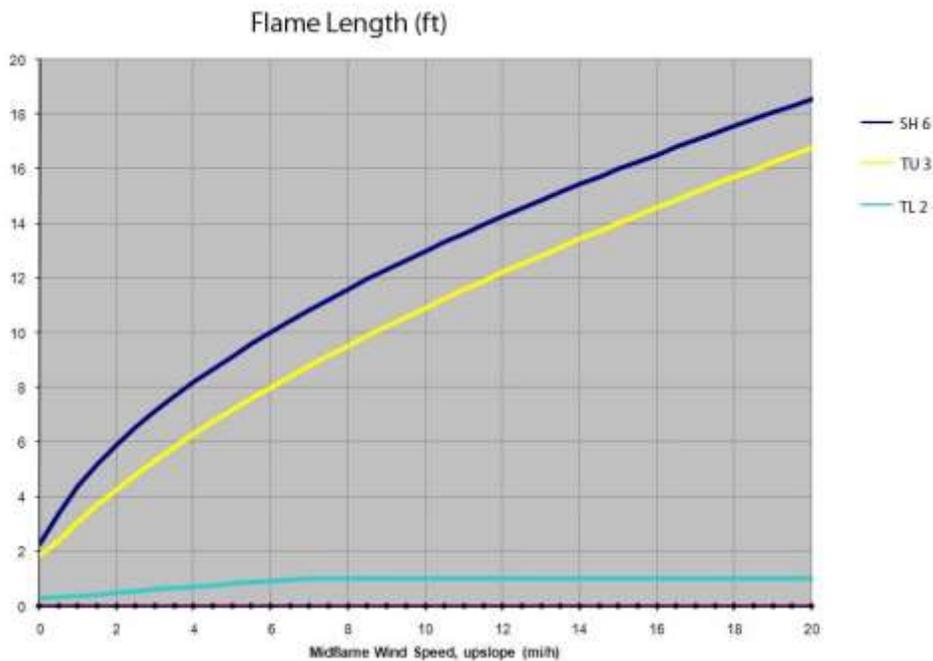


Figure 7. Flame lengths for shrub and timber fuel models

### 3.1.5 Historic role of fire

Fire has been described repeatedly as a dominant factor in the history and biology of natural communities (Mutch 1970). The Everglades is less than 6,000 years old, a relatively young system, as evidenced by the earliest layers of peat deposit (FNAI 2009). Fire is one of the basic natural forces that has influenced plant communities over evolutionary periods of time, particularly grass prairies and pine forests (Mutch 1970). Evidence indicates that fires have occurred in the Everglades for the past 5000 years and that many fires could be attributed to Native Americans. Audubon wardens in the 1930's made numerous references to Indian ignited fires in the southern Everglades and subsequent European settlers most likely continued to use fire in similar ways (NPS 1991).

Everglades National Park (NP) was the first National Park Service unit to use prescribed fire to maintain biological diversity. Along with the dedication of Everglades NP in 1947 came the National Park service policy of fire control and total fire suppression. In 1958, a study was initiated to determine the role of fire in Everglades NP. The study concluded that in order to preserve certain ecosystems, active fire management was needed. As a result of the 1958 study, the first prescribed fire ever in a national park unit was conducted in Everglades NP. The objectives were to reintroduce fire in a controlled manner to minimize damaging effects and perpetuate the fire-adapted pine forest community of the park. To maintain its biological diversity, fire is a necessary part of Everglades NP. The 1968 National Park Service endorsement of prescribed fire was recognition that fires were a natural process in these ecosystems (NPS 1991).

Upon establishment of the park in 1947, fires in the Park were suppressed. In FMU 1, due to

inaccessibility, many of these fires ran their natural course. In FMU 3, prior to the establishment of the park, most of the pines of Long Pine Key and Pine Island were logged. The roads created allowed easier accessibility for fire managers and the pine rocklands were prescribed burned routinely throughout the 60's and 70's. FMU's 2 and 4 have similar fuel types; however accessibility and fire cause differs. FMU 4 was added to the park in 1989, however, Everglades NP has actively participated in fire management activities in this area prior to acquisition by cooperative agreement. This FMU has a history of very frequent human caused wildfires, predominantly during the dry season. These fires have occasionally been large and difficult to suppress. Due to the rapid spread of fire in the dense grassy fuels, the largest fires in the park have occurred in FMU's 2 and 4.

Access to the interior of FMU's 1 and 2 often require helicopter transportation. If fire escapes initial attack, helicopters and other special equipment such as single engine air tankers (SEATs) are often required. In FMU 4, although vehicle access is possible in some areas, SEAT's and helicopter use is often needed. In the pine rocklands of FMU 3, single engine airtankers are less effective, therefore engines and helicopters are used.

Everglades NP has records of wildland fires dating back to 1948. Earlier records have been converted into digital format and digitized using mapping software. These have been combined with the digital files and all wildland perimeters are in a GIS database (Figure 8). All records are stored on the fire management shared server and hard copies are stored in the fire records room in the Robertson Building.

### **3.1.6 Fire regime/condition class**

Early accounts of fire in the Everglades revealed a casual attitude towards fire (Robertson 1953). This attitude was developed from the historical fire regime which consisted of low severity of fires across large uninhabited expanses. These frequent low-severity fires resulted in little to no change in most plant communities and likely helped produce this attitude (Robertson 1953). Conversely, when fire was removed from the system, vegetational succession occurred (Robertson 1953, Snyder 1991).

Charcoal and ash lenses have been found throughout the Everglades in certain types of peat layers (Cohen 1974). However the frequency which natural fires burned in any one community is less well understood. Typical methods for determining FRIs (tree ring and fire scar studies) have not been successful in the Everglades (Taylor 1980 in Snyder 1991). FRIs for ENP fire-adapted vegetation have been calculated using the best available science and published literature. For more information on how fire return intervals were developed, see Section 4.4.1.

#### Fire Regime

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but including the influence of aboriginal burning (Agee 1993, Brown 1995). Fire regime is a description of an area's fire return interval combined with the severity of fire effects on the landscape. A fire return interval is the number of years between fires at a specific location or plant community. Fire return interval range is the span of years between the shortest and longest periods between fires in a vegetation type. Fire return intervals for community types in Everglades NP were chosen based on literature and decisions made by the Interdisciplinary Team (Table 3).

Community Type / FMU	Fire Return Interval (years)	Notes	Citations
Coastal Prairie FMU 1	2-10		FRCC (2003), Landfire (2008)
Saw Grass FMU 2 / FMU 4 / FMU 3	3-12	Includes habitat within FMU 3 south of Pine Blocks and HID	FNAI (2009), FRCC (2003), Landfire (2008), Alexander (1971), Hofstetter (1973), Hofstetter (1974), Uchytel (2010)
Muhly Grass - Marl Prairie FMU 2 / FMU 4 / FMU 3	3-12	See comment below	FNAI (2009), Landfire (2008), Hofstetter (1973)
Pine Rockland FMU 3	3-7	Includes pine rockland and embedded prairie communities	FNAI (2009), FRCC (2004), Landfire (2008), Hofstetter (1973), Carey (2010), Snyder et al (1990), USFWS (1999)

Table 3. Fire Return Intervals

#### Fire regime condition class

A fire regime condition class (FRCC) is an expression of the departure of the current condition from the historical fire regime (Hann and Bunnell 2001). There are three classes for each fire regime: low (FRCC 1), moderate (FRCC 2), and high (FRCC 3). These classes reflect the departure from the central tendency of the natural (historical) fire regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002).

Condition Class	Description	Potential Risks
Condition Class 1	Within the natural (historical) range of variability of vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are similar to those that occurred prior to fire exclusion (suppression) and other types of management that do not mimic the natural fire regime and associated vegetation and fuel characteristics. Composition and structure of vegetation and fuels are similar to the natural (historical) fire regime. Risk of loss of key ecosystem components (e.g., native species, large trees, and soil) are low.
Condition Class 2	Moderate departure from the natural (historical) regime of vegetation characteristics; fuel	Fire behavior, effects, and other associated disturbances are moderately departed (more

	composition; fire frequency, severity, and pattern; and other associated disturbances	or less severe). Composition and structure of vegetation and fuel are moderately altered. Uncharacteristic conditions range from low to moderate Risk of loss of key ecosystem components are moderate.
Condition Class 3	High departure from the natural (historical) regime of vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated disturbances	Fire behavior, effects, and other associated disturbances are highly departed (more or less severe). Composition and structure of vegetation and fuel are highly altered. Uncharacteristic conditions range from moderate to high. Risk of loss of key ecosystem components are high.

Table 4. Condition Classes (adapted from FRCC 2003)

### 3.2 AREA -WIDE MANAGEMENT CONSIDERATIONS

#### 3.2.1 Wildland Fire Management Goals

The goals of the Everglades National Park Fire Management Plan are:

- Conduct all fire management activities in a manner that maintains the safety of firefighters and the public.
- Protect human life and property both within and adjacent to Park areas.
- Protect natural and cultural resources from adverse effects of fire and fire management activities.
- Maintain or improve the quality of the native fire adapted vegetation communities that occur within Everglades National Park.
- Maintain a framework of adaptive management to ensure a responsive, efficient, safe, and accountable fire management organization.
- Allow natural processes to continue by managing fires through monitoring with little or no suppression action to the maximum extent feasible to achieve resource benefits.
- Use planned ignitions to supplement the natural role of fire as an ecosystem process, achieve resource management objectives, reduce hazard fuel accumulations, reduce threats to WUI from wildfires, protect park resources, maintain fire adapted ecosystems, treat exotic plants and to secure the park boundary.
- Use science-based fire management to maintain a healthy and sustainable ecosystem. To the degree possible, achieve a healthy range of variation in the fire return interval, fire size, fire behavior, fire effects, and other characteristics of the fire regime using the best available

science.

- Use science-based fire management to maintain and enhance the wilderness character of the Marjory Stoneman Douglas Wilderness and any lands found eligible for wilderness designation.

### 3.2.2 Firefighter and Public Safety

Operational guidance directs all fire management activities to be conducted to enhance and provide resource benefit, and mitigate risk from unwanted wildfires, while providing for firefighter and public safety. All actions will conform to safety policies defined in, but not limited to: *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book), *NPS Director's Order 18*, and the Standards for Operations and Safety chapter in the *NPS Reference Manual 18*.

The *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book) states:

“Firefighter and public safety is our first priority. This Fire Management Plan and activities defined within reflect this commitment. The commitment to and accountability for safety is a joint responsibility of all firefighters, managers, and administrators. Individuals must be responsible for their own performance and accountability. Every supervisor, employee, and volunteer is responsible for following safe work practices and procedures, as well as identifying and reporting unsafe conditions. All firefighters, fireline supervisors, fire managers, and agency administrators have the responsibility to ensure compliance with established safe firefighting practices.”

Safety is the primary concern of the fire management program. All operational documents will address both public and employee safety. The potential effects to employees and the public will be considered for all projects. Fire management operations involve a variety of associated risks. Aviation activities include loading and off-loading personnel and supplies in unimproved helispots as well as water delivery and aerial ignition operations. Planned and unplanned ignitions and monitoring activities occur in complex terrain during a wide variety of weather patterns.

There are several specific elements considered regarding the safety of firefighters, employees and the public identified below. Mitigations related to these elements are covered in section 3.2.3 Management Values.

#### Transportation Corridors

Fires have the potential to affect several transportation corridors and can present road hazards. Transportation corridors include the Main Park Road, U.S. 41, U.S. 1, Krome Avenue, and secondary surface roads within and adjacent to the park.

#### Urban interface and park infrastructure

Three Wildland Urban Interface (WUI) Communities at Risk within and adjacent to the park have been identified. These include the Miccosukee Reserved Area and greater Miccosukee Community, the 8 ½ Square Mile Area, and the Pine Island and Park Headquarters complex. These communities are at risk from wildfires burning in natural fuels intermixed with homes. Other park infrastructure potentially at risk from wildfire is located in Long Pine Key, Flamingo, East Everglades, and Shark Valley. Smoke can

cause health issues, and sensitive members of the public are more susceptible to its impact.

#### Visitor Use

The primary high visitor use areas potentially impacted by fire include Royal Palm, Ernest Coe Visitor Center, Long Pine Key Campground, Flamingo, Shark Valley, Mahogany Hammock, Pahayokee Overlook, and Chekika. ENP also has an extensive backcountry area accessible by boaters. Fires in the wilderness pose potential risk to these park visitors.

#### Park Operations

Park operations can be impacted by both planned and unplanned ignitions. Impacts can include both smoke and direct fire exposure.

#### Park Neighbors

Residents of the Miccosukee Reserved Area and greater Miccosukee Community and the 8 ½ Square Mile Area are the communities most susceptible to smoke impacts resulting from fires near the park boundary. Homestead, Florida City, and the Greater Miami area can also be affected by smoke.

### **3.2.3 Management Values**

Fire has the potential to impact most of the terrestrial resources within the park. Broad categories of natural, cultural, visitor, and community resources and the associated operational mitigations are described below.

#### **3.2.3.1 Wilderness Resources**

The Everglades National Park (NP) enabling legislation states that the lands “shall be, and are hereby, established, dedicated, and set apart as a public park for the benefit and enjoyment of the people... The said areas shall be permanently reserved as wilderness, and no development of the project or plan for the entertainment of visitors shall be undertaken which will interfere with the preservation intact of the unique flora and fauna and the essential primitive natural conditions now prevailing in the area (Title 16, USC Chapter 1).” In 1978, legislation was passed designating 1,296,500 acres of Everglades NP backcountry as wilderness, in accordance with the Wilderness Act of 1964. Approximately 90% of the Park contains the Marjory Stoneman Douglas Wilderness. The Wilderness Act provisions apply to all fire management activities undertaken on wilderness lands (Figure 9).

The Wilderness Act identifies four qualities of wilderness character that unify all wilderness areas. These four qualities are untrammeled, undeveloped, natural, outstanding opportunities for solitude or a primitive and unconfined type of recreation. The Wilderness Act prohibits certain uses in wilderness “...except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act....” The Minimum Requirements Decision Guide will be used to determine how fire management actions will be conducted using the minimum action necessary to maintain wilderness character using the least amount of an otherwise prohibited use. The Everglades National Park Wilderness Committee is responsible for reviewing and approving minimum tool analyses for all activities within the park’s designated Wilderness involving prohibited uses.

Wilderness character will be protected and preserved and all fire management operations will comply

with Wilderness legislation. The following mitigations will assist fire managers in achieving this objective.

Mitigations:

- All planned fire management operations that involve prohibited uses will be conducted in accordance with an approved Minimum Requirements Decision Guide (Appendix F).
- Use of specialized equipment, such as rolligons, in planned fire management operations will require preparation of a new Minimum Requirements Decision Guide, review by the Wilderness committee, and approval by the Superintendent prior to implementation.
- All unplanned fire response actions will be conducted using the minimum impact suppression tactics (MIST) (Appendix G) to minimize impacts to the Wilderness character of the Park.
- Fire Management will work with the Park to obtain and use the best available science to plan, review, and adjust fire management practices as needed, to mitigate impacts and enhance Wilderness character to the maximum extent feasible.
- Planned ignition treatments and science based fire management will be implemented to maintain and enhance the natural wilderness character of Everglades National Park.



# Everglades NP Wilderness

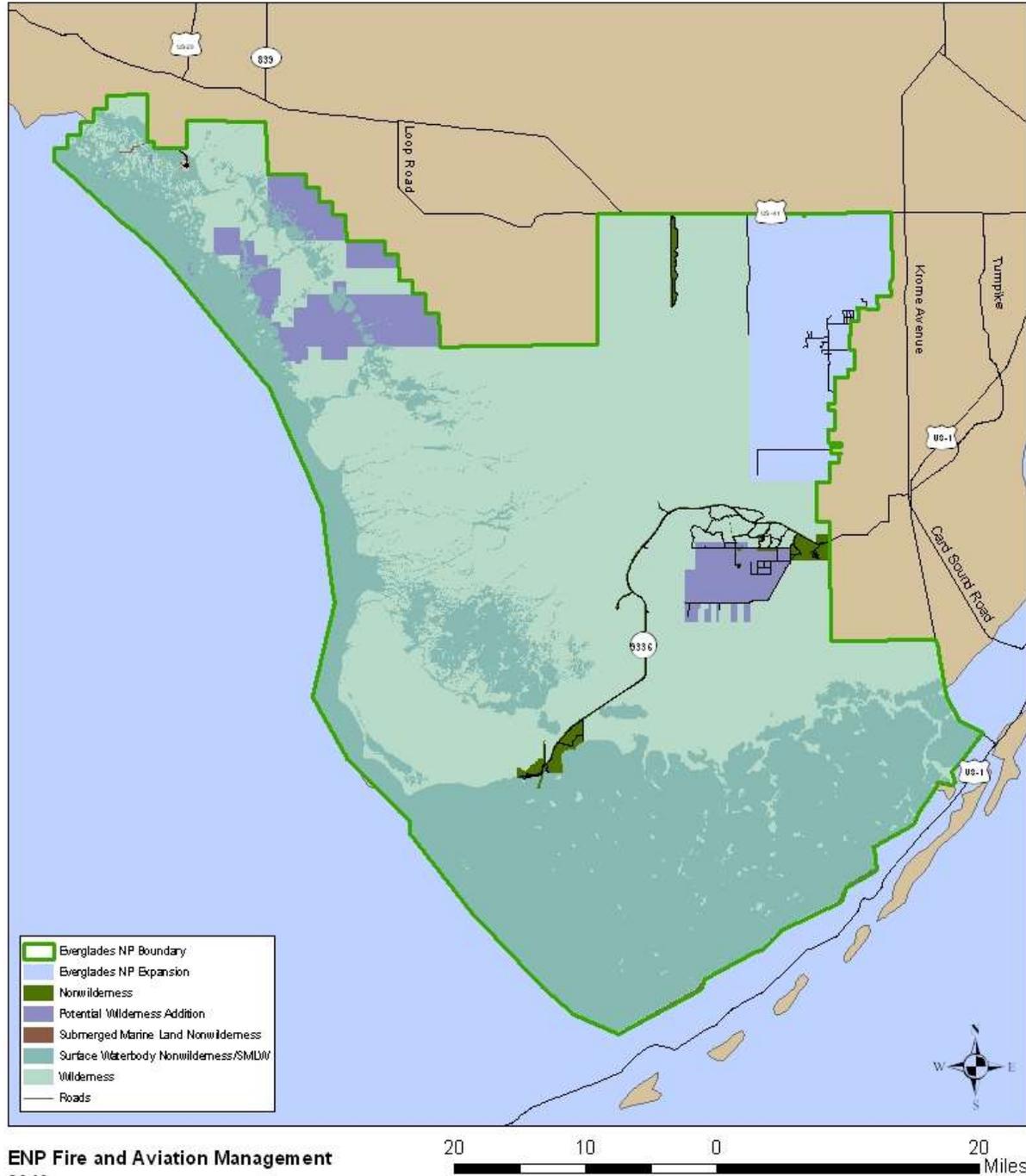


Figure 9. Wilderness Map

### 3.2.3.2 Archeological Cultural and Historic Resources

Everglades ENP manages hundreds of archeological sites, historic structures, ethnographic resources, and cultural landscapes, as well as the South Florida Collections Management Center with hundreds of thousands of museum objects, natural history specimens and archives. While comprehensive cultural resource inventories have not been completed for the park, surveys of high probability areas have revealed sites in 5 broad categories:

#### Archeological Sites (ASMIS Database)

- Earthen middens/Tree Islands (Shark River Archaeological District and East Everglades)
- Earthen mounds (Bear Lake Mounds)
- Shell middens/mangrove islands (10,000 Islands)
- Shell works /mangrove islands (10,000 Islands)
- Wet sites (Anhinga Trail)
- Coastal middens (Cape Sable)
- Historic Homesites (Flamingo-Cape Sable, 10,000 Islands, East Everglades)

#### Historic Structures (LCS Database)

- Nike HM-69 Missile Base (Dan Beard Center and Launch Area)
- Mission 66 Structures (Flamingo, Shark Valley Tower, Pine Island)
- Early Park Structures (Royal Palm Deer Feeding Station, Chekika Cabin)
- Hunt Camps (East Everglades)
- Historic Roads and Canals (Old Ingraham Highway, Tamiami Trail, Homestead Canal, East Cape Canal, Mud Lake Canal, Buttonwood Canal)
- Monuments and Memorials (Coe VC, Flamingo, Cape Sable)

#### Cultural Landscapes (CLI Database)

- Flamingo Mission 66 Cultural Landscape
- Nike HM-69 Missile Base Cultural Landscape
- Royal Palm Hammock Cultural Landscape

#### Ethnographic Resources

- Miccosukee Reserved Area and Osceola Camp
- East Everglades Hunt camps
- Airboat Association and Coopertown
- Fishing Areas in Flamingo and 10,000 Islands

#### Museum Collections

- Dan Beard Center
- Robertson Building
- Flamingo Visitor Center
- Park Headquarters

Many historic sites, including roads and canals and the former town sites of Flamingo, Cape Sable and Snake Bight have not been mapped and well documented, and there are large areas, such as the Pine

rocklands, that have not been surveyed at all. While the Pine rocklands have a low probability to contain cultural resources, historic sites such as sawmills, fence lines, and campsites could be present in these areas. In addition, submerged areas adjacent to tree islands and mangrove islands could also contain archaeological deposits. The park currently maintains an evolving archeological site probability model, the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H), which is utilized as a means for identifying areas considered likely and unlikely to contain currently unidentified archeological and historical resources.

Archeological sites, historical structures, cultural landscapes, and museum collections will be identified, protected, and preserved. The following mitigations will assist fire managers in achieving this objective.

Cultural resource mitigations:

- The park Cultural Resource Branch will provide Fire and Aviation Management the most current data of cultural and archeological sites.
- In consultation with the Cultural Resources Branch, Fire and Aviation Management will assure that appropriate actions are taken to protect cultural resource sites.
- Cultural resource protection and mitigations will be a consideration in every fire management action.
- The use of Minimum Impact Suppression Tactics (MIST) (Appendix G) will be employed at all times to minimize ground disturbance to any known or unknown cultural resource sites.
- Prior to the use of ground disturbing equipment or techniques in planned ignition treatment operations, the Cultural Resource Branch will be consulted and consultation with the State Historic Preservation Office (SHPO) and affiliated Tribes will be undertaken if necessary.
- Planned ignition treatments will be used to reduce fuels adjacent to cultural sites to provide protection from unwanted fire spread.
- During periods of high fire risk, fire management will implement repositioning of wildfire operational resources for the protection of cultural resources.
- Soils moisture levels will be monitored and considered in the planning and implementation of planned ignition treatments to ensure conditions are within the prescription parameters to prevent fire spread into high probability cultural sites including tree islands and hammocks.
- Fire management will request resource advisor or technical specialist assistance as required for planning and implementing fire management activities related to cultural resource sites.
- Consultation with the Miccosukee and Seminole Tribes will occur to ensure that Tribal cultural values are protected.
- Fire Management will work with the Cultural Resource Branch to obtain and use the best available science to plan, review and adjust fire management practices as needed to mitigate impacts to cultural resources.
- Fire Management will work with the Cultural Resource Branch to utilize the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H) in fire management planning.
- Fire Management will work with the Cultural Resource Division to identify currently unidentified archeological and historical resources threatened by bum activities. Survey strategies will be designed to both identify and protect resources threatened by prescribed bums and to further refine and modify the GIS Model for Archeological Site Prediction and Survey Planning at EVER (Appendix H).
- With regard to Fire Management Planning, in the vast majority of cases, planned ignitions are

expected to occur only in areas (Pine Rockland, Saw Grass Prairie, Muhly Prairie, and Coastal Prairie) which can be characterized as generally impacting only low or very low archeological and historical site probability areas since the currently identified moderate probability zones (Mixed Mangroves and Mud areas) and the high probability zones (Subtropical Hardwood Hammocks and Bayheads) (see Appendix H) are not normally affected by planned ignitions. Since only low to very low probability areas are normally subjected to planned ignitions, and are unlikely to result in serious harm to below ground archeological resources when burned within prescription - i.e. within controlled low intensity and low soil temperature conditions (Sturdevant 2009), it is the potential loss of above ground flammable resources that might exist at unidentified nineteenth to twentieth century historic sites that is of most concern. For this reason, pedestrian survey (under the guidance of the park cultural resources branch or regional archeological partners) will be conducted pre-burn in order to identify above-ground fire-threatened resources in burn units in areas described in the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H) as low or very low archeological and historical site probability areas.

- In the unlikely event that a planned ignition extends into areas other than low or very low archeological and historical site probability areas, the Cultural Resource Branch will be consulted for pre-burn survey recommendations and consultation with the State Historic Preservation Office (SHPO) and affiliated Tribes will be undertaken.
- When appropriate resources are available and conditions identified in the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H) are met, the park and/or regional cultural resource partners will conduct metal detecting and subsurface archeological survey in specified low or very low archeological and historical site probability areas after selected planned ignition treatments to document sites and fire effects on them and/or confirm/further refine the probability model included within the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H). The strategy for these opportunistic surveys is described in the *GIS Model for Archeological Site Prediction and Survey Planning at EVER* (Appendix H). The results of these surveys will be shared with the State Historic Preservation Office (SHPO).

### 3.2.3.3 Natural Resources

Fire has the potential to impact most of the terrestrial resources within the Park along with air and water quality. This plan identifies those known natural resources which may have sensitivity to the timing, duration and amount of fire as well as operational mitigations.

#### Soils

The substrate of the Everglades is flat limestone with peat and marl accumulated on the limestone in the long and short hydroperiod prairies (FNAI 2009). The pine rocklands substrate is limestone with small accumulations of soil that are present in depressions and crevices in the rock surface (FNAI 2009). The tree islands and hammocks exist on slightly higher elevation areas and have a larger amount of organic soil development, organic litter, and duff layer. Although not a soil, periphyton, comprised of algae, bacteria and other associated microorganisms, is also an important component of the Everglades substrate.

Severe fires have the potential to consume organic soils in the prairies, tree islands and hammocks and

impact the widespread marl soils and periphyton crust. This effect is most likely to occur from unplanned wildfire during periods of drought when soil moistures are low and the periphyton is dry. Under moderate burning conditions, little effect is expected on the peat and marl soils, and periphyton of the fire adapted prairies. Soft marl soils may also be impacted by off road vehicles used during fire management operations. Fire managers will incorporate new information as it becomes available into wildland fire management planning and implementation and response strategies.

The integrity of soils in the park will be protected and preserved to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

Mitigations:

- The use of Minimum Impact Suppression Tactics (MIST) (Appendix G) will be employed at all times to minimize substrate and soil disturbance.
- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammocks and tree islands to provide protection from unwanted fire spread.
- Soils moisture levels will be monitored and considered in the planning and implementation of planned ignition treatments to ensure conditions are within the prescription parameters to prevent fire spread into the organic soils of tree islands and hammocks.
- Planned ignition treatments will be used to reduce fuel loading, thereby reducing subsequent fire intensity and severity to lessen the effect of fire on organic soil and periphyton substrates.
- Specialized equipment, such as rolligons, will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated, and not without prior approval from the superintendent. All off road vehicles will only be used in instances where travel by other means is prohibitive.
- Under drought conditions when organic fires in sloughs are possible, a full suppression management strategy will be used.
- Fire management will support research and incorporate new information regarding fire effects on soils and organic substrates in ENP.
- Fire Management will work with the South Florida Natural Resources Center (SFNRC) and Cultural Resource Branch to obtain and use the best available science to plan, review, and adjust fire management practices as needed, to mitigate impacts to soils.
- Fire Management will be conducted in coordination with restoration projects as they are implemented.

### **Water resources**

ENP lies within the larger Kissimmee-Lake Okeechobee-Everglades Watershed. This watershed is the dominant freshwater supply for the surrounding metropolitan and populated areas. Hydrology has been altered as a result of regional development and water quality has declined in some areas due to agricultural and urban runoff (NPS 2006). Everglades NP waters are low-nutrient, high-quality and currently designated as Outstanding Florida Waters. There is interplay of surface water and ground water resources in the Park. The groundwater resources are located in underground aquifers that are made mostly of limestone and other carbonate rocks. In the wetter months, the surface water flow recharges aquifers near the surface. During the dry winter months, superficial aquifers supply ground water to support streamflow and provide moisture for wetlands and marsh habitats. The marine habitats of ENP are shallow waters influenced by the freshwater inflows from the north and generally have soft sediment bottoms (NPS 2006).

Wildland fire has the potential to affect water quality by increasing levels of nutrients and sediments in the water. Severe fires that are most likely to occur from unplanned wildfire during periods of drought would have the potential to cause the greatest impacts. There are also several operational activities that may have impacts on the quality of water in the everglades, including the use of fire retardant and/or Class A foam in fire suppression activities and the use of fuels in pumps and ignition devices. Water drops may also have impacts if the quality of water being used is of a lower quality than that in the system.

Water resources within the Park will be protected and preserved to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

Mitigations:

- Fire retardant will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated without the use of retardant. Additional approval from the superintendent will be required prior to the use of retardant.
- Specialized equipment, such as rolligons, will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated without the use of this equipment. Additional approval from the superintendent will be required prior to the use of specialized equipment, such as rolligons.
- Class A foam (surfactant) will only be used to protect life and property. Everglades fire management engines will be flushed to eliminate residual foam in pump equipment that will be used in park fire operations.
- The water tanks of air tankers will be rinsed prior to use in the Park to eliminate residual substances being transferred through the water being dropped.
- Solution holes will not be used as a water source for helicopter dip sites.
- During fire management operations, funnels and spouts will be used when dispensing fuel and/or oil, spill containment berms will be used during portable pump operations, and containers will be filled to the appropriate level to prevent overflow and spills.
- Fire Management will work with the South Florida Natural Resources Center (SFNRC) to obtain and use the best available science to plan, review and adjust fire management practices as needed to mitigate impacts to water resources.
- Fire Management will be conducted in coordination with restoration projects as they are implemented.

**Rare and important vegetation communities**

Everglades NP is home to a number of unique and important vegetation communities. The pine rockland ecosystem is a globally imperiled ecosystem. It is extremely limited in distribution with the largest continuous community in the United States located in the Long Pine Key portion of ENP (FNAI 2009). The tropical hardwood hammocks and tree islands contain a number of rare plant and animal species and are important habitat for wading and migratory birds. Everglades NP is a unique subtropical wetland that is designated as a Wetland of International Importance.

In the pine rocklands, wildland fire prevents habitat loss through succession to hardwood hammock, sustains community structure, prevents succession of woody species, and maintains the high herbaceous diversity found in the pine rockland vegetation community (Loope and Dunevitz 1981). Fire

is also an important component of the wetland prairie ecosystems of ENP. Hardwood hammocks and tree islands are fire sensitive communities that historically experienced very infrequent fire. Severe fires that are most likely to occur from unplanned wildfire during periods of drought would have the potential to cause the greatest impacts to fire sensitive hammocks and tree islands. The pine rockland community is maintained by fire; however severe fires also have potential to impact this community as well as the wetland prairies. Impacts to wetlands soils have been considered and included in mitigations for Park soils.

Rare and important vegetation communities will be protected and preserved to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

**Mitigations:**

- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammocks and tree islands to provide protection from unwanted fire spread.
- Soils moisture levels will be monitored and considered in the planning and implementation of prescribed fire treatments to ensure conditions are within the prescription parameters to prevent fire spread into tree islands and hammocks.
- Planned ignition treatments will be implemented to restore and maintain the pine rockland and wetland prairie ecosystems to benefit wildlife and plant species associated with these habitats.
- SFNRC will provide Fire Management the most current information and data regarding rare and important vegetation communities.
- Fire effects monitoring in the pine rockland and prairie ecosystems will continue to inform fire managers and support adaptive management in fire operations.
- Fire Management will work with the South Florida Natural Resources Center (SFNRC) to obtain and use the best available science to plan, review and adjust fire management practices as needed to help maintain and protect rare and important vegetation communities.

**Species of special concern and associated habitat**

Everglades National Park (NP) provides sanctuary for more than 20 federally listed and 270 state-listed rare, threatened, and endangered species. In addition, there are a number of species of special concern, including reintroduced and rare species. Additional information and mitigations regarding selected federally listed species can be found in the monitoring plan (Appendix I). The Biological Opinion issued by the U.S. FWS (appendix J) also includes mitigations for federally listed species that must be complied with in prescribed fire and wildland fire activities.

Wildland fire performs beneficial ecosystem functions for communities that are maintained by fire. Wildland fire thereby benefits wildlife associated with these habitats. Species that are found in fire sensitive habitats may be impacted by fires that are most likely to occur from unplanned wildfire during periods of drought. Severe fires also have the potential to impact wildlife associated with fire adapted habitats.

Species of special concern and associated habitats will be protected and preserved to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

**Mitigations:**

- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood

hammocks tree islands and other fire-sensitive habitats, to provide wildlife protection from unwanted fire spread.

- Soils moisture levels will be monitored and considered in the planning and implementation of planned ignition treatments to ensure conditions are within the prescription parameters to prevent fire spread into tree islands and hammocks.
- Planned ignition treatments will be implemented to restore and maintain the pine rockland and wetland prairie ecosystems to benefit wildlife and plant species associated with these habitats.
- Fire effects monitoring in the pine rockland and prairie ecosystems will continue to inform fire managers and support adaptive management in fire operations.
- Planned ignition treatments will be implemented with the goal of creating a mosaic pattern of burned and unburned habitat to provide some on-site refugia for imperiled species and facilitate recolonization of sites following fire.
- NPS will use planned ignition treatments of varying intensity and intervals to the extent practicable using an adaptive management approach.
- Planned ignition treatments will be implemented using firing patterns that provide escape routes for wildlife.
- Where possible the use of mechanical or herbicide treatments in combination with planned ignition treatments will be minimized or avoided. In some cases the combined use of fire and herbicide is the most effective treatment.
- Fire Management personnel will be educated to recognize listed species and where those species occur in a burn unit to the extent practicable. Vehicle and equipment operators will be notified to avoid impacts to listed species. If encountered, species will be avoided and allowed to leave the immediate area before operations are resumed.
- Fire management personnel will, to the extent practicable, record the locations of any covered species and nests, dens, cover sites or tracks. This information will be made available to the USFWS upon request.
- If dead, sick or injured listed species are encountered, fire management will contact the South Florida Ecological Service Field Office and the ENP Biological Resources Branch Chief.
- When constructing firebreaks, boundary fire breaks will be limited to up to 30 ft. maximum width and interior firebreaks will be limited to up to 20 ft. maximum width. Scattering debris on listed species or their nests, dens or cover will be avoided.
- NPS will construct temporary fuel breaks, if needed, using methods that have the least likelihood of creating soil disturbance when appropriate.
- Fire breaks or staging areas will not be placed through known populations of listed plant species for planned ignition activities. Occasionally, listed plants occur on or adjacent to hiking trails, administrative roads, or similar features, and hiking, administrative uses, including maintaining firebreaks, may result in impacts to individuals.
- SFNRC will provide Fire Management the most current information and data regarding species of special concern.
- Fire Management will work with the South Florida Natural Resources Center (SFNRC) and the U.S. Fish and Wildlife Service to obtain and use the best available science to plan, review, and adjust fire management practices as needed to help maintain or expand the population size or numbers of populations of species of special concern.
- The Endangered Species Act of 1973 requires an evaluation of the effects of proposed actions on all federally listed species and designated critical habitat with potential to be affected by the

action. In accordance with section 7 of the Endangered Species Act, the U.S. FWS has issued a Biological Opinion for prescribed fire and wildland fire management activities described in the FMP (appendix J). This includes Reasonable and Prudent Measures considered necessary and appropriate to minimize the take, along with Terms and Conditions that must be complied with, to implement the reasonable and prudent measures.

- Fire Management will adhere to the Terms and Conditions identified to implement the reasonable and prudent measures listed in the Biological Opinion for the Fire Management Plan (appendix J).

### Exotic Plants

While not a management value, exotic plant invasions can threaten the management values of ENP and affect fire management practices. ENP has a program for managing invasive exotic plant species, the Exotic Vegetation Management Program (EVMP). Most management efforts are concentrated on four plant species: Melaleuca (*Melaleuca quinquenervia*), Australian pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolius*), and Old World climbing fern (*Lygodium microphyllum*). Most of the Melaleuca and Australian pine in the park are in the East Everglades addition (FMU 4). Brazilian pepper is widely distributed in the park, with concentrations in the Hole-in-the-Donut (HID), along the western side of the park, and in a band from the east end of the HID to the eastern park boundary. Old World climbing fern is concentrated in coastal prairies along the western side of the park, with small outliers in a few hammocks. In addition to these four major exotic plants, there are more than 200 other exotic plant species found within the park. Differing techniques and levels of management are used for these species.

Under some circumstances, fire can contribute to the spread and establishment of particular non-native invasive plants. Melaleuca (*Melaleuca quinquenervia*) populations for example, may thrive and invade new areas following fire. Fire exclusion, however may also contribute to the reduction of native species and increase of non-native fire adapted species. Brazilian pepper (*Schinus terebinthifolius*) may invade the pine rockland habitat in the absence of fire and develop dense stands that suppress native understory grasses, resulting in lower fine fuel loads, thus altering the fire regime of the native plant community (Zouhar et al. 2008).

Exotic plant populations will be considered when managing fire to reduce the presence and spread of exotic species invasions through fire management actions to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

#### Mitigations

- EVMP will provide Fire Management with the most current information and data regarding exotic species.
- Fire Management vehicles and equipment would be washed to prevent increased spread of exotics as a result of fire management actions.
- Untreated stands of Melaleuca will not be treated with planned ignition treatments without prior approval from the exotics plant manager.
- In consultation with SFNRC, Fire Management will use planned ignition treatments as a tool to treat, manage, and reduce the presence and spread of exotic species invasions in the park to the maximum extent feasible.
- Fire Management will work with the South Florida Natural Resources Center (SFNRC) to obtain

and use the best available science to plan, review and adjust fire management practices as needed to manage and reduce the spread of exotic plant populations.

- Fire Management will be conducted in coordination with restoration projects as they are implemented.

### **3.2.3.4 Wildland Urban Interface (WUI)**

The wildland urban interface (WUI) is a topic of special concern under Federal Fire Policy. Communities at risk from wildfires have been identified by local, state, and federal fire management agencies. Much of the fuel management funding appropriated by Congress is intended to be used to reduce the threat of wildland fire to these communities. ENP has defined a WUI zone for fire management planning and protection, for at-risk residential areas and communities.

Everglades NP contains a number of WUI structures within the park and several surrounding communities, including a nationally designated community at risk. Residential houses are located within the park in Pine Island, and Flamingo. Residential communities, including the Miccosukee Reserved Area and greater Miccosukee Community which is a nationally designated WUI community at risk, concessioners and businesses (airboat tours, nurseries, Shark Valley, Flamingo store and tours), and the Everglades correctional institute are located within or adjacent to the Park boundary. In addition to residential communities, several visitor and education facilities, and offices are located throughout the Park.

A number of monitoring and research stations, access boardwalks, and campsites are scattered throughout the park (located in prairies, mangroves, and other habitats). These stations record valuable data for Everglades restoration and contain expensive high tech sensitive equipment.

Transportation corridors within and adjacent to the Park include park roads, US Hwy 41, US Highway 1, and Krome Avenue. Public health can be impaired by long-lasting and dense amounts of smoke. Local economies can experience severe financial losses when a wildland fire causes road and area closures, as well recreational losses.

The objectives of the fire management program related to WUI protection include:

- Restore ecosystem structure and fuel loads to more natural conditions, so the potential for intense fire is reduced and to make communities safer to defend from wildfires.
- Planned ignition or mechanical treatments in adjacent fuels can be performed to reduce the threat of an unplanned ignition occurring in these areas.
- Areas that have been deemed WUI are kept on a shorter fire return interval cycle (3 year cycle for pine rocklands and prairies).

The following mitigations will assist fire managers in achieving these objectives.

#### **Mitigations**

- Conduct planned ignition treatments to reduce hazard fuel accumulation.
- Notify and update residents and employees of proposed and/or ongoing operations.
- Respond to fires in the Mutual Response Zone (Appendix C).
- Reference Pre-Attack plan to identify key items to be considered in initial attack (Appendix K).
- Monitor urban expansion to identify new communities at risk.
- Maintaining the necessary staffing, equipment, training, and qualifications in accordance with National Wildfire Coordinating Group (NWCG) standards and National Park Service policy.

- Manage an efficient wildland fire preparedness organization according to plans, protocols and guidelines to prevent detect and take effective management actions on all wildland fires.
- Fire management will consider the safety of the public, park personnel, and fire crews as the highest priority for all fire management activities.
- Park staff will be notified of all planned and unplanned fire management activities with the potential to impact park operations as appropriate.

### **3.2.3.5 Visitor Use and Experience**

About 1.1 million visitors explore ENP each year. The majority of these people visit during the dry winter months when the weather is cooler, insects are fewer, and wildlife viewing opportunities are optimal. The majority of visitors arrive in private vehicles, although tours, special interest groups, and students may arrive by bus. Additionally, vessels enter park waters from the Keys or the west coast of the state. The marina located at Flamingo is the only in-park facility to accommodate these users. Recreational opportunities for which the park is known include wildlife viewing, walking and hiking, bicycling, horseback riding, fishing, canoeing or kayaking, boating, camping (both frontcountry and wilderness), photography, and attending ranger or concessioner-led interpretive programs. Additionally, each year, approximately 15,000 students, teachers, and chaperones come to the park for environmental education experiences.

Fire management activities can affect visitor use and experience through altering visibility, road and areas closures, improving wildlife species habitat and viewing, and providing educational and interpretative opportunities. Visitor use and experience impacts from smoke have been considered and included in mitigations for air quality and smoke management. Impacts to visitor use infrastructure has been considered and included in mitigations for the Park's WUI.

Impacts to visitor use and experience will be prevented and educational and interpretative opportunities provided for park visitors to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

Mitigations:

- Fire Management will consider the safety of public, personnel, and fire crews as the highest priority for all fire management activities.
- Reconnaissance will be conducted prior to planned fire operations to verify that no backcountry users, campers, or visitors will be adversely impacted.
- Advanced notifications of planned ignition treatments will be provided to park interpretive staff to have at visitor access points and permitting stations.
- Fire management will coordinate with the park's interpretive staff to provide educational and interpretative opportunities regarding fire management activities and fire ecology.

### **3.2.3.6 Air Quality and Smoke Management**

#### **Air Quality**

The 1970 Clean Air Act passed by congress, most recently amended in 1990, defines responsibilities for protecting and improving the nation's air quality. Under the Clean Air Act, Prevention of Significant

Deterioration, sections 160-164, Everglades National Park (NP) has been designated a "Class I" area, meaning that the area has the maximum air quality protection afforded to any area by law. Federal land managers have a responsibility to protect the air quality and related values within Class I areas. Requirements of the Clean Air Act include obtaining necessary burn authorizations for planned ignition treatments, complying with the National Ambient Air Quality Standards (NAAQS) both inside and outside unit boundaries, and protecting visibility in congressionally-mandated Class I unit areas. Visibility and clean air are primary natural resource values in all NPS units. Protection of these resources are given full consideration in fire management planning and operations.

Fire management activities and wildland fire incidents have the potential to affect visibility and air quality within and adjacent to ENP. Air quality is monitored as part of the National Park Service's national program. Parameters measured include ozone, wind speed, visibility, and ultraviolet radiation. The air quality monitoring program also includes an atmospheric deposition sampler that is monitored weekly in cooperation with the U.S. Environmental Protection Agency (NPS 2010). ENP participates in several air quality monitoring programs (NPS 2006), and Fire and Aviation Management coordinate planned ignition treatments with the Florida Forest Service (previously Florida Division of Forestry) to minimize air quality effects and ensure compliance with state air quality regulations.

The Florida Forest Service issues burn authorizations or permits once they determine that air quality and fire danger are favorable for safe burning.

### **Smoke Management**

Smoke management is paramount to protecting and preserving air quality and protecting the health and safety of employees and the public in and around ENP. Smoke management is an integral part of the burn authorizations process. The Florida Department of Environmental Protection (DEP) has overall air quality regulatory authority within the state and has transferred smoke management regulation and authorizations to the Florida Forest Service (FFS). The FFS manages smoke according to the requirements set forth in the Florida Administrative Code 51-2.06, (<http://flame.fl-dof.com/Env/law.html>) which covers agricultural and silvicultural fires. The code requires, among other things, that all planned ignition treatments have a burn authorization and pass through a smoke screening process.

A number of smoke sensitive areas exist both within and outside the park. Internal areas include park housing communities, administrative areas, offices, and visitor use areas. External receptors include the areas along the East Everglades Expansion boundary, the city of Homestead, Homestead general airport, the city of Miami and the greater Miami area and other settled areas adjacent to the Park. The Miccosukee Reserved Area and greater Miccosukee Community and areas to the northwest of the park including Everglades City are also potential smoke receptors. Smoke impacts and visibility impairments along transportation corridors both within and outside the Park are a concern regarding safety of firefighters, park employees and the public. Health effects on employees, visitors and local residents are also considered regarding smoke impacts and impacts to air quality.

Air quality will be protected and preserved, and smoke management will be considered to prevent and/or reduce impacts from fire management actions to the degree practicable. The following mitigations will assist fire managers in achieving this objective.

#### Mitigations:

- Burn authorizations or permits would be obtained from the Florida Forest Service once they determine that air quality and fire danger are favorable for safe burning.
- Day of burn weather forecasts and fuel types will be used to generate plume trajectory maps.
- Forecasted plume trajectories must not impact smoke sensitive receptors in order for burn permits to be issued. Smoke management maps shall be printed and included with the permanent fire record.
- Smoke screening tools will be used to determine smoke vector paths for planned ignition treatments and unplanned incidents as appropriate.
- Smoke dispersal will be monitored by Fire Effects Monitors (FEMO) during planned ignition treatments and unplanned incidents as appropriate.
- Caution signs will be placed where smoke may impact transportation corridors.
- Traffic control measures will be implemented as appropriate by fire management or requested personnel.
- Advanced notifications of planned ignition treatments will be provided to all park staff and park interpretative staff to have at visitor access points and permitting stations.

### **3.3 FIRE MANAGEMENT UNITS**

The park is divided into four fire management units: Coastal Prairies (FMU 1); River of Grass (FMU 2); Pine Rocklands (FMU 3); and East Everglades (FMU 4) (Figure 10).



## Fire Management Units of Everglades NP



ENP Fire and Aviation Management  
2011

20 10 0 20 Miles

Figure 10. Fire Management Units

### **3.3.1. Coastal Prairies (FMU 1)**

FMU 1 is primarily the coastal portion of the park (Figure 11). Fire-dependent acreage is estimated at 99,371 acres, out of approximately 106,964 terrestrial acres within the unit. In most of FMU 1, mangroves surround coastal prairies creating islands of discreet pockets of fire-adapted vegetation. Lightning is frequent in this region igniting fires when fuel conditions are receptive. Big Cypress National Preserve shares a common border along the stair steps region of this FMU. Within FMU 1 natural processes shall be allowed to function wherever and whenever possible.

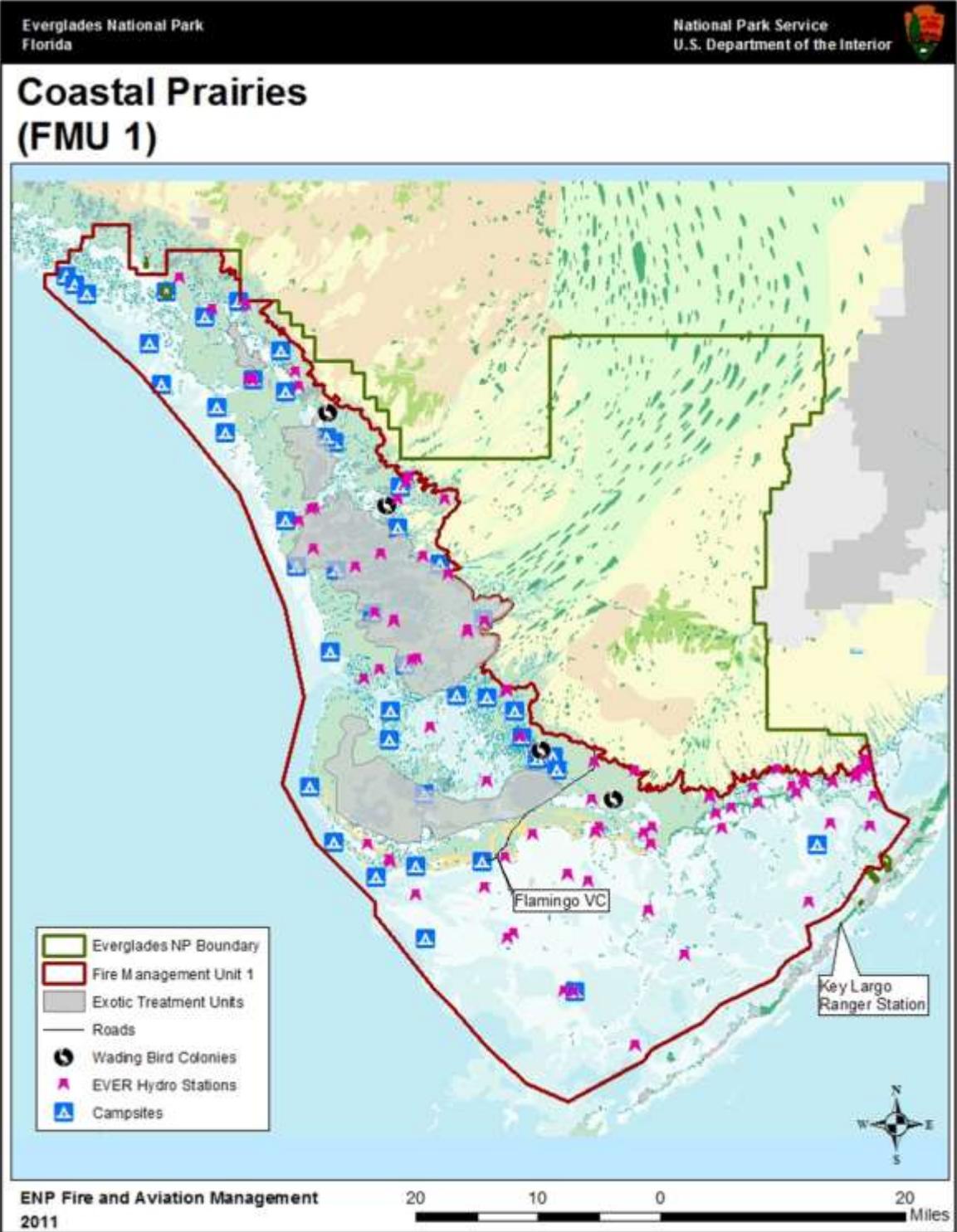


Figure 11. Coastal Prairies (FMU 1)

Management values displayed in the above map are a representation of the current conditions. Management values will be updated annually during the Fire Management Plan review and update.

### 3.3.1.1 Management Considerations and Constraints

- The FMU is in a Class I airshed but smoke impacts to the overall airshed are negligible.
- Fire operations in designated wilderness will be managed in accordance with the minimum tool analysis (Appendix F).
- The spread of exotic species will be limited through conducting fire operations in support of the Exotic Vegetation Management Program (EVMP).
- In the event that research identifies the need, planned ignitions could be used to achieve future resource management objectives.
- Recommendations from resource specialists will be considered during planning and implementation of fire management activities.
- Threatened and endangered species, rare habitats, species of special concern, park infrastructure, and archeological and cultural resources require protection.
- In addition to the prescribed fire notification process for the park and cooperators, advanced notification of planned fire operations will be provided at visitor access points, permitting stations, visitor centers, and/or entrance stations (based on fire locations).
- Prior to planned ignitions, reconnaissance will be conducted to verify that no backcountry users, campers, or visitors would be adversely impacted.
- A burn authorization will be obtained from the Florida Forest Service for each planned ignition.
- Any fires that span the Big Cypress National Preserve boundary will receive the appropriate level of management and approval from both Big Cypress National Preserve and Everglades National Park.
- Park and private infrastructure and transportation corridors represent an additional management consideration.
- During wood stork nesting season, bucket operations are prohibited at Paurotis Pond.

### 3.3.1.2 Fire Management Objectives

- Planned ignition treatments will be used to reduce hazardous fuels to protect park values.
- Planned ignition treatments will be used to create mosaic patterns to break up the fuel continuity, maintain habitat diversity and to provide species refugia.
- Planned ignition treatments will be used to help manage the spread of Old World climbing fern (*Lygodium microphyllum*) and inhibit the encroachment of Brazilian pepper (*Schinus terebinthifolius*).
- Planned ignition treatments will be used in conjunction with chemical and mechanical treatments to manage exotic vegetation populations identified by the Exotic Vegetation Management Program (EVMP).
- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammock, tree islands, and cultural resource sites to provide protection from unwanted fire spread.
- Fires will be managed using the full range of management strategies to protect, restore, or maintain resources in the park.
- Unplanned ignitions will be managed in order to protect life and property and whenever possible achieve resource benefits consistent with the objectives identified for this FMU.
- Unplanned ignitions will be evaluated using a decision support process (WFDSS) that examines the full range of management responses under the following conditions; strategies and tactics will consider firefighter and public safety first, fire cause, current and predicted weather, current and potential fire behavior and effects, values to be protected, sensitive tree island and

hammocks, archeological and/or cultural resources, proximity to WUI areas & Park infrastructure, untreated stands of Melaleuca (*Melaleuca quinquenervia*), and Australian pine (*Casuarina equisetifolia*), resource availability, and cost effectiveness.

- Use science based fire management to maintain and enhance the wilderness character of the Marjory Stoneman Douglas Wilderness.

### 3.3.1.3 Major Vegetation Types/ Fuel Characteristics

#### Vegetation

The coastal prairie vegetation community is the primary fire-adapted community within this FMU. See section 3.1.2.1 for more information on the coastal prairie vegetation community. Exotic vegetation is a serious management concern in FMU 1. The fire program coordinates with the Exotic Vegetation Management Program (EVMP) to manage Old World climbing fern (*Lygodium microphyllum*). Lygodium was first discovered in ENP, in 1999, in the coastal prairie communities of FMU 1. Today this FMU has the largest coverage of Lygodium in ENP, and it is conservatively estimated at 1,851 gross infested acres (2010 Exotics SRF). Successful management of this exotic plant will require the use of fire. Today Lygodium has affected both the fire-adapted coastal prairie communities and the surrounding non fire-adapted mangrove and woody communities of this FMU. Other exotic vegetation present in the areas includes Brazilian pepper and in limited areas, Australian pine.

#### Fuel Characteristics

FMU 1 is comprised of GR 5, GR 6, GR 8, and GR 9 fire behavior fuel models. See section 3.1.4 Fire Behavior for a more detailed description.

### 3.3.1.4 Values

The special values in FMU 1 include Wilderness character, wading bird colonies, backcountry campsites, threatened and endangered plant species, research sites and structures, and cultural sites. Several of these resources are located in mangrove areas that are rarely impacted by fire. Federally listed species of particular management concern include the wood stork, eastern indigo snake, and listed plants. Fire managers will coordinate with the USFWS regarding all federally listed species. Fire management has specific mitigations in place to prevent to the degree practicable, impacts to these values. See section 3.2.3 for further descriptions of management values and associated mitigations.

### 3.3.2 River of Grass (FMU 2)

At 390,521 acres in size and an estimated 321,641 fire-adapted acres, FMU 2 is the largest fire management unit in the park (Figure 12). Big Cypress National Preserve shares a common border and fires in FMU 2 have the potential to spread from Big Cypress into FMU 2 and from FMU 2 into Big Cypress. In FMU 2 wet and dry hydrological patterns affect fire spread, fuel continuity, and fuel availability. As water levels rise, the continuity and availability of flammable fuels decrease. Thus, hydrology of this unit has a significant effect on the size, intensity, and duration of fires within the Everglades. Under extremely dry conditions however, fires will burn across areas that would normally act as natural fuel breaks under wetter conditions. Within this FMU, natural processes shall be allowed to function wherever and whenever possible.

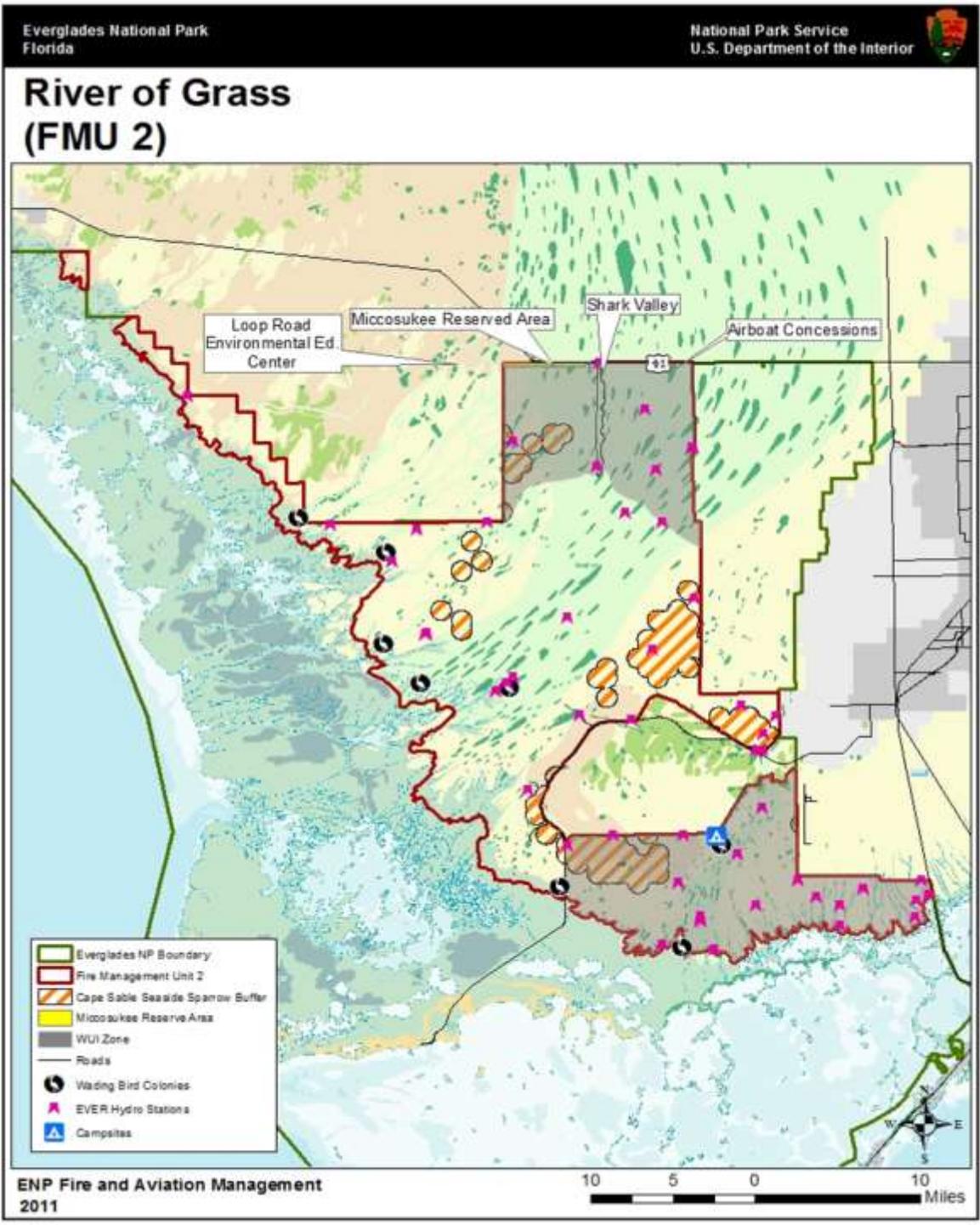


Figure 12. River of Grass (FMU 2) Management values displayed in the above map are a representation of the current conditions. Management values will be updated annually during the FMP review and update.

### 3.3.2.1 Management Considerations and Constraints

- The FMU is in a Class I airshed but smoke impacts to the overall airshed are negligible.
- Fire operations in designated wilderness will be managed in accordance with the minimum tool analysis (Appendix F).
- The spread of exotic species will be limited through conducting fire operations in support of the Exotic Vegetation Management Program (EVMP).
- In the event that research identifies the need, planned ignitions could be used to achieve future resource management objectives.
- Recommendations from resource specialists will be considered during planning and implementation of fire management activities.
- Threatened and endangered species, rare habitats, species of special concern, park infrastructure, and archeological and cultural resources will require protection.
- In addition to the prescribed fire notification process for the park and cooperators, advanced notification of planned fire operations will be provided at visitor access points, permitting stations, visitor centers, and/or entrance stations (based on fire locations).
- Prior to planned ignitions, reconnaissance will be conducted to verify that that no backcountry users, campers, or visitors would be adversely impacted.
- A burn authorization will be obtained from the Florida Forest Service for each planned ignition treatment.
- Any fires that span the Big Cypress National Preserve boundary will receive the appropriate level of management approval from both Big Cypress National Preserve and Everglades National Park.
- Park and private infrastructure and transportation corridors represent an additional management consideration.
- When safe, fire management strategies will require actions to exclude fire from untreated stands of melaleuca and Australian pine.
- During wood stork nesting season, bucket operations are prohibited at Paurotis Pond.

### 3.3.2.2 Fire Management Objectives

- Planned ignition treatments will be used to reduce hazardous fuels to protect park values.
- Planned ignition treatments will be used to create mosaic patterns to break up the fuel continuity, maintain habitat diversity and to provide species refugia.
- Planned ignition treatments will be used to help manage the spread of Old World climbing fern (*Lygodium microphyllum*) and inhibit the encroachment of Brazilian pepper (*Schinus terebinthifolius*).
- Planned ignition treatments will be used in conjunction with chemical and mechanical treatments to manage exotic vegetation populations identified by the Exotic Vegetation Management Program (EVMP).
- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammocks, tree islands, and cultural resource sites to provide protection from unwanted fire spread.
- Fires will be managed using the full range of management strategies to protect, restore, or maintain resources in the park.
- Unplanned ignitions will be managed in order to protect life and property and whenever possible achieve resource benefits consistent with the objectives identified for this FMU.

- Unplanned ignitions will be evaluated using a decision support process (WFDSS) that examines the full range of management responses under the following conditions; strategies and tactics will consider firefighter and public safety first, fire cause, current and predicted weather, current and potential fire behavior and effects, values to be protected, sensitive tree island and hammocks, archeological and/or cultural resources, proximity to WUI areas & Park infrastructure, untreated stands of Melaleuca (*Melaleuca quinquenervia*), and Australian pine (*Casuarina equisetifolia*), resource availability, and cost effectiveness.
- Ensure all fire management activities comply with the annual Cape Sable seaside sparrow Fire Management Strategy.
- Use science based fire management to maintain and enhance the wilderness character of the Marjory Stoneman Douglas Wilderness.

### 3.3.2.3 Major Vegetation Types/Fuel Characteristics

#### Vegetation

The fire-adapted vegetation communities of FMU 2 consist of sawgrass (*Cladium jamaicense*) prairies and marl prairies. Associated habitats include tree islands, fresh water sloughs, and emergent plant communities. FMU 2 also contains cypress and small scattered pine islands. See section 3.1.2.1 for additional information on FMU 2 vegetation communities. Exotic vegetation present in the area includes Brazilian pepper, Melaleuca, and Australian pine.

#### Fuel Characteristics

FMU 2 is comprised of GR 5, GR 6, GR 8, and GR 9 grass fire behavior fuel models and TL 2 (tropical hardwood hammocks) fuel model. See section 3.1.4 Fire Behavior for a more detailed description.

### 3.3.2.4 Values

The special values in FMU 2 include Wilderness character, threatened and endangered species and species of special concern, wading and migrating bird populations, unique and important habitats including wetlands and tree islands, WUI, businesses and park concessions, visitor use and experience, research sites, and cultural sites.

Federally listed species of particular management concern include the Cape Sable seaside sparrow (CSSS), Everglade snail kite, wood stork, Florida panther, eastern indigo snake, and listed plants. Fire managers will coordinate with the USFWS regarding all federally listed species as well as adhere to the Cape Sable seaside sparrow fire management strategy (Appendix E).

The WUI values within and adjacent to FMU 2 consist of the Miccosukee Reserved Area and greater Miccosukee Community, a nationally designated WUI community at risk, Shark Valley tram tour concessions and visitor center, airboat tour and restaurant businesses, U.S. Highway 41, park campsites, and Loop Road Environmental Education Center within Big Cypress National Preserve. Fire management has specific mitigations in place to prevent to the degree practicable, impacts to these values. See section 3.2.3 for further descriptions of management values and associated mitigations.

### 3.3.3 Pine rocklands (FMU 3)

Fire Management Unit 3 is a 55,131 acre (estimated 44,956 fire-adapted acres) complex of pine rocklands, seasonally flooded prairies, and tropical hardwood hammocks on the southern end of the Miami Rock Ridge (Figure 13). FMU 3 includes the park's two major pine rocklands: Long Pine Key and Pine Island.

The majority of the unit is bounded by roads, including the Main Park Road and the Old Ingraham Highway. Fire roads, consisting of a combination of original logging roads and fire lanes constructed by the park in 1956, divide the pine rocklands into distinct units known as Blocks (Figure 7). The Long Pine Key portion of FMU 3 includes former farmland known as Hole-in-the-Donut (HID) which is currently undergoing restoration. Prior to agricultural conversion, the HID was an extension of the pineland and prairie ecosystem. A large part of the HID has been invaded by the exotic Brazilian pepper and is not receptive to fire except for under extreme conditions. Within this FMU, natural processes shall be allowed to function wherever and whenever possible.



## Pine Rocklands (FMU 3)

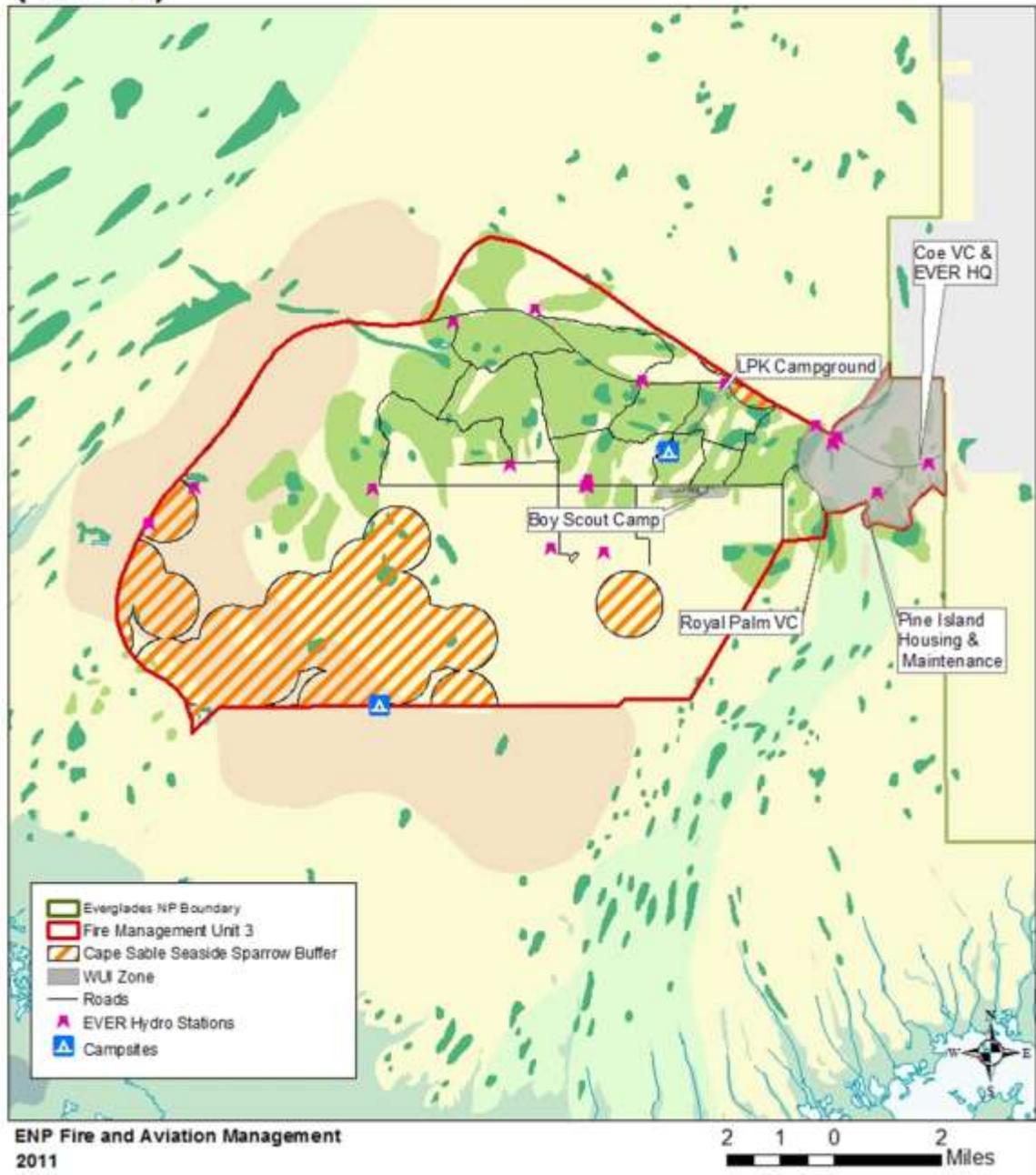


Figure 13: Pine Rocklands (FMU 3)

Management values displayed in the above map are a representation of the current conditions. Management values will be updated annually during the FMP review and update.

### 3.3.3.1 Management Considerations and Constraints

- The FMU is in a Class I airshed but smoke impacts to the overall airshed are negligible.
- Fire operations in designated wilderness will be managed in accordance with the minimum tool analysis (Appendix F)
- The spread of exotic species will be limited through conducting fire operations in support of the Exotic Vegetation Management Program (EVMP).
- In the event that research identifies the need, planned ignitions could be used to achieve future resource management objectives.
- Recommendations from resource specialists will be considered during planning and implementation of fire management activities.
- Threatened and endangered species, rare habitats, species of special concern, park infrastructure, and archeological and cultural resources will require protection.
- In addition to the prescribed fire notification process for the park and cooperators, advanced notification of planned fire operations will be provided at visitor access points, permitting stations, visitor centers, and/or entrance stations (based on fire locations).
- Prior to planned ignitions, reconnaissance will be conducted to verify that that no backcountry users, campers, or visitors would be adversely impacted.
- A burn authorization will be obtained from the Florida Forest Service for each prescribed fire.
- Park and private infrastructure and transportation corridors represent an additional management consideration.
- During wood stork nesting season, bucket operations are prohibited at Paurotis Pond.

### 3.3.3.2 Fire Management Objectives

- Planned ignition treatments will be used to reduce hazardous fuels to protect park values.
- Planned ignition treatments will be used to create mosaic patterns to break up the fuel continuity, maintain habitat diversity, and to provide species refugia.
- Planned ignition treatments will be used to maintain pine rockland habitat within ENP.
- Planned ignition treatments will be used to help manage the spread of Old World climbing fern (*Lygodium microphyllum*) and inhibit the encroachment of Brazilian pepper (*Schinus terebinthifolius*).
- Planned ignition treatments will be used in conjunction with chemical and mechanical treatments to manage exotic vegetation populations identified by the Exotic Vegetation Management Program (EVMP).
- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammocks, tree islands, and cultural resource sites to provide protection from unwanted fire spread.
- Planned ignition treatments will be used to restore natural fire processes in areas in the Hole-in-the-Donut identified by resource management.
- Fires will be managed using the full range of management strategies to protect, restore, or maintain resources in the park.
- Unplanned ignitions will be managed in order to protect life and property and whenever possible achieve resource benefits consistent with the objectives identified for this FMU.
- Unplanned ignitions will be evaluated using a decision support process (WFDSS) that examines the full range of management responses under the following conditions; strategies and tactics will consider firefighter and public safety first, fire cause, current and predicted weather, current

and potential fire behavior and effects, values to be protected, sensitive tree island and hammocks, archeological and/or cultural resources, proximity to WUI areas & Park infrastructure, untreated stands of Melaleuca (*Melaleuca quinquenervia*), and Australian pine (*Casuarina equisetifolia*), resource availability, and cost effectiveness.

- Ensure all fire management activities comply with the annual Cape Sable seaside sparrow Fire Management Strategy.
- Use science based fire management to maintain and enhance the wilderness character of the Marjory Stoneman Douglas Wilderness.

### 3.3.3.3 Major Vegetation Types/Fuel Characteristics

#### Vegetation

The pineland is traversed by short hydro-period prairies. Hammocks, embedded in the pine rocklands, range in size from less than an acre to several hundred acres. See section 3.1.2.1 for more information on FMU 3 vegetation communities. There is a high rate of endemism among pineland and hammock plant species. The pine rocklands are occasionally inundated by water, especially after periods of heavy rain. There is very little soil development in the pine rocklands, except where organic material collects in the depressions and solution holes in the rock, and some iron-rich clay soils accumulate in limestone pockets. Hardwood hammocks in Long Pine Key have a shallow organic soil that overlays the limestone bedrock. The soils in the short-hydroperiod prairies are gray and light gray marl.

#### Fuel Characteristics

FMU 3 is comprised of GR 5 and GR 6 grass fire behavior fuel models, TU 3 and SH 6 (pine overstory, herbaceous-layer, shrubs), and TL 2 (tropical hardwood hammocks). See section 3.1.4 Fire Behavior for a more detailed description.

### 3.3.3.4 Values

The special values in FMU 3 include Wilderness character, threatened and endangered species and species of special concern, re-introduced species, wading and migrating bird populations, unique and important habitats including pine rocklands, hardwood hammocks, wetlands and tree islands, wildland WUI, businesses and Park concessions, visitor use and experience, research sites, and cultural sites.

Federally listed species of particular management concern include the Cape Sable seaside sparrow (CSSS), Florida leafwing and Bartram's scrub-hairstreak butterflies, Everglade snail kite, wood stork, Florida panther, eastern indigo snake, and listed plants. Fire managers will coordinate with the USFWS regarding all federally listed species as well as adhere to the Cape Sable seaside sparrow fire management strategy (Appendix E).

The WUI values within and adjacent to FMU 3 consist of the Pine Island housing and administrative complex, Headquarters, Beard and Robertson buildings, Coe and Royal Palm Visitor Centers, Anhinga Trail boardwalk, Hidden Lake Environmental Education Center, Boy Scout in-holding, Long Pine Key Campground, Coe Campground, Main Park road, Entrance station, Anhinga Highway, and U.S. Hwy 1. Fire management has specific mitigations in place to prevent to the degree practicable, impacts to these values. See section 3.2.3. for further descriptions of management values and associated mitigations.

### 3.3.4. East Everglades (FMU 4)

Fire Management Unit 4 encompasses the 106,964 acre (estimated 99,371 fire-adapted acres) East Everglades Expansion Area authorized for addition to the park in 1989 (Figure 14). FMU 4 is bounded to the east by the park boundary and the associated Mutual Response Zone (Appendix C), consisting of private, South Florida Water Management District, and U.S. Army Corps of Engineers lands. To the north, the unit boundary follows the Everglades NP boundary and US Hwy 41.

In FMU 4 there are large continuous areas of flammable vegetation with a mix of long and short hydro-period prairies that create conditions for fire spread. This FMU is proximate to roads and high levels of human activity. There has been a history of a higher occurrence of human caused fires in this FMU. Implementation of planned ignition treatments to reduce fuel loads have been successful in preventing many fires from entering into the park as well as fires exiting the park and threatening life and property along the boundary. Historic and current airboat use in this area has created a large number of trails that act as fuel breaks under wet conditions. Wet and dry hydrological patterns affect fire spread, fuel continuity and availability. As water levels rise the connectivity and thus availability of flammable fuels decrease. This dynamic has a significant effect on the size, intensity and duration of fires in the Everglades. Under extremely dry conditions fires will burn across areas that would be natural fuel breaks under wetter conditions. Within this FMU, natural processes shall be allowed to function wherever and whenever possible.



# East Everglades (FMU 4)

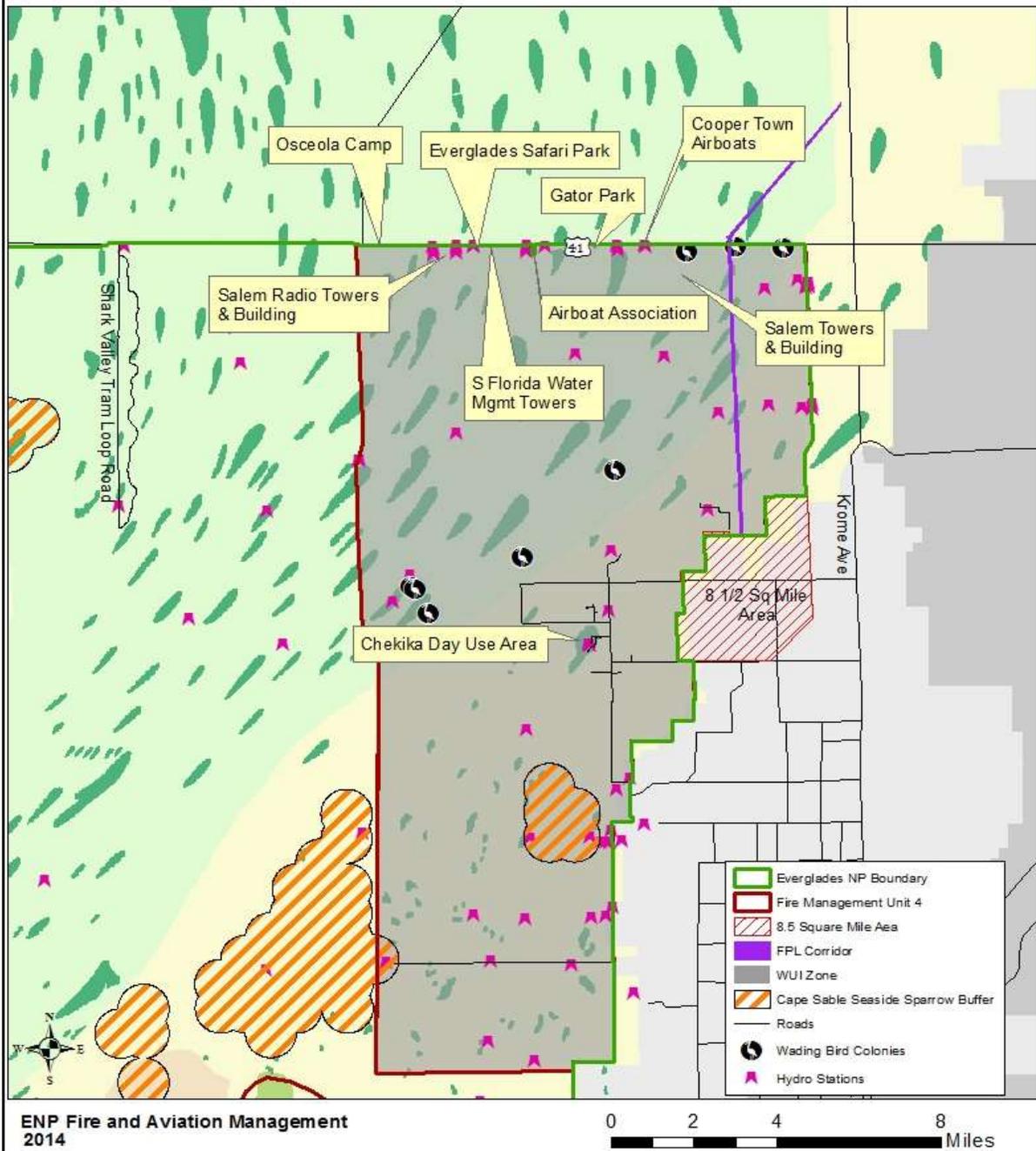


Figure 14: East Everglades (FMU 4)

Management values displayed in the above map are a representation of the current conditions. Management values will be updated annually during the FMP review and update.

#### 3.3.4.1 Management Considerations and Constraints

- The FMU is in a Class I airshed but smoke impacts to the overall airshed are negligible.
- Fire operations in designated wilderness will be managed in accordance with the minimum tool analysis (Appendix F).
- The spread of exotic species will be limited through conducting fire operations in support of the Exotic Vegetation Management Program (EVMP).
- In the event that research identifies the need, planned ignitions could be used to achieve future resource management objectives.
- Recommendations from resource specialists will be considered during planning and implementation of fire management activities.
- Threatened and endangered species, rare habitats, species of special concern, park infrastructure, and archeological and cultural resources will require protection.
- In addition to the prescribed fire notification process for the park and cooperators, advanced notification of planned fire operations will be provided at visitor access points, permitting stations, visitor centers and/or entrance stations (based on fire locations).
- Prior to planned ignitions, reconnaissance will be conducted to verify that that no backcountry users, campers, or visitors would be adversely impacted.
- A burn authorization will be obtained from the Florida Forest Service for each prescribed fire.
- Park and private infrastructure and transportation corridors represent an additional management consideration.
- When safe, fire management strategies must include actions to exclude fire from untreated stands of Melaleuca (*Melaleuca quinquenervia*) and Australian Pine (*Casuarina equisetifolia*).
- A significant safety concern involves hazardous materials illegally disposed in this FMU.
- During wood stork nesting season, bucket operations are prohibited at Paurotis Pond.

#### 3.3.4.2 Fire Management Objectives

- Planned ignition treatments will be used to reduce hazardous fuels to protect park values.
- Planned ignition treatments will be used to create mosaic patterns to break up the fuel continuity, maintain habitat diversity and to provide species refugia.
- Planned ignition treatments will be used to reduce fuel loading adjacent to hardwood hammocks, tree islands, and cultural resource sites to provide protection from unwanted fire spread.
- Planned ignition treatments will be used to help manage the spread of Old World climbing fern (*Lygodium microphyllum*) and inhibit the encroachment of Brazilian pepper (*Schinus terebinthifolius*).
- Planned ignition treatments will be used in conjunction with chemical and mechanical treatments to manage exotic vegetation populations identified by the Exotic Vegetation Management Program (EVMP).
- Fires will be managed using the full range of management strategies to protect, restore, or maintain resources in the park.
- Unplanned ignitions will be managed in order to protect life and property and whenever possible achieve resource benefits consistent with the objectives identified for this FMU.

- Unplanned ignitions will be evaluated using a decision support process (WFDSS) that examines the full range of management responses under the following conditions; strategies and tactics will consider firefighter and public safety first, fire cause, current and predicted weather, current and potential fire behavior and effects, values to be protected, sensitive tree island and hammocks, archeological and/or cultural resources, proximity to WUI areas & Park infrastructure, untreated stands of Melaleuca (*Melaleuca quinquenervia*), and Australian pine (*Casuarina equisetifolia*), resource availability, and cost effectiveness.
- Ensure all fire management activities comply with the annual Cape Sable seaside sparrow fire management strategy.
- Use science based fire management to maintain and enhance the wilderness character of the Marjory Stoneman Douglas Wilderness.

### 3.3.4.3 Major Vegetation Types/Fuel Characteristics

#### Vegetation

The fire adapted vegetation communities of FMU 4 consist of sawgrass prairies and marl prairies. Associated habitats include tree islands, fresh water sloughs, and emergent plant communities. See section 3.1.2.1 for more information on FMU 4 vegetation communities. Exotic vegetation is a serious management concern in FMU 4. Exotic vegetation present in the area includes Brazilian pepper, Melaleuca, and Australian pine.

#### Fuel Characteristics

FMU 4 is comprised of GR 5, GR 6, GR 8, and GR 9 grass fire behavior fuel models and TL 2 (tropical hardwood hammocks) timber fire behavior fuel model. See section 3.1.4 Fire Behavior for a more detailed description.

### 3.3.4.4 Values

The special values in FMU 4 include Wilderness study area, threatened and endangered species and species of special concern, wading and migratory bird populations, and unique and important habitats including wetlands and tree islands, WUI, businesses and park concessions, visitor use and experience, research sites, and cultural sites.

Federally listed species of particular management concern include the Cape Sable seaside sparrow, Everglade snail kite, wood stork, Florida panther, eastern indigo snake, and listed plants. Fire managers will coordinate with the USFWS regarding all federally listed species as well as adhere to the Cape Sable seaside sparrow fire management strategy (Appendix E)

The WUI values within and adjacent to FMU 4 consist of the 8 ½ Square Mile Area residential and agricultural community, Chekika Visitor Use Area and associated infrastructure, the Hernandez House and East Everglades Station, nurseries and other businesses, the airboat association, U.S. Hwy 41, Krome Avenue, former hunt camps, private and commercial establishments, radio towers, and the Osceola Indian Camp. Fire management has specific mitigations in place to prevent to the degree practicable, impacts to these values. See section 3.2.3. for further descriptions of management values and associated mitigations.

## 4.0 WILDLAND FIRE OPERATIONAL GUIDANCE

### Objectives

- As stated in the overall objectives of this plan (Section 3.2.1), firefighter and public safety is the first priority of all fire management activities.
- Comply with national, regional, and local legislation, orders, and policies.
- Conduct all fire management activities in accordance with approved management plans for ENP.
- Maintain the necessary staffing, equipment, training, and qualifications in accordance with National Wildfire Coordinating Group (NWCG) standards and agency policy.
- Maintain safe and effective fire readiness according to established plans, protocols, and guidelines to prevent, detect, and take effective management actions on all wildland fires.
- Continue to pursue cooperative management efforts and agreements with state, local, and other federal agencies to provide efficient, cost-effective suppression and planned ignition treatments.

## 4.1 MANAGEMENT OPTIONS

The following is a range of wildland fire management strategies that may be used throughout the park to achieve park objectives. Use of these strategies conforms to Guidance for Implementation of Federal Wildland Fire Management Policy 2009 and National Park Service Director's Order 18.

### 4.1.1 Wildland Fire

#### Unplanned Ignitions

Wildfires resulting from unplanned ignitions will be evaluated to determine the appropriate response based on the criteria designed to meet the park management goals and objectives. Wildfires will be managed for both protection and resource objectives. Decision support processes and analysis that help determine and document decisions regarding the management of individual ignitions will follow current national direction. Currently, the Wildland Fire Decision Support System (WFDSS) will be used to aid in the management decisions for fires that exceed initial attack. Unplanned ignitions will be managed to protect life and property and whenever possible, achieve resource benefits. Specific management options are listed in section 4.2.3 Incident Management.

#### Planned Ignitions

Planned ignitions (prescribed fires) will continue to be used to achieve hazard fuel reduction objectives, protect WUI, and to meet resource management goals. Planned ignitions will be guided by the best available science as well as ongoing fire effects monitoring. Annual consultation with the South Florida Natural Resources Center, the Interdisciplinary team, subject matter experts and external stakeholders will provide valuable input for adapting the fire management program as needed. Planned ignitions will be implemented under an approved Prescribed Burn Plan. A Multi-Year fuels treatment plan is included as Appendix M within this document. This plan sets forth an annual program of work to achieve the objectives set forth in this document.

### **4.1.2 Non-Fire Applications**

Non-fire treatments will continue to be used to meet identified objectives. Their primary purpose is to achieve hazard fuel reduction in locations where the use of planned ignition treatments is not feasible. Use of non-fire treatments will be guided by park planning procedures and consultation with appropriate resource staff and subject matter experts. Currently, chemical and mechanical exotic plant treatment and mowing occur within Everglades NP under the Exotic Vegetation Management Program and Maintenance division. While hazardous fuel reduction is not the primary objective of these projects, they function to reduce hazardous fuel accumulation in ENP.

## **4.2 MANAGEMENT OF UNPLANNED IGNITIONS**

### **Objectives**

- Establish and maintain a program to manage unplanned ignitions in accordance with departmental and agency policy and scientifically based parameters.
- Conduct all fire operations in designated wilderness in accordance with the Minimum Tool Analysis (Appendix F) and Minimum Impact Suppression Tactics (MIST; Appendix G).
- Manage fires using the full range of management strategies to protect, restore, or maintain resources within the Park.

Wildfires resulting from unplanned ignitions will be evaluated to determine the appropriate response based on the criteria designed to meet the park management goals and objectives. Wildfires will be managed for both protection and resource objectives. Unplanned ignitions will be managed to protect life and property and whenever possible achieve resource benefits. Park resources at risk and objectives for each FMU are contained within the WFDSS database which will guide the ongoing effectiveness and re-evaluation of fire management strategies. This database will be reviewed and updated annually by subject matter experts.

All unplanned wildfires will be initially sized-up by the Initial Attack Incident Commander (IC). The size-up information will be immediately transmitted to Everglades Fire Dispatch and the Duty Officer. They will use the size-up information, current fire management situation, and/or the WFDSS to make appropriate decisions for the incident.

The authority to approve an Initial Fire Assessment and Strategy has been delegated from the FMO to the DO in accordance with RM-18. Adjacent landowners that may be affected by fires that have the potential to burn across the park boundary must be included in the Initial Fire Assessment and Periodic Fire Assessment. Due to the remote nature and limited access of ENP, aviation resources are frequently used in fire management operations. All aviation operations are conducted in accordance with the park's Aviation Management Plan.

### **4.2.1 Unplanned Fire Occurrence**

ENP has a year-round fire season. This means the potential for wildland fire exists in any month of the year. The twenty-year fire history (1994-2014) for ENP includes 697 fires (Figure 15). The majority of

unplanned fires occur in the months of January-May, but can occur during any month of the year.

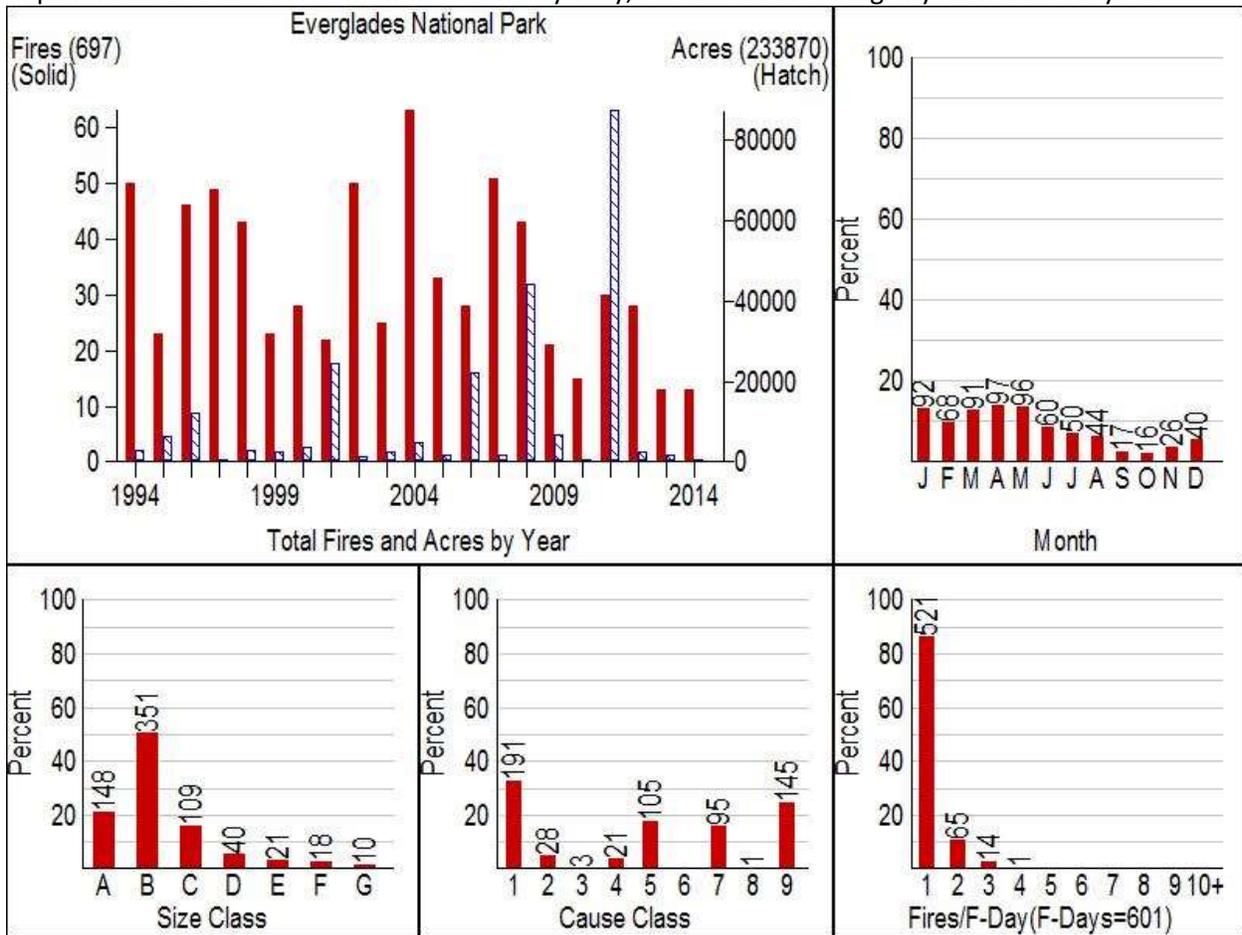


Figure 15. 20-year fire occurrence – Everglades National Park

**Size Classes:**

- 0.1-0.25 acres
- 0.25-9.9 acres
- 10.0-99.9 acres
- 100.0-299.9 acres
- 300.0-999.9 acres
- 1000.0-4999.9 acres
- 5000+acres

**Cause Classes:**

- 1. Lightning
- 2. Equipment
- 3. Smoking
- 4. Campfire
- 5. Debris Burning
- 6. Railroad
- 7. Arson
- 8. Children
- 9. Miscellaneous

**4.2.2 Preparedness**

Annual Training

All personnel participating in wildland fire activities must meet the basic requirements for a firefighter type two (FFT2). Annual Fireline Safety Refresher Training and Work Capacity Tests are required for all personnel participating in planned or unplanned ignition operations that are subject to assignments on the fireline. This training will include National Park Service requirements and meet NWCG standards.

The Fire Management Officer (FMO) will assure that an annual training program is established that meets Interagency Fire Program Management (IFPM) qualification standards for fire program personnel. The Assistant Fire Management Officers (AFMO) is the training officer responsible for facilitating training, oversight, and management of the Incident Qualification and Certification System (IQCS). Annual training is achieved through a combination of courses held locally or attended out of area. Training will be obtained in the most cost-effective manner possible.

#### Readiness

Wildland fire and aviation preparedness reviews are conducted following the annual Fireline Refresher training in late January. This review will identify operational, procedural, personnel, or equipment deficiencies and recommend corrective actions. Standards for preparedness reviews are based on the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book) and conducted according to the Interagency Preparedness Review Guide (2010).

#### Preparedness Plan

The Preparedness Plan was written in accordance with the Everglades Fire Management Plan to provide management direction for wildland fire operations. This direction is based on objectives stated in the Everglades Fire Management Plan and local level procedures for operations. Decision support processes and analysis that help determine and document decisions regarding the management of individual ignitions will follow current national direction. Currently, WFDSS will be used to aid in management decisions for fires that exceed initial attack. Wildland fire resulting from unplanned ignitions will be evaluated to determine the appropriate response based on the criteria designed to meet the park management goals and objectives. Unplanned ignitions will be managed to protect life and property and whenever possible achieve resource benefits. The Preparedness Plan will be reviewed and updated annually and can be found in Appendix N.

#### National Fire Danger Rating System (NFDRS)

A combination of Burning Index (BI), standing water levels, and hammock soil moisture levels are used to determine the daily staffing class. The BI from the National Fire Danger Rating System, is the starting variable for establishment of staffing classes. Since BI does not take standing water levels or hammock soil moistures into account, the basic staffing class is modified based on these factors. Hammock soil moisture is a key prescription factor in the determination of daily staffing class. Historically, it has been noted that once hammock soil moistures are less than 82%, fire can spread into the organic soils of tree islands and hammocks. Variables such as, minimum relative humidity, dispersion index, maximum temperature, and days since last rain are also indicators of potential fire behavior/fire danger. A Fire Danger pocket card has been developed for the Park to display the critical thresholds of fire danger to assist firefighters involved in wildland fire operations. An example of the Park's pocket card can be found in Appendix O, and will be updated annually with the most current information.

#### Step-Up Plan

Everglades Step-Up Plan will aid in directing preparedness actions in response when increasing fire danger exists at the Park. Preparedness actions are delineated by staffing classes that range from 1=low, 2=moderate, 3=high, 4=very high & 5= extreme. Each staffing class contains the planned actions that are intended to mitigate the fire danger conditions. The actions listed within each class are designed to enhance the Park's fire management capabilities for short periods when staffing cannot

meet initial attack needs.

The Park's Step- Up Plan was developed using NFDRS indices, weather data collected from the 2 RAWS (Cache, and Chekika), standing water levels, and lightning activity level (LAL). Fire history from Everglades NP was analyzed using Fire Family Plus. Everglades NP has chosen National Fire Danger Rating System (NFDRS) Burning Index (BI), standing water levels, and lightning activity levels (LAL) to determine the daily staffing class.

The staffing class breakpoints were determined by using Fire Family Plus to identify the 90<sup>th</sup> and 97<sup>th</sup> percentiles. Historical fire occurrence from 1980-2014 was observed with the BI values to result in the best breakpoints. The Step-Up Plan will be reviewed and updated annually and can be found in Appendix P.

A Fire Danger pocket card was developed for the Park using Fire Family Plus to display the critical thresholds of fire danger to assist firefighters involved in wildland fire operations. An example of the Park's pocket card can be found in Appendix N, and will be updated annually with the most current information.

#### **4.2.3 Incident Management**

When a fire is reported, a qualified IC will be dispatched to the fire to provide a thorough size-up. The size-up will include the following information:

- Fire size and character
- Spread potential
- Values at risk
- Fuels and fire behavior
- Additional resources needed for containment
- Potential tactics and strategies

The IC will provide dispatch with the size-up information. It will be the responsibility of the IC to determine the type and number of additional resources that are required to take the appropriate action. Dispatch will provide radio communication, logistical support and weather updates.

Incident Commanders (IC) have the authority to respond to wildfires with a full range of fire management strategies:

- Full Suppression: Strategy developed to achieve control of a fire and prevent it from exceeding a defined perimeter.
- Point/Zone protection: A variety of suppression actions taken to protect a specific point or areas from fire usually by tactics which constrain progressive fire encroachment away from identified values at risk
- Monitor/Confine/Contain: Management actions conforming to a strategy that periodically checks the fire to ensure it continues to meet established.

When evaluating the initial response, the IC and fire management staff will consider risks to public and firefighter safety, values at risk, and the cost of various strategies and tactics. The Incident Complexity Analysis (Types 3, 4, 5), located in the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book) will be used by the IC and Duty Officer to determine the appropriate management

complexity level.

#### Information/Variables Used to Determine Initial Action Responses

- Public and firefighter safety
- Cape Sable seaside sparrow habitat
- Urban interface/ communities at risk
- Sensitive tree islands and hammocks
- Transportation corridors
- Park Infrastructure
- Archeological and cultural sites
- Untreated stands of Melaleuca (*Melaleuca quinquenervia*) and Australian Pine (*Casuarina equisetifolia*)
- Rookeries and significant nesting and denning sites
- Park boundary

#### Typical Response Times

Response time by NPS equipment and personnel will vary depending on the location of both Initial Attack (IA) resources and fire location. Based upon the needs identified in the initial attack priority list, the following are the response times.

FMU-1: Helitack - Due to remoteness and logistics, response times may exceed an hour.

FMU-2: Engines and helitack – 30 - 40 minutes

FMU-3: Engines and helitack - 20 minutes

FMU-4: Engines and helitack – 20 minutes

#### Restrictions and Special Concerns

Minimum Tool Analysis comprehensively addresses prohibited activities and restrictions associated with wilderness and potential wilderness. The Minimum Tool Analysis is found in Appendix F.

Fire retardant, class A foam, and specialized equipment, such as rolligons, will be used only when an operation cannot be safely completed and/or impacts to values cannot be mitigated. Permission will be granted by the Park Superintendent.

#### Minimum Impact Suppression Tactics (MIST)

Director's Order #18 states that: "Methods used to suppress wildland fires should minimize impacts of the suppression action and the fire, commensurate with effective control and resource values to be protected." Everglades NP adopts the MIST guidelines in RM 18.

#### Extended Attack and Large Fire Suppression

The Park has a history of extended attack fires and is adequately prepared to manage these incidents. Additional support is typically available from other members from the South Florida Fire Planning Unit (e.g. Big Cypress National Preserve, Florida Panther National Wildlife Refuge, Loxahatchee National Wildlife Refuge, and Biscayne National Park), cooperators (Florida Forest Service, Miami-Dade Fire Rescue) and Administratively Determined (AD) emergency hiring sources.

The Florida Interagency Coordination Center (FICC) is utilized to obtain additional resources. Additionally, senior fire management staff is actively involved with the statewide unified command process, which allows park input in the prioritization for use of national resources within the State of Florida.

If fire exceeds the capability of the local organization, the same processes are utilized to order a Type 1 or Type 2 Incident Team. Guidance for determination of Type 1 or 2 complexity need will come from the extended attack transition analysis from the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book).

#### Escaped initial attack procedures

A documented decision is required whenever a wildfire exceeds initial attack. A fire that has exceeded initial attack is considered extended attack when:

- The fire has not been contained by the initial attack resources dispatched to the fire.
- Initial attack objectives are not attainable.
- The fire has not been contained within the first operational period and there is no estimate of containment or control.

The IC and Duty Officer are responsible to make this determination. The Duty Officer is responsible for initiating a complexity rating, assigning or ordering the appropriate incident commander (IC), and initiating the WFDSS process. The documentation prepared for Type 3, 4 or 5 fires will be reviewed and approved by the FMO or designee. Type 1 or 2 fires will be approved by the Superintendent, unless financial limits are exceeded. In such cases, Regional Director or National Director approval is required (refer to the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book)). The decision document will be updated to implement significant changes in management strategies and/or objectives.

#### Complexity Analysis

The Incident Complexity Analysis (Types 3, 4, 5) will be used by the IC and Duty Officer to determine the appropriate management complexity level. If fire exceeds the capability of the Type 3 management organization, the same processes are utilized to order a Type 1 or Type 2 Incident Management Team. Guidance for determination is found in the Incident Complexity Analysis from the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book).

#### Delegation of Authority

The delegation of authority for Type 4 and 5 fires is given to the FMO who then in turn delegates to the Duty Officer and/or Incident Commander (IC). A Type 4 or 5 IC will not receive a formal delegation of authority, but will receive a briefing describing their responsibilities and authorities from their assigned supervisor or the Duty Officer. All Type 1, 2 and 3 IC's will receive a delegation of authority from the Superintendent.

The Fire Management Officer (FMO) is responsible and accountable for providing leadership for fire and aviation management programs in the park. The FMO determines program requirements to implement decisions through the FMP to meet resource objectives. The FMO negotiates interagency agreements and represents the Agency Administrator on local interagency fire and fire aviation groups.

The Superintendent annually shall provide and update the expectations of the FMO duties by means of a limited delegation of authority that encompasses the scope of duties outlined above. The FMO and IC are assumed to be working within the scope of their job descriptions and as such will not require specific signed delegations of authority for the performance of their assigned duties. Should an incident require management by off park resources (Incident Command Teams or ICs from another park/agency, specific Delegations of authority for that incident will be prepared and signed by the Superintendent and IC. The delegation of authority contains specific, measurable objectives, as well as limitations to that authority.

### Records and Reports

All electronic documents are stored on the fire management shared server (located at Headquarters) and hard copy documents are stored in the fire records room in the Robertson Building. Checklists of possible wildland fire documents and the individual responsible for completing them can be found below and in Section 4.4.3 (Table 5 & Table 10).

Each wildfire action requires the submission of an Individual Fire Report, submitted via Wildland Fire Management Information (WFMI). A WFMI report is required regardless of who takes action. When Park staff take or assist in initial attack off Park lands, the agency with jurisdiction will file a report. The Park must also file a report to document the Park support action and to support potential billing to non-federal entities for trespass fires. The following types of fires must be reported within 10 days of a fire being declared out:

- All wildfires on NPS and NPS-protected lands
- Wildfires threatening NPS lands on which we take action
- All escaped planned ignitions, where a wildfire declaration is made
- All false alarms

It is the responsibility of the IC to provide the information necessary to complete the fire report, and the FMO's job to ensure they are entered into the system. The AFMO will complete the actual data entry for all wildfire information into WFMI. The park's Prescribed Fire Specialist will complete the data entry for all planned ignitions.

Other reports that are required include:

- *ICS-209* for extended attack fires (over 100 acres in timber or over 300 acres in grass) will be submitted daily through the 209 system on the internet by the dispatch office
- *Close of Business (COB)* report (forwarded to the Florida Interagency Coordination System in Tallahassee, FL). This report will be submitted by the dispatch office and will include information for fires that occur on park property (fire size, status, start date, discovery time, and resources assigned).

### After Action Review

An After Action Review (AAR) will be completed at the end of each operational period using the format outlined in the NWCG Incident Response Pocket Guide. These AARs will be documented in writing as part of the fire record and disseminated to all fire management personnel. Any significant lessons learned will be entered into the National Lessons Learned Center database.

<b>Checklist of Wildland Fire Documents and Reports Unplanned Ignitions</b>	
<b>Document</b>	<b>Person Responsible for Completion</b>
DI-1202	IC/-Dispatcher
ICS -201	IC-
ICS-214, w/narrative	IC and/or Unit Leader
Resource Orders	IC/Duty Officer/ Dispatcher
Fire Map/GPS data	IC/PFS
Archived Photographs	Personnel taking photos w/government equipment
WFSS (Including periodic review)	IC and/or Duty Officer
Spot Weather Forecast	IC or Duty Officer
Fire Monitoring Reports (includes smoke emission and transport observations) *Optional	FEMO
Incident Status Summary ICS-209	IC/Duty Officer/Fire Dispatcher
Fire Behavior Predictions	IC/Duty Officer
Incident Complexity Analysis	Duty Officer/IC
Incident Action Plan (IAP)	IC/Duty Officer
After Action Review (AAR)	IC
Cost Tracking	IC/Duty Officer/FMO/FPMA
Post Fire Analysis	Prescribed Fire Specialist/Fire Ecologist

Table 5. Documents for Unplanned Ignitions

#### 4.3 BURNED AREA EMERGENCY RESPONSE (BAER)

Many fires occur naturally, and some ecosystems are adapted to fires, relying on them to maintain their health. However, wildland fires can sometimes leave behind a burned landscape that threatens human safety, property, and ecosystems. The Burned Area Emergency Response (BAER) program is the NPS post-fire response program that implements Emergency Stabilization (ES) treatments to minimize

threats to life or property resulting from the effects of a wildfire or to stabilize and prevent unacceptable degradation to natural and cultural resources resulting from the effects of a fire.

The Burned Area Emergency Response (BAER program) is dedicated to protecting lives, property, and resources while promoting the restoration and maintenance of healthy ecosystems. The program determines the need to implement emergency treatments to meet the following objectives:

- Minimize threats to life or property.
- Stabilize and prevent further unacceptable degradation to natural and cultural resources resulting from the effects of a fire.
- Repair or improve lands damaged directly by a wildland fire.
- Rehabilitate or establish healthy, stable ecosystems in the burned area.

Should a BAER team be required on the unit an archeologist or cultural resource specialist and natural resource specialist will be part of the team. Policy and direction for all activities associated with the management of a BAER team is found in RM 18.

#### **4.3.1 Emergency Stabilization**

Emergency stabilization is an extension of emergency actions. These actions may also include repair, replacement, or construction of physical improvements in order to prevent unacceptable degradation to natural and cultural resources. The objectives of emergency stabilization are to first determine the need for emergency treatments, and then to prescribe and implement the treatments. Life and property are the first priority. Cultural and natural resources treated through ES should be unique and immediately threatened. The Park Fire Coordinator and the Natural Resource Specialist will jointly assess and if necessary formulate a BAER emergency stabilization plan. The BAER plan will be submitted to the Regional BAER Coordinator through the Fire Management Officer for approval within 7 days from the date the fire is declared contained. BAER project requests totaling \$500,000 or less can be approved by the Regional Director. Submissions over this amount are reviewed at the regional level and forwarded to the NPS Fire Management Program Center for approval.

Burned areas will not be seeded; residual seed and sprouting from surviving rootstalks will provide natural re-vegetation. This method is superior even to introduction of "native" seeds. Seed-bearing materials cut along the lines can be scattered as mulch to guarantee indigenous seed. Consideration will also be given to the use of organic mats for controlling erosion in locations susceptible to erosion.

Rehabilitation of firelines and other efforts to control erosion will start as soon as possible, even before a fire is declared out. This is especially important if firefighting equipment and personnel are still available. Funding of the direct costs of rehabilitation will be through an emergency fire account.

All suppression fire management activities will be carried out in accordance with MIST guidelines (appendix G) to cause the least amount of resource damage. Localized rehabilitation and restoration may be completed as part of ongoing fire operations. These actions may include stabilization, repair, replacement, or construction of improvements to prevent degradation to natural or cultural resources.

### 4.3.2 Burned Area Rehabilitation

Post-fire Burned Area Rehabilitation (BAR) projects is the NPS post-fire response program that implements the types of long-term actions to repair or improve lands damaged directly by a wildland fire. Burned area rehabilitation consists of non-emergency efforts undertaken to repair or improve wildfire-damaged lands unlikely to recover naturally, or to repair or replace minor facilities damaged by wildfire. The objectives of burned area rehabilitation are to (1) evaluate actual and potential long-term post-wildfire impacts to critical cultural and natural resources and to identify those areas unlikely to recover naturally from severe wildfire damage; (2) to develop and implement cost-effective plans to emulate historical or pre-wildfire ecosystem structure, function, diversity, and dynamics consistent with approved land management plans, or if that is infeasible, to restore or establish a healthy, stable ecosystem in which native species are well represented; and (3) to repair or replace minor facilities damaged by wildfire. The Park Fire Coordinator and the Natural Resource Specialist will jointly assess and if necessary formulate a non-emergency Burned Area Rehabilitation plan. BAR project requests are approved as part of a competitive process within the Department of Interior and project selections are made at the beginning of each fiscal year or after an approved appropriations bill, whichever is later. The BAR plan will be submitted to the Regional BAER Coordinator through the Fire Management Officer. Projects are reviewed at the regional level and forwarded to the NPS Fire Management Program Center for processing. It should be submitted by the end of the first fiscal year in order to be funded in the next fiscal year. Projects are eligible for BAR funding up to three years of the containment date of the fire.

Fire managers should ensure that rehabilitation activities do not result in the spread of invasive plant propagules. Vehicles, equipment, and firefighters should be cleaned before entering the rehabilitation area. Any materials brought in to prevent erosion, such as organic mats or lumber should be free of unwanted seeds. Before spreading any cut materials from the fire line check to be sure you will not be introducing invasive plant material to the newly burned area.

For detailed direction concerning Burned Area Emergency Rehabilitation refer to the Interagency Burned Area Rehabilitation Guidebook, Oct. 2006; and the Burned Area Emergency Response Treatments Catalog, December 2006.

Damages resulting from wildfires are addressed through four activities:

- **Wildfire Suppression Activity Damage Repair.** Planned actions taken to repair the damages to resources, lands, and facilities resulting from wildfire suppression actions and documented in the Incident Action Plan. These actions are usually implemented immediately after containment of the wildfire by the IMT before demobilization.
- **Emergency Stabilization.** Planned actions to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a wildfire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. Emergency stabilization actions must be taken within one year following containment of a wildfire and documented in a Burned Area Emergency Response Plan.
- **Rehabilitation.** Efforts taken within three years of containment of a wildfire to repair or improve wildfire damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by wildfire. These efforts are documented in a separate

Burned Area Rehabilitation Plan.

- Restoration. Continuing the rehabilitation beyond the initial three years or the repair or replacement of major facilities damaged by the wildfire.

	<b>Suppression Rehabilitation</b>	<b>Emergency Stabilization</b>	<b>Rehabilitation</b>	<b>Restoration</b>
<b>Objective:</b>	Repair Suppression Damages	Protect Life and Property	Repair Damages	Long Term Ecosystem Restoration
<b>Damage Due To:</b>	Suppression Activities	Post-Fire Events	Fire	Fire
<b>Urgency:</b>	Before Incident Close-out	1 – 12 Months	1 – 3 Years	3 + Years
<b>Responsibility:</b>	Incident Commander	Agency Administrator	Agency Administrator	Agency Administrator
<b>Funding Type:</b>	Suppression	Emergency Stabilization	Rehabilitation	Regular Program

Table 6: Burned Area Emergency Response Post Fire Activities Table

#### 4.4 MANAGEMENT OF PLANNED FUELS TREATMENTS

The goal of the Everglades Prescribed Fire Program is to supplement natural fires role as an ecosystem process and to achieve resource management objectives. Planned ignition treatments (prescribed fire) are used to reduce hazard fuel accumulations, reduce threats to wildland urban interface (WUI) from wildfires, protect park resources, maintain fire adapted ecosystems, treat exotic plants, and to secure the Park boundary.

Objectives:

- Use planned ignition treatments to reduce, to an acceptable level, the risk of wildland fires exiting ENP, except as authorized by adjacent managers.
- Use planned ignition treatments to reduce the risk from fire to natural, cultural, and social resource values (specific resource values are covered in more detail in FMU sections – visitor experience is considered a social value).
- Use planned ignition treatments to improve ecosystem health and resilience.
- Use planned ignition treatments to treat, manage, and reduce the presence and spread of exotic species invasions in the park.
- Monitor planned ignition treatments to assess the range of effects and treatment effectiveness within fire regime characteristics of a given vegetation community.

#### 4.4.1 Multi-Year Fuels Treatment Plan

The Everglades National Park Multi-Year Fuels Treatment Plan outlines a projected scope of work for the Park's fire management program and the collaborative process used in the prioritization, selection, review and update of fuels treatment projects (Appendix M). The purpose of the multi-year fuels treatment plan is to provide a projected work plan that will assist managers in planning and implementing treatments designed to reduce the risk and impacts of unwanted fire through planned ignition treatments, while restoring and maintaining fire adapted ecosystems in Everglades NP.

This fuels treatment plan will assist the fuels management program in implementing fire management policies and help achieve fire management goals as defined in the *Federal Wildland Fire Policy and Program Review (2001)*, *Managing the Impact of Wildfires on Communities and the Environment (USDOI/USDA 2000)* and *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: 10 Year Implementation Strategy*.

Appendix M describes the plans for fuels treatment projects within a multi-year frame of reference. Project prioritization, selection and planning, encompasses a five year moving window (the current planning year and four out-years). An annual review and update of the candidate projects will be conducted which will take into consideration previous planned ignition treatments and accomplishments, unplanned fire occurrence and new information regarding policy changes, scientific knowledge and Park conditions. An additional year of candidate projects will be added to the plan during the annual review and update planning process.

Re-treatment of candidate projects described in the plan may occur for three reasons: 1) units are again available for treatment based on the defined fire return interval 2) units require treatment implementation in phases 3) identified treatment objectives have not been achieved during unit treatment. All unit re-treatment projects will be considered during project prioritization, selection and planning and during the annual review and update planning process.

The methodology developed to implement the multi-year fuels plan provides a dynamic and adaptable program of work. Both planned and unplanned ignitions are dependent on changing environmental factors and Park conditions. The tables in Appendix M list the tentative prescribed fire projects by fiscal year for Everglades NP. All projects and associated acres within the multi-year fuels plan are subject to change. Units will be considered for treatment only if they are within the defined fire return interval range and therefore considered available for treatment. (See table 8 for fire return interval range). Factors that would cause change include, but are not limited to:

- Unplanned wildland fires in the Park that may burn units or portions of units prior to schedule.
- Unplanned wildland fires that may provide opportunities to treat adjacent areas prior to the schedule date and are available for treatment.
- Opportunities to accomplish cooperative projects with adjacent land owners and other agencies in a year other than when the unit is scheduled and are available for treatment.
- Opportunities to accomplish additional target projects that are available for treatment

- in a given calendar year due to favorable burning conditions.
- Diminished opportunities to accomplish proposed targets due to weather, air quality, or resource availability constraints.
- National or regional preparedness levels that would preclude the use planned ignition treatments.
- Socio-political or administrative concerns that would preclude the use planned ignition treatments.
- Lack of available funding and/or staffing to safely and efficiently accomplish projects.
- Cultural or natural resource impacts that cannot be avoided or mitigated.
- Trends from monitoring effects of treatment indicate a change is needed.
- Changes to Federal and/or National Park Service fire management policies.
- Opportunities to achieve additional Park goals and objectives (i.e. assist with research, education, visitor experience, or maintenance).
- Fire Management Plan mitigations cannot be met.

#### Planning:

Project units are contained within the larger Park FMUs (Figure 10). Boundaries were based on existing fuel breaks, such as roads, rivers, and other natural barriers to fire spread, wherever possible. Some project boundaries however are not more than lines on a map and cannot be considered as features that will stop the spread of fire unassisted. Project units are specific to and within one of the four FMUs. Fuels treatment planning begins with an availability analysis for all project units (Figure 16). All units that are available for treatment are identified. This includes all areas currently at or past the defined fire return interval (FRI) for the associated unit (this is described in more detail below). Units that are in a condition where they have not reached the planning fire return interval are not considered to be available for treatment (note: Units that have not reached the planning fire return interval (FRI) may be considered for treatment if new management objectives indicate this need and the unit is within the defined FRI. Operational factors that may indicate this need are listed in the above bulleted section. New resource objectives will be based on the best available science and discussed in the annual planning meeting. The planning FRI and defined FRI described in more detail below (Tables 8 & 9, Appendix L).

With the availability analysis, typically identifying more areas than are possible to accomplish in any one year, criteria have been identified to help determine the highest priority project units. Project units are assigned to a selection group based on prioritization values specific to each FMU (Table 6). Selection groups contain units of similar condition and are ranked in order of importance with those units most in need of treatment in the top ranked priority group (similar to a unit weighting system). A selection analysis that integrates a unit's group ranking for each prioritization value is used to determine the highest priority projects. Selection analysis occurs within an FMU or within an FMU sub-division (WUI vs. Non-WUI). Project units do not compete for prioritization and subsequent selection across FMUs. The selection analysis identifies and establishes the proposed program of work by FMU within the multi-year fuels plan.

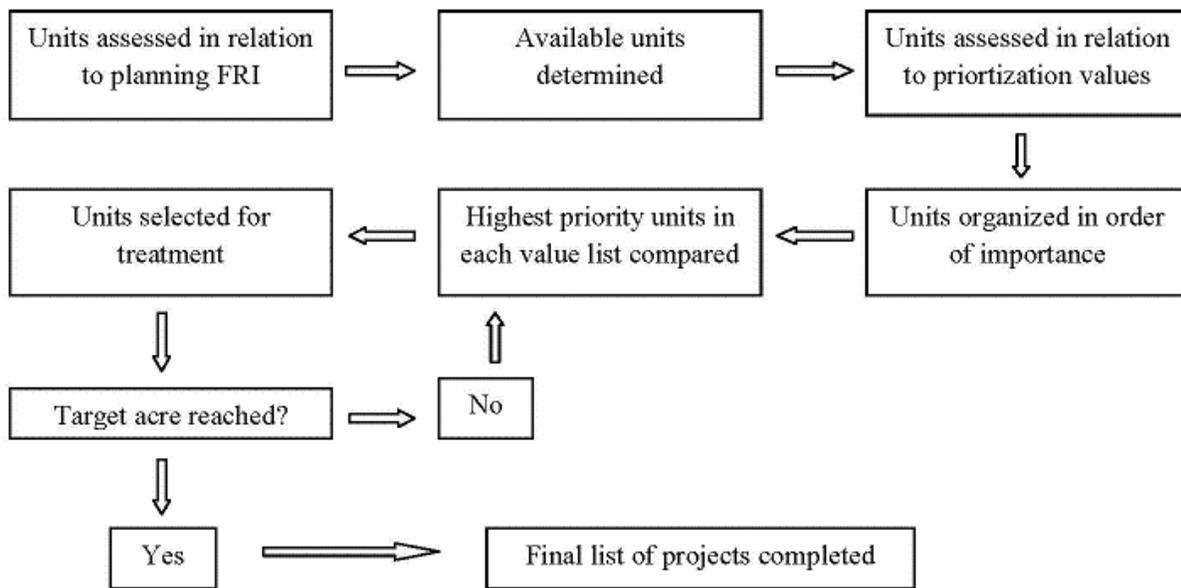


Figure 16. Fuels Plan flow chart

The prioritization values include planning FRI departure (described in more detail below), fuel loading, proximity to Cape Sable seaside sparrow populations, proximity to WUI /Park boundary values, and exotic plant presence/management objectives. As other prioritization values are identified, they will be applied to the appropriate units and incorporated into decision making in the future. The selection analysis is designed to allow additional prioritization values to be incorporated. When identified, additional prioritization values will be incorporated during project prioritization, selection and planning and during the annual review and program update planning process.

Prioritization Values:

FMU	WUI / Non WUI / Exotic management	Prioritization Value	Prioritization Value	Planning Fire Return Interval
FMU 1	Non WUI	Adjacency to FMU 2 planned units	Planning FRI departure	6 year
FMU 1	Exotic Management	Exotic plant management objectives	Planning FRI departure	2 year
FMU 2	WUI	Proximity to WUI/Boundary values	Planning FRI departure	3 year
FMU 2	Non-WUI	Proximity to CSSS populations	Planning FRI departure	8 year
FMU 3	WUI	Proximity to WUI/Boundary values	Planning FRI departure	3 year
FMU 3	Non-WUI	Fuel loading	Planning FRI departure	3 year
FMU 4	WUI	Proximity to WUI/Boundary values	Planning FRI departure	3 year

Table 7: Prioritization Values

Fire Return Interval:

A fire return interval is the number of years between fires at a specific location or plant community. Fire return interval range is the span of years between the shortest and longest periods between fires in a vegetation type. Everglades Fire Management has defined fire return intervals based on the dominant fire adapted vegetation type within each project unit. Fire return intervals were determined for fire adapted vegetation types within each FMU based on literature reviews and internal evaluation and assessment (Table 7).

FMU	Fire adapted vegetation communities		
FMU 1 Coastal Prairie	Coastal prairie		
FMU 2 River of Grass	Sawgrass prairie	Marl prairie	
FMU 3 Pine Rocklands	Pine rockland	Marl prairie	Sawgrass prairie
FMU 4 East Everglades	Sawgrass prairie	Marl prairie	

Table 8: Fire Adapted Vegetation Communities

Fire return interval ranges are based on literature reviews and information from subject matter experts for each fire adapted vegetation type. A broader fire return interval range can be found in literature, however the fire return intervals used for this FMP were selected based on review from a variety of sources and input from subject matter experts.

Community Type / FMU	Fire Return Interval Range (years)	Notes	Citation(s)
Coastal Prairie FMU 1	2-10		FRCC (2003), Landfire (2008)
Saw Grass FMU 2 / FMU 4 / FMU 3	3-12	Includes habitat within FMU 3 south of Pine Blocks and HID	FNAI (2009), FRCC (2003), Landfire (2008), Alexander (1971), Hofstetter (1973), Hofstetter (1974), Uchytel (2010)
Marl Prairie FMU 2 / FMU 4 / FMU 3	3-12	See comment below	FNAI (2009), Landfire (2008), Hofstetter (1973)
Pine Rockland FMU 3	3-7	Includes pine rockland and embedded prairie communities	FNAI (2009), FRCC (2004), Landfire (2008), Hofstetter (1973), Carey (2010), Snyder et al (1990), USFWS (1999)

Table 9: Fire Return Intervals

Several other vegetation communities may appear within or adjacent to project units, however these areas are not targeted for planned ignition treatment. Examples of these areas include but are not limited to: hardwood hammocks, tree islands, and mangrove/buttonwood forests.

A planning fire return interval was determined for each project unit based on the fire return interval ranges. The minimum FRI or the mean FRI was used to determine FRI departure and planned ignition treatment planning cycles.

Vegetation Type	FMU	WUI / Non-WUI / Exotic management	Planning FRI	FRI range	Minimum/Mean FRI
Pine Rockland	FMU 3	WUI	3 year	3-7 years	Minimum
Pine Rockland	FMU 3	Non-WUI	3 year	3-7 years	Minimum
Saw Grass Prairie	FMU 2	WUI	3 year	3-12 years	Minimum
Saw Grass Prairie	FMU 2	Non-WUI	8 year	3-12 years	Mean
Muhly Prairie	FMU 2	WUI	3 year	3-12 years	Minimum
Muhly Prairie	FMU 2	Non-WUI	8 year	3-12 years	Mean
Saw Grass Prairie	FMU 3	WUI	3 year	3-12 years	Minimum
Saw Grass Prairie	FMU 3	Non-WUI	8 year	3-12 years	Mean
Muhly Prairie	FMU 3	WUI	3 year	3-12 years	Minimum
Muhly Prairie	FMU 3	Non-WUI	3 year	3-12 years	Minimum
Saw Grass Prairie	FMU 4	WUI	3 year	3-12 years	Minimum
Saw Grass Prairie	FMU 4	Non-WUI	8 year	3-12 years	Mean
Muhly Prairie	FMU 4	WUI	3 year	3-12 years	Minimum
Muhly Prairie	FMU 4	Non-WUI	8 year	3-12 years	Mean
Coastal Prairie	FMU 1	Non-WUI	6 year	2-10 years	Mean
Coastal Prairie	FMU 1	Exotic	2 year	2-10 years	Minimum

Table 10: Planning Fire Return Intervals

*Minimum FRI:* The minimum FRI is used for three groups; WUI project units, pine rockland project units, and coastal prairie project units. **1)** All WUI project unit planning is based on a minimum FRI. These areas have a higher probability of human caused fire occurrence and present greater risk of fire spread threatening Park developments and developments and communities adjacent to the Park. **2)** Planning for the units in the pine rockland vegetation type are based on a minimum FRI. The pine rockland vegetation community has the most narrow FRI range. Currently, the majority of the pine rocklands are in a greater than 5 years post fire and at the mean FRI of 5 years, hazardous fuel accumulations have been observed along with increased hardwood plant encroachment. **3)** In the Coastal Prairies, those units that are specific to exotic plant treatments are based on a minimum FRI. The best management practices involving the use of fire in the treatment and management of exotic species in the coastal prairie areas of Everglades NP are still being explored. Research and monitoring to determine the most effective season of burning and fire return interval is ongoing through the fire management fire effects monitoring program and Exotic Vegetation Management Program (EVMP).

*Mean FRI:* For all units not addressed above, project unit planning is based on a mean FRI. This represents a moderate cycle for fire and fuels management planning for all remaining areas.

Fire history maps of previous fire scars on the landscape were used to determine where fires have occurred and where they have been absent (Figure 8). The fire return interval for a given vegetation type can be used in conjunction with fire history maps to determine the degree of departure from the

defined fire return interval, known as the fire return interval departure. The FRI departure for each project unit is assessed based on the defined planning FRI and GIS fire history maps which date back to 1948. Prioritization is based on the degree of departure from the planning FRI for each project unit.

#### Fuel loading:

Fuel loading is the amount of fuel or flammable vegetation in a given area. Generally, as time since fire increases and vegetation growth continues, fuel loading continues to increase. Fire intensity and rates of spread increase with increases in fuel loading. Fuel loading also affects other fire behavior such as the probability of an ignition starting a fire and torching (fire racing upward from the ground to treetop). The higher the fuel loading, the more heat will be produced during a fire. Fuel loading also affects the degree of difficulty in controlling and managing fire. Hazardous fuel loading refers to fuel loading levels that would cause fire control and management to be of greater risk than under normal conditions. A determination of hazardous fuel loading also takes into account proximity to urban development and Park values. Fuel loading is assessed based on data collected from fire effects monitoring plots. Unit prioritization is based on shrub height (FMU 3) and continuity of fuels present in a unit. Under this prioritization value, the highest priority is assigned to units with the tallest and most continuous fuels (highest live fuel loading).

#### Proximity to Cape Sable seaside sparrow habitat:

The Cape Sable seaside sparrow is a federally-listed endangered species that lives in the interior prairies of Everglades NP. Cape Sable seaside sparrows are adapted to life in vegetation that burns periodically. Depending on the timing and intensity, fire may affect the habitat and bird populations. The use of planned ignition treatments for fuel reduction is an effective proactive management tool to decrease the probability of an unwanted ignition and reduce fire spread rates and fire intensity. In terms of the Cape Sable seaside sparrow, planned ignition treatments adjacent to sparrow habitat can enhance the capacity of firefighters to manage and limit fire spread within the sub-populations. Cape Sable seaside sparrow sub-population priority is based on the most recent Cape Sable seaside sparrow survey annual update available with the largest populations receiving the highest priority. Under this prioritization value, unit prioritization is based on the sub-population contained within or adjacent to the project unit. Sub-population priority designation and subsequent unit prioritization will be reviewed annually at the Cape Sable seaside sparrow working group.

#### Adjacency to planned units in other FMUs:

Everglades NP FMUs and project units were created based on management objectives, vegetation community and existing fuel breaks where possible. In many cases continuous fuels are present across both FMU and project unit boundaries. Continuous fuels span the border between FMU 1 and FMU 2. To reduce the amount of artificially created fuel breaks on the landscape, and facilitate planned ignition treatment operations, FMU 1 project units were selected based on the schedule of the adjacent FMU 2 project units.

#### WUI/Boundary protection:

Everglades NP borders major cities, highways, and other development areas on the north and east sides of the Park. Wildland urban interface (WUI) refers to areas where wildland fire may threaten homes, communities and other development areas.

For protection of life and property along the boundary of Everglades NP, fire management has defined

WUI zone units. The WUI zone is defined as any area that can be impacted by a wildland fire within an 8 hour period, one operational period, from the Park boundary. The fire spread model Behave was used based on fire behavior fuel model GR 6 and moderate environmental conditions. The outputs from this analysis indicated that an ignition in this fuel type under these conditions would travel 6 miles in one operational period. This 6 mile “buffer” was used to determine areas that were at risk from unwanted fire spread. To have the least impact on the landscape, natural fuel breaks were used to determine the WUI zone unit boundaries.

All WUI project units are considered a high priority for treatment for the protection of life and property. ENP boundary units are also considered a high priority for treatment in the protection of Park values from unwanted human ignitions originating both within and outside the boundary possibly impacting the Park or adjacent communities. WUI unit prioritization is based on the proximity and threat to values at risk (homes, highways, and developed areas). Park boundary unit prioritization is based on the likelihood of an unwanted human ignition occurring and causing unwanted fire to enter and impact the Park. WUI and Park boundary values correspond in terms of unit prioritization and are therefore considered as one prioritization value.

#### Exotic plant management:

Everglades NP is threatened by the establishment of several invasive exotic plants. Planned ignition treatments are one tool that may assist managers in limiting invasion of exotic plants into natural areas and reducing bio-mass of those species that have become established. Planned ignition treatments are currently being used in conjunction with other exotic plant control methods within Everglades NP. Unit prioritization is based on the extent of exotic plant invasion, efficacy of planned ignition treatments as a management tool in the area and consultation with the Exotic Vegetation Management Program (EVMP).

#### Mitigations:

- Specific mitigations in project unit selection have been developed in addition to the mitigations regarding management values (section 3.2.3).
- For FMU 3 Non-WUI pine rockland project units, adjacent units (pine blocks) will not be burned within one year of each other. This timing would also allow recovery time for rare plant populations occurring within adjacent blocks.

#### Adaptive Management:

New research and information is constantly considered to increase the Park’s ability to apply the best available knowledge to fire and fuels management. The planning and selection analysis is currently based on data gathered through the Park’s fire effects monitoring and prescribed fire monitoring programs. Analysis is done through computerized and non-automated methods. The computer programs primarily used for analysis are the Park’s geographic information system (GIS), and the National fire effects database and analysis program, FEAT-FIREMON Integration (FFI). Analyses are updated annually and can reflect changes in management objectives, values, Park conditions, and new scientific information applying adaptive management to fire and fuels management planning.

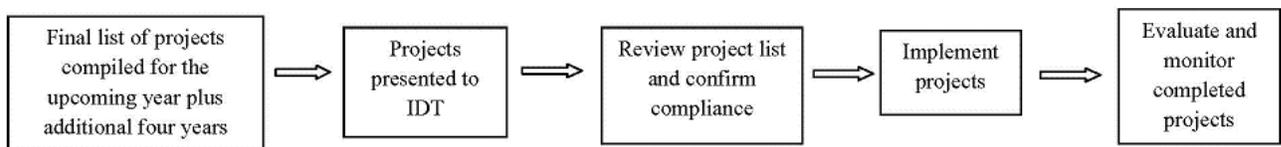
#### Annual review/update/certification:

Annually in June, an updated program of work including a list of proposed fuels treatment projects for the upcoming season, as well as well as candidate projects for an additional four years will be presented

to the interdisciplinary team (IDT). The IDT will review the proposed program of work and confirm that the changes and actions proposed are within the scope of the companion Environmental Assessment (EA) for the Fire Management Plan (FMP). If the nature of any part of the proposal is found to be outside the scope of the FMP's EA, additional environmental compliance will be required for the non-conforming actions. Once there is agreement among the IDT regarding the proposed program of work, the updated multi-year fuels treatment plan projects will be presented to the superintendent for approval and appropriate compliance consultation and documentation attained.

### 5-year review

Five years after final approval, and every five years thereafter, the Multi-year fuels treatment plan will be reviewed to determine whether it remains adequate to continue future fire and fuels management actions (Figure 17). Fire return intervals and prioritization values will be reassessed during this review and may occur at the annual review, as needed. If significant new changes, policy changes, or scientific knowledge needs to be incorporated into the Multi-year fuels treatment plan resulting in effects or consequences not evaluated in the current EA, the plan and EA will be revised. For all areas where effects have not changed, operations can continue under the approved plan and EA. If no substantial changes to the program direction or effects are discovered during the review, the plan may be renewed for an additional five years with proper documentation.



\*see Figure 16 Fuels Plan Flow Chart for process resulting in final list of projects

Figure 17. Planning and Compliance flow chart

### IDT Participants

- Fire Management Officer
- Fire Ecologist
- Prescribed Fire Specialist
- Chief of Biological Resource Division
- Botanist
- Wildlife Biologist
- Chief of Cultural Resources
- Environmental Compliance Division

### 4.4.2 Prescribed Fire Burn Plans (Planned Ignition treatments)

ENP uses the Interagency Prescribed Fire Planning and Implementation Procedures Guide (2013) to assist with planning, implementation, and evaluating planned ignition treatments. Planned ignition treatments are only implemented through an approved Prescribed Fire Plan that has been developed

from the fire management objectives listed in the Fire Management Plan. Each plan is prepared by a Burn Boss at the level equal to or higher than the complexity of the burn. The plan is then approved by the Agency Administrator and technically reviewed by a Burn Boss at the level equal to or higher than the complexity of the burn.

Each operational period of the planned ignition treatment is supplemented with an Incident Action Plan (IAP). IAPs are prepared to document specific treatment unit resource requirements and operational tactics for each operational period.

Prior to any planned ignition treatment, an Agency Administrator Ignition Authorization form must be signed by the Agency Administrator. This approval evaluates whether compliance requirements, prescribed fire plan’s elements, and internal and external notifications have been completed. Prior to ignition operations on the day of the burn, the Burn Boss will complete the Prescribed Fire Go/No-Go Checklist to assist in the on-site tactical decision as to whether or not to proceed with the operation. Each prescribed fire plan will require completion of a complexity analysis using the *Prescribed Fire Complexity Rating Guide*. The analysis assigns relative values to risk, potential consequences, and technical difficulty.

#### 4.4.2.1 Planning and Documentation

The following schedule describes the annual prescribed fire planning process:

Task	Date	Participants
Annual fuels treatment planning meeting <ul style="list-style-type: none"> <li>• Review burn objectives</li> <li>• Assess compliance needs</li> <li>• Evaluate implementation needs</li> </ul>	June	IDT: FMO, Fire Ecologist, Prescribed Fire Specialist, Chief of Biological Science division, Chief of Cultural Resource Division, Member of Environmental Compliance Division, member from USFWS Ecological Services Office
Complete Draft Annual Burn Plans	May 1	Burn Boss
Review Burn Plans	June-August	FMO, Technical Reviewer, Prescribed Fire Specialist, Chief of Biological Resources, Chief of Cultural Resources, Chief of Visitor and Resource Protection.
Approve Burn Plans	September	Agency Administrator

Table 11. Annual Prescribed Fire Planning Process

#### 4.4.3 Project Implementation

##### Qualifications

During prescribed fire planning and operations, all federal agencies will accept each other’s standards for qualifications. The minimum qualification standard is the National Wildland Fire Coordinating Group

(NWCG) *Wildland and Prescribed Fire Qualifications System Guide*, (PMS 310-1). State and local cooperators and contractors working on federal agency prescribed fires must meet the NWCG PMS 310-1 standards unless local agreements specify otherwise. No less than the organization described in the approved Prescribed Fire Plan may be used for implementation.

Notifications

In addition to the park and cooperator planned treatment notification (Appendix L), information about planned ignition treatments being conducted will be provided at visitor centers and entrance stations. Prior to planned ignitions, reconnaissance will verify that no backcountry users will be adversely impacted.

Wildland Fire Transition Plan

It is required that each burn plan include the process for declaring an unplanned ignition as a wildfire. In instances where the Wildland Fire Transition Plan is implemented, a decision document will be completed and suppression action will be initiated based on the outcomes of the analysis.

Reports

<b>Checklist of Wildland Fire Documents and Reports (Planned Ignitions)</b>	
<b>Document</b>	<b>Person Responsible for Completion</b>
DI-1202	Burn Boss/Dispatcher
ICS -201	Burn Boss
ICS-214, w/narrative	Burn Boss and/or Unit Leader
Resource Orders	PFS/Duty Officer/ Dispatcher
Fire Map/GPS data	Burn Boss/PFS
Archived Photographs	Personnel taking photos w/government equipment
Spot Weather Forecast	Burn Boss or Duty Officer
Fire Monitoring Reports (includes smoke emission and transport observations)	FEMO
Incident Action Plan (IAP)	Burn Boss/Duty Officer
After Action Review (AAR)	Burn Boss
Cost Tracking	Burn Boss/PFS/Duty Officer/FMO/FPMA

<b>Checklist of Wildland Fire Documents and Reports (Planned Ignitions)</b>	
<b>Document</b>	<b>Person Responsible for Completion</b>
Original signed prescribed fire plan	Prescribed Fire Specialist/Burn Boss
Prescribed Fire notification checklist	Dispatch
Agency Go-No Go Pre-Ignition Approval	Burn Boss/Prescribed Fire Specialist
Operational Go-No Go Checklist	Burn Boss
Post Fire Analysis	Prescribed Fire Specialist/Fire Ecologist
Smoke Dispersal information	Burn Boss/Prescribed Fire Specialist
FFS Authorization number	Burn Boss

Table 12. Documents required for Planned Ignitions

#### 4.4.4 Historical Fuel Treatments

A detailed history of planned ignition treatments may be found on the Everglades Fire Management server located at Headquarters. The first planned ignition treatment in ENP was in 1958. Wildland fire records from 1948 to the present are on record at the Robertson building. Older perimeters have been digitized and all wildland fire perimeters are in a GIS database.

#### 4.5 PREVENTION AND EDUCATION

The objectives of the Park's fire prevention program are to proactively mitigate damages and losses from unwanted wildland fires, reduce human caused ignitions, reduce suppression costs, mitigate the risks of wildland fire to private property and park resources, and protect the lives of firefighters and the public. This is accomplished by working with cooperating agencies, and educating park employees, the public, and our neighbors, not only in fire prevention, but also the natural role of fire in the Everglades ecosystem.

When wildfires occur, information will be made available by the DO to the public and park staff, to the level appropriate, for the incident. Park fire staff will provide relevant fire information to the park's information officer. Local media (newspapers, radio, and television) may be provided with briefings, photos, and interview opportunities. Any media access to fires will be in compliance with the

*Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book). Current information will be posted on the ENP Website ([www.nps.gov/ever](http://www.nps.gov/ever)) and/or the NPS's Fire News website ([www.nps.gov/fire/public/pub\\_firenews.cfm](http://www.nps.gov/fire/public/pub_firenews.cfm)). A fire information officer will be assigned as needed.

Because visitors usually visit one of the contact points in the park, there exists excellent opportunities to make fire information available to the public. Currently, the fire program has no dedicated staff position for fire information, education, and prevention. Fire management must rely upon park interpretation, ranger division, and park public affairs to convey information to the public along with fire management staff who are able to assume public information and education collateral duties. The following actions are particularly important during periods of high fire management activity.

- Timely and accurate information will be provided to the media and park visitors regarding the status of fire actions and suppression efforts.
- Informational handouts explaining the fire management program will be prepared and updated as necessary. During periods when planned ignition treatment operations are occurring, these handouts will be distributed to park visitors and the general public.
- Ongoing fire operations will be discussed through informal contacts with park personnel, park neighbors, and visitors.
- Adjacent landowners will be notified when wildland fire is a threat to residential areas.
- Fire management will maintain an internet and intranet website which will be used to educate the public and park staff on fire operations and activities.
- Fire management will participate in fire education outreach activities including participating in local community events, special presentations, on-site/off-site activities with educational groups, and participating in other interagency activities.
- Urban expansion will be monitored and fire management will continue to assess increasing need for fire information, prevention, and education.
- Fire management will request smoke advisories to be broadcast on NOAA weather radio when appropriate.

#### **4.6 FIRE MANAGEMENT PROGRAM STRUCTURE**

##### **Fire Management Officer**

The Fire Management Officer (FMO) is responsible for planning, implementing, and administration of all dimensions of fire management, including planned ignition treatments, wildland fire management strategies, fire ecology, and non-fire fuel reduction. The FMO is also the park Aviation Manager. The FMO supervises the senior program specialists which include the Prescribed Fire Specialist, Assistant Fire Management Officer, and the Fire Ecologist. The FMO supervises the Fire Program Management Assistant as well. The FMO is responsible for interagency coordination of the fire program. During periods of absence, in excess of lieu days, the FMO will assure that an Acting FMO is designated. The FMO is required to meet the Unit Fire Program Manager standards of the Interagency Fire Program Management Qualifications Standards (IFPM) for a moderate complexity program. FMO responsibilities are also outlined in the *Interagency Standards for Fire and Fire Aviation Operations* guide (Red Book). This position is supervised by the SFNRC Deputy Director who has oversight responsibility for the entire program.

##### **Assistant Fire Management Officer (AFMO)**

The Assistant Fire Management Officer (AFMO) is responsible for all aspects of fire operations and provides support to wildland fire, both planned and unplanned ignitions, and non-fire fuel treatments. Responsibilities of the AFMO include: planning and implementing wildland fire management training and qualification programs; maintaining fire readiness, which includes implementing the Step-Up Plan; fire prevention; maintenance and management of vehicles and equipment; maintaining cache inventory and replacement; and coordinating project work with other divisions. The AFMO supervises the Aviation Operations Specialist, the Station Managers, and Dispatch. During periods of absence, in excess of lieu days, the AFMO will assure that an Acting AFMO is designated. This position is required to meet the Assistant Fire Management Officer standards of the IFPM for a moderate complexity program.

### **Dispatcher/Flight Following**

The Dispatcher is responsible for a wide range of fire dispatch, logistical and administrative support functions. It is the responsibility of the dispatcher to provide daily initial attack and aircraft dispatch, and all related functions. The dispatcher is also responsible for incident resource ordering. The dispatcher will complete and process resource order requests for personnel, equipment, supplies, and/or aircraft for all types of incidents as needed. They coordinate with other dispatch organizations on mobilization, reassignment, and demobilization of resources, and respond to resource order requests from other dispatch offices. The dispatcher is in charge of determining the status of available resources and ensuring this information is made available in a timely manner. The dispatcher is also required to perform intelligence duties (resource availability status, management briefings, incident statistics, historical fire and weather analysis, indices charts, mobilization response data, situation reports). They review internal operating procedures and systems, make recommendations for improvement, and update/develop operating plans and mobilization guides. Daily duties include operating various dispatch communications systems and consolidating, reviewing, and inputting fire weather data into weather application software that transmits resultant probabilities and forecasts. This information is then relayed to field personnel and fire management staff. The dispatcher is also responsible for record keeping duties that include monitor/complete daily, weekly, monthly, yearly required records, reports, summaries and input data into a number of fire-related computer applications (incident qualification records, fire reporting systems, automated dispatch systems).

### **Prescribed Fire Specialist (PFS)**

The Prescribed Fire Specialist (PFS) assists the fire program including with wildland fire, both planned and unplanned, and non-fire fuels treatments. In coordination with park staff, the PFS develops fuels treatment objectives and prescriptions, and produces plans to meet fire management goals. The PFS implements fuels treatment plans; maintains all fire records and fire history data; and is responsible for maintaining all fire weather stations, weather observations, and field monitoring of fuels and other indices. During periods of absence, in excess of lieu days, the PFS will ensure that an Acting PFS is designated. This position is required to meet the Prescribed Fire and Fuels Specialist standards of the IFPM for a moderate complexity program.

### **Fire Ecologist**

The fire ecologist coordinates with Fire Management and other park staff on all wildland fire planning, compliance, operations, evaluation, and ecological monitoring activities. The fire ecologist provides oversight of the fire effects monitoring program, which includes continued implementation of the monitoring program, data analysis, and interpretation expertise for the monitoring program. Duties also include assisting fire staff with compliance issues such as updating the park FMP and EA.

Additional duties include developing sound ecological objectives for fire management activities based on analysis of existing fire ecology data, fire effects data, and fire management information in coordination with fire staff. The Fire Ecologist is the liaison between the Fire Management program and the research community, identifying research needs and integrating fire management activities into overall ecosystem restoration. The fire ecologist supervises the Lead Fire Effects monitor. While not subject to IFPM requirements, it is beneficial for this position to be well versed in fireline operations.

#### **Fire Program Management Assistant (FPMA)**

The Fire Program Management Assistant is responsible for budget tracking and management, payroll and timekeeping, administrative files and recordkeeping, processing personnel actions, managing travel, and fire support including logistics and dispatching.

#### **Duty Officer**

Everglades Fire and Aviation utilizes a Duty Officer (DO) system to assist the fire and aviation management staff. Duties include: coordinating daily activities; fire size-ups; setting priorities; mobilizing resources; and fire management planning, approval, and reporting. This is not a permanent staff position, and the DO assignment rotates among staff members. The responsibilities of the Duty Officer require a combination of fire management qualifications and fire program management skills. The DO must be well versed in park policies and procedures as well as resource mobilization processes. At a minimum the DO must be a fully qualified ICT 4, have detailed knowledge of park values at risk and special resource issues, and have a working knowledge of FMP.

#### **Fire Management Staff**

Although broken into various disciplines, the remaining fire management staff members support all aspects of fire and aviation management. All positions that are primary or secondary firefighters are required to meet the Training and Qualifications Standards of the IFPM for a moderate complexity program.

### **4.7 AVIATION OPERATIONS**

Everglades National Park has been delegated authority through Directors Orders 60 to manage the Park's aviation program, and is required to formulate a local Aviation Management Plan. Aviation use often offers the least impact and least invasive means of access to carry out research, fire and resource management, law enforcement and search and rescue activities. With approximately 90% of Everglades NP designated as wilderness, helicopter landings for planned fire management activities will be conducted in accordance with the Wilderness Act. Aircraft use occurs daily in Everglades NP. The web of aviation use touches to some degree nearly every employee. The complexity of the aviation program requires constant coordination and technical expertise. In addition, consistent interpretation of Departmental, Service and Park policy is necessary for the safe and efficient use of aircraft in the park. As a result, Everglades NP has identified the need for a park aviation plan as well as a full time helitack crew stationed at Homestead General Airport. The Park Aviation Manager (PAM), along with aviation staff, will be the contacts for inter and intra-park aviation related projects. However, it is imperative that supervisors and managers maintain a strong presence when their employees are engaged in aviation related activities. Supervisors and managers are ultimately responsible for their employees' actions.

The primary aviation related projects are resource management, research data collection, fire

operations, managerial overflights, reconnaissance, law enforcement and search and rescue. All pilots and aircraft are appropriately carded with the Office of Aviation Services (OAS) qualifications. Exemptions may occur when using cooperator aircraft on specific missions, which require OAS approval. Ground access to most areas is not feasible. This necessitates utilizing non-designated landing sites for rotor-wing aircraft. Almost every aviation activity falls within the special use category as defined in DM 351 DM 1.7, DO 60 and IHOG.

Currently, fixed-wing aircraft and their users include an on-call contract, this is a single engine fixed wing 182 Cessna aircraft used by all park field programs. The park is evaluating the fixed wing program, to include the possibility of acquiring a fleet aircraft in the near future.

Single engine air-tankers 802 Air tractors (SEAT's) are used during initial attack and large fire incidents. These additional aircraft are contracted using the call when needed list maintained by OAS. However, at this time Everglades NP and Big Cypress National Preserve are able to acquire the SEAT directly. The Florida Interagency Command Center (FICC) will be notified when a SEAT is ordered directly. When the state of Florida goes under a unified command and they have control of the SEAT, the SEAT has to be ordered through FICC daily.

All personnel involved in aviation operations for wildland fire, both planned and unplanned ignitions, shall carry current NWCG qualifications appropriate to their position, as demonstrated by a current and valid incident qualifications card ("red card").

All Park personnel regularly involved in aviation operations by virtue of their position in the organization shall meet and maintain currency of all the local safety and awareness training requirements listed in the Everglades Aviation Plan, National Park Service, U.S. Department of the Interior, OAS, and NWCG. Joint air operations with cooperating agencies may involve a diversity of aircraft and mission types and are conducted within the scope of cooperative agreements.

## **5.0 MONITORING AND EVALUATION**

### **5.1 LONG AND SHORT-TERM MONITORING**

Everglades Fire Management has developed both short and long-term monitoring programs to assess the effects of fire management activities.

Short-term monitoring will include documenting the fire environment and fire behavior during wildland fire incidents. Long-term monitoring will track changes in overall resource conditions through one or more fire cycles over time.

The goal of the monitoring program is to provide fire and resource managers with information necessary to conduct fire management activities, and to serve as a feedback mechanism to assess and evaluate the degree to which fire management objectives are being achieved. Information from fire effects monitoring program will assist managers in accomplishing the following:

- Make decisions regarding fire management, strategies, and tactics
- Compare actual planned ignition treatment effects with stated burn objectives
- Assess, validate, and refine current management prescriptions and techniques
- Identify concerns which require further research

### **5.2 NPS FIRE MONITORING HANDBOOK**

The Fire Monitoring Handbook (FMH) provides the underlying monitoring protocols for the ENP fire effects program. ENP has adapted and developed additional fire effects monitoring protocols to better assess fire effects on vegetation and monitor additional resources of concern (see Appendix I).

### **5.3 ADAPTIVE MANAGEMENT**

This Fire Management Plan represents an adaptive management approach for ENP (Figure 18). For the purposes of this plan, adaptive management is using scientific knowledge and experience to design and adapt fire management strategies which allow managers to achieve the goals and objectives set forth in this plan. The adaptive aspect of these strategies for fire management is the ability to obtain and use the best available science to plan, review, and adjust fire management practices as needed to achieve goals and objectives and mitigate unwanted impacts.

The fire effects monitoring program is a key component in implementing and maintaining an adaptive management framework in Everglades Fire and Aviation Management. The program provides managers with information necessary in the decision making process regarding fire management activities which include developing and refining strategies and tactics for planned ignitions, in order to achieve the goals set by the FMP. Data collected by the fire effects monitoring program, along with information gathered from park managers and researchers, will be integrated into fire management priorities, decisions, and actions. Fire Management will use the best available science to review and adjust fire management practices, as needed, to achieve fire and park management goals and objectives.

The following is the Adaptive Management Process for Fire Management

#### Applying Adaptive Management Approach

1. Monitor baseline data.
2. Identify quantifiable targets illustrating desired state of ecosystem.
3. Develop objectives.
4. Develop strategies to meet objectives.
5. Implement management actions.
6. Monitor variables to capture system response.
7. Assess if objectives have been met.
8. Evaluate objectives.
9. Evaluate the burn prescription and management strategies.
10. The best available science including fire monitoring data will be used to plan, review, and adjust fire management practices, as needed, to achieve goals and objectives and mitigate impacts.

# Adaptive Management Flow Chart

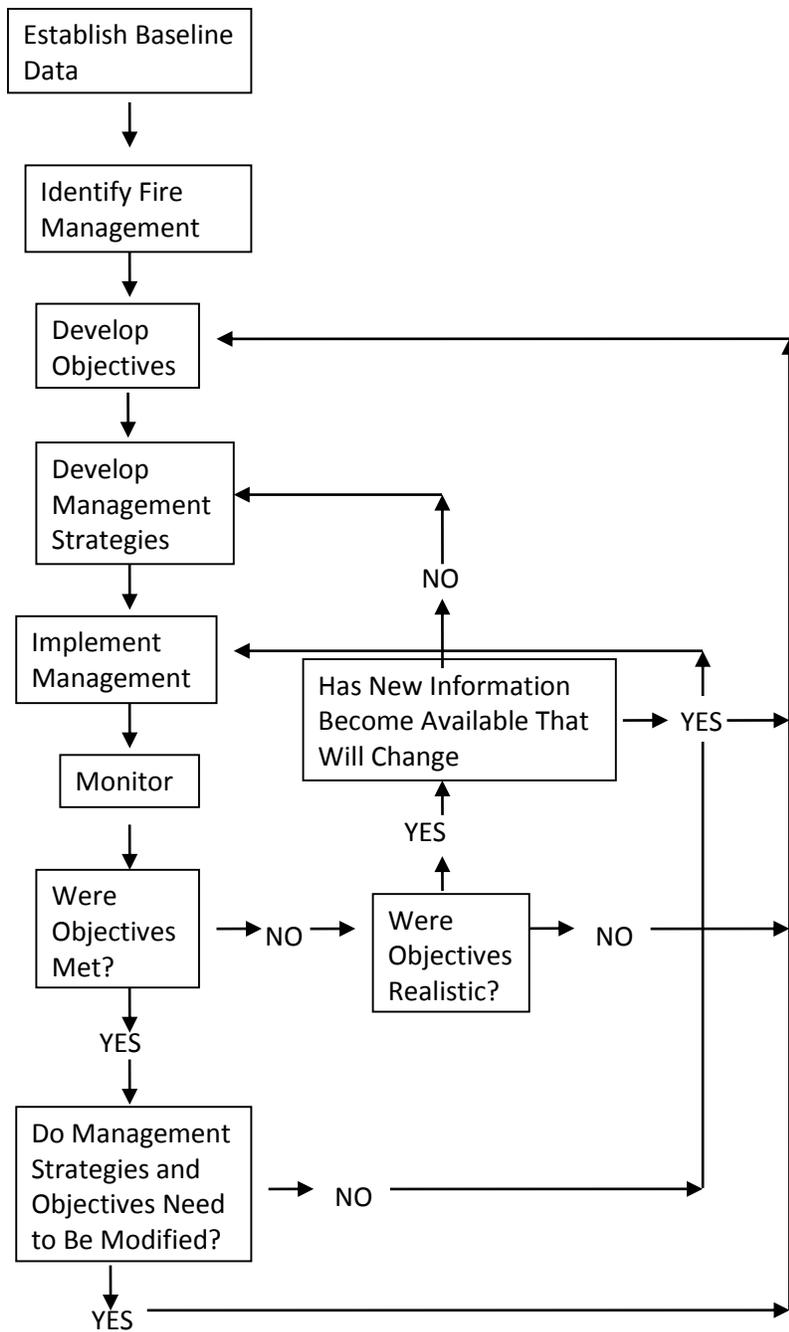


Figure 18. Adaptive Management Flow Chart

#### 5.4 FIRE MONITORING PLAN

The Everglades Fire Monitoring Plan (Appendix I) describes the levels of fire effects monitoring and the

methods used. The plan describes sampling design, schedule, data management, and analysis protocols.

## **6.0 ANNUAL PLAN REVIEW**

### **6.1 POLICY REVIEW**

All wildland fires and fire related incidents will be reviewed in accordance with *RM 18*, Wildland Fire and Program Reviews chapter and the *Interagency Standards for Fire and Fire Aviation Operations* (Red Book).

### **6.2 PARK SPECIFIC STANDARDS AND PROCEDURES**

Everglades Fire and Aviation will conduct reviews for one or more of the following purposes:

- To examine the progress of an ongoing incident to confirm effective decisions or correct deficiencies.
- To identify new or approved procedures, techniques, or tactics.
- To compile consistent and complete information to improve or refine park, regional, or national Fire Management Programs.
- To examine anomalous fire related incidents in order to determine cause(s), contributing factors, and where applicable, recommend corrective actions. If negligence is indicated, the circumstances will be reported and investigated in accordance with applicable regulations, policies, or guidelines.
- To determine the cost effectiveness of a fire operation.

### **6.3 FIRE MANAGEMENT PLAN UPDATES**

The annual FMP review will follow standards and procedures outlined in *RM 18*, Chapter 4. FMP reviews will be conducted annually, and a seven year comprehensive review is recommended. Reviews are intended to keep the document current with policy and ensure the fire management program is incorporating new knowledge, modernization, and using the best available science through adaptive management. The FMP will be reviewed and updated annually by the Interdisciplinary Team (IDT). The IDT will confirm that the changes and actions proposed are within the scope of the companion Environmental Assessment (EA) for the FMP. If the nature of any part of the proposal is found to be outside the scope of the FMP's EA, additional environmental compliance will be required for the non-conforming actions. Once there is agreement among the IDT regarding any changes, the updated FMP will be presented to the superintendent for approval and appropriate compliance consultation and documentation will be attained. A more comprehensive FMP revision will occur as needed, as determined by findings in the annual review.

## 7.0 REFERENCES

- Alexander, Taylor R. 1971. Sawgrass biology related to the future of the everglades ecosystem. Soil and Crop Science Society of Florida Proceedings 31: 72-74.
- Alexander, T.R., and A.G. Crook. 1984. Recent vegetational changes in southern Florida. Pages 99-210 in P.J. Gleason, editor. Environments of South Florida: Present and Past II. Miami Geological Society, Coral Gables.
- Agee, J.K. 1993. Fire ecology of Pacific Northwest Forests. Island Press, Wash. DC.
- Bass, Jr., O.L. Everglades National Park Wildlife Biologist. Personal communication, 2011.
- Bradley, K.A., and G.D. Gann. 1999. Status summaries of 12 rockland plant taxa in southern Florida. Institute for Regional Conservation. Report submitted to United States Fish and Wildlife Service, Vero Beach, Florida.
- Brown, J.K. 1995. Fire regimes and their relevance to ecosystem management. Pages 171-178 *In Proceedings of Society of American Foresters National Convention, Sept. 18-22, 1994, Anchorage, AK. Society of American Foresters, Wash. DC.*
- Carey, Jennifer H. 1992. *Pinus elliottii*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2010, May 14].
- Cohen, A. 1974. Evidence of fires in the ancient Everglades and coastal swamps of southern Florida. In: P.J. Gleason. Environments of South Florida: Present and Past, Memoir 2. Coral Gables, Florida: Miami Geological Society.
- Davis, S. M. and J. C. Ogden. 1994. Introduction. In: S. M. Davis and J. C. Ogden. Everglades: The Ecosystem and Its Restoration. Delray Beach, Florida.: St. Lucie Press: 3-8.
- Dees, C. S., J. D. Clark and F. T. Van Manen. 2001. Florida Panther Habitat Use in Response to Prescribed Fire. *The Journal of Wildlife Management* 65(1): 141-147
- Deuver, M.J., J.F. Meeder, L.C. Meeder, and J.M. McCollom. 1994. The climate of south Florida and its role in shaping the Everglades ecosystem. In: S. M. Davis and J. C. Ogden. Everglades: The Ecosystem and Its Restoration. Delray Beach, Florida: St. Lucie Press: 225-248.
- Florida Natural Areas Inventory FNAI. 2009. Guide to the Natural Communities of Florida - 2009 Update (draft). FNAI and FDEP, Tallahassee, Florida.
- Florida Natural Areas Inventory (FNAI). 2010. Guide to the natural communities of Florida: 2010 edition. Florida Natural Areas Inventory, Tallahassee, FL.
- Fire Regime Condition Class FRCC. 2003. Fire Regime Condition Class Definition. Retrieved May 14, 2010, from <http://www.nwcg.gov/teams/wfewt/message/FrccDefinitions.pdf>

Gann, G.D., K.A. Bradley, and S.W. Woodmansee. 2009. Floristic Inventory of South Florida Database. Institute for Regional Conservation. URL: <http://regionalconservation.org/ircs/database/database.asp>

Gunderson, Lance H., David P Brannon and Gary Irish. 1986. Vegetation Cover types of Shark River Slough, Everglades NP Derived from LANDSAT thematic mapper data. South Florida Reserach Center Report# SFRC-86/03. Everglades National Park, Homestead, Florida.

Gunderson and Loftus. 1993. The Everglades. In: W. H. Martin, S. G. Boyce, and A. C. Echternacht. Biodiversity of the Southeastern United States: Lowland Terrestrial Communities. New York: John Wiley and Sons: 199-255.

Gunderson. 1994. Vegetation of the Everglades: Determinants of Community composition. In: S. M. Davis and J. C. Ogden. Everglades: The Ecosystem and Its Restoration. Delray Beach, Florida.: St. Lucie Press: 323-340.

Gunderson, L.H., and J.R. Snyder. 1994. Fire patterns in the southern Everglades. Pages 291-305 in S.M. Davis and J.C. Ogden, editors. Everglades: The Ecosystem and its Restoration. St. Lucie Press, Delray Beach.

Hann, W.J., Bunnell, D.L. 2001. Fire and land management planning and implementation across multiple scales. *Int. J. Wildland Fire*. 10:389-403.

Hardy, C.C., Schmidt, K.M., Menakis, J.M., Samson, N.R. 2001. Spatial data for national fire planning and fuel management. *International Journal of Wildland Fire* 10:353-372.

Herndon, A., and D. Taylor. 1986. Response of a *Muhlenbergia* prairie to repeated burning: changes in above-ground biomass. South Florida Research Center Report# SFRC-86/05. Everglades National Park, Homestead, Florida.

Hilsenbeck, C.E., R.H. Hofstetter, and T.R. Alexander. 1979. Preliminary synopsis of major plant communities in the east Everglades area: vegetation map supplement. Unpublished Report Department of Biology, University of Miami, Miami, Florida.

Hofstetter, Ronald H. 1974. The effect of fire on the pineland and sawgrass communities of southern Florida. University of Miami.

Hofstetter, Ronald H. 1973. Fire in the ecosystem: an ecological study of the effects of fire on the wet prairie, sawgrass glades, and pineland communities of south Florida. University of Miami.

Kloor, Keith. (n.d.) *Forgotten Islands*. *True Nature*. Retrieved May 14, 2010, from <http://www.audubonmagazine.org/truenature/truenature0107.html>

Kushlan, J.A. 1990. Freshwater marshes. Pages 324-363 in R.L. Myers and J.J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press, Orlando.

Lockwood, J. L., M.S. Ross, and J.P. Sah. 2003. Smoke on the water: the interplay of fire and water flow on Everglades Restoration. *Frontiers Ecol. Environ.* 1(9): 462-468.

Lockwood, J.L. and LaPuma, D.A. 2004. Fire effects on Cape Sable seaside sparrow demography: 2004 final report. A report to the US Fish and Wildlife Service, Vero Beach, FL: 31 December 2004.

Loope, L.L., and V.L. Dunevitz. 1981. Impact of fire exclusion and invasion of *Schinus terebinthifolius* on limestone rockland pine forests of southeastern Florida. Report T-645. South Florida Research Center, Everglades National Park, Homestead, Florida.

Loveless, C.M. 1959. A study of the vegetation in the Florida Everglades. *Ecology* 40:1-9.

McPherson, K. (2008). Everglades: Flora and Fauna. *Forest Encyclopedia Network*. Retrieved May 14, 2010, from <http://www.forestencyclopedia.net/p/p4/p142/p143/p269/view>

LANDFIRE: LANDFIRE Rapid Assessment Reference Condition Models. <http://www.landfire.gov/index.php> [2007, February 8].

Mutch, Robert. Wildland Fires and Ecosystems – A Hypothesis. *Ecology* 51(6): 1046-1051.

National Park Service, United States Department of the Interior NPS. 1991. *Fire Management Plan: Everglades National Park*.

National Park Service. 2005. Fire Ecology and Monitoring. Wildland Fire Management Reference Manual – 18, Chapter 11.

National Park Service. 2001 Fire Monitoring Handbook. Boise (ID): National Interagency Fire Center. 274p.

National Park Service, United States Department of the Interior NPS. 2006. *Draft Exotic Plant Management Plan Environmental Impact Statement: South Florida and Caribbean Parks*.

National Park Service, United States Department of the Interior NPS. 2007. Status of the Cape Sable seaside sparrow 2007 survey report. Retrieved May 14, 2010, from <http://www.nps.gov/ever/parknews/status-of-cape-sable-seaside-sparrow-2007-survey-report.htm>

National Park Service, United States Department of the Interior NPS. 2009. Section 7 Consultation: EVERGLADES NATIONAL PARK 2009 Prescribed Fire / Wildland Fuels Treatment.

National Park Service, United States Department of the Interior NPS. 2010. Everglades National Park website. Retrieved May 14, 2010, from <http://www.nps.gov/ever/naturescience/naturalfeaturesandecosystems.htm>

National Park Service, United States Department of the Interior NPS. 2011. Everglades National Park website. Retrieved July 8, 2011, <http://www.nps.gov/ever/naturescience/floridapantherindepth.htm>

Olmstead I.C. and L.L. Loope. 1984. Plant communities of Everglades National Park. In: P.J. Gleason. Environments of South Florida: Present and Past, Memoir 2. Coral Gables, Florida: Miami Geological Society.

Possley, J., and J. Maschinski. 2006. Competitive effects of the invasive grass *Rhynchelytrum repens* (Willd.) CE Hubb. on pine rockland vegetation. *Natural Areas Journal* 26:391-395.

Robertson, W.B., Jr. 1953. A survey of the effects of fire in Everglades National Park. United States Department of the Interior, National Park Service, Homestead, Florida.

Ross, M.S., J.J. O'Brien, and L.d.S. Sternberg. 1994. Sea-level rise and the reduction in pine forests in the Florida Keys. *Ecological Applications* 4:144-156.

Robertson, W.B. and O.L. Bass, Jr., 1986. Ecology and Population Dynamics of the Florida Panther in Everglades National Park. South Florida Research Center, Everglades National Park; Homestead, Florida.

Rothman, H. K. 2005. A test of adversity and strength: wildland fire in the National Park System. US Department of Interior, National Park Service, Washington, D.C.

SC Department of Natural Resources SCDNR. 2005. Comprehensive Wildlife Conservation Strategy. SC Department of Natural Resources. URL: <http://www.dnr.sc.gov/cwcs/pdf/Woodstork.pdf>

Schmidt, K.M., Menakis, J.P. Hardy, C.C., Hann, W.J., Bunnell, D.L. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. General Technical Report, RMRS-GTR-87, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Scott, J.H. and R.E. Burgan. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model. United States Department of Agricultural, Forest Service. General Technical Report RMRS-GTR-153.

Snow, S. Everglades National Park Wildlife Biologist. Personal communication, 2011.

Snyder, J.R., A. Herndon, and W.B. Robertson, Jr. 1990. South Florida rockland. Pages 230-280 in R.L. Myers and J.J. Ewel, editors. *Ecosystems of Florida*. University of Central Florida Press, Orlando.

Snyder, J. R. 1991. Fire regimes in subtropical south Florida. In: *Proceedings of the 17th Tall Timbers Fire Ecology Conference* 17: 303-319.

Steiner, T.M., O.L. Bass, Jr., and J.A. Kushlan. 1983. Status of the eastern indigo snake in southern Florida National Parks and vicinity. South Florida Research Center Report SFRC-83/01, Everglades National Park; Homestead, Florida.

Stevens, J. T., and B. Beckage. 2009. Fire Feedbacks Facilitate Invasion of Pine Savannas by Brazilian Pepper (*Schinus terebinthifolius*). *New Phytologist*. 184(2): 365-375

Sturdevant, Jay T. 2009. Experimental study of local fire conditions and effects on surface or near-surface archeological resources at National Park Service units – Midwest Region. NPS Midwest Archeological Center, Lincoln Nebraska.

Taylor, D.L. 1983. Fire management and the Cape Sable seaside sparrow. Pages 147-152 in T. Quay, J. Funderburg, D. Lee, E. Potter, and C. Robbins, editors. The Seaside Sparrow, its Biology and Management. North Carolina State Museum of Natural History, Raleigh.

Uchytel, Ronald J. 1992. *Cladium jamaicense*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2010, May 14].

United States Fish and Wildlife Service USFWS. 1999. South Florida multi-species recovery plan. United States Fish and Wildlife Service South Florida Ecological Services Office.

United States Fish and Wildlife Service USFWS. 2003 Draft Species Conservation Guidelines South Florida: Cape Sable seaside sparrow. United States Fish and Wildlife Service. URL: [http://fish.btstest.com/region4/verobeach/images/pdflibrary/Cape\\_Sable\\_Seaside-sparrow\\_Conservation\\_Guidelines.pdf](http://fish.btstest.com/region4/verobeach/images/pdflibrary/Cape_Sable_Seaside-sparrow_Conservation_Guidelines.pdf)

United States Fish and Wildlife Service USFWS. 2010a. Species Assessment Form for the *Anaea troglodyta floridalis*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/I087\\_I01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/I087_I01.pdf)

United States Fish and Wildlife Service USFWS. 2010b. Species Assessment Form for the *Strymon acis bartrami*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/I07G\\_I01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/I07G_I01.pdf)

United States Fish and Wildlife Service USFWS. 2010c. Species Assessment Form for the *Argythamnia blodgettii*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q045\\_P01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q045_P01.pdf)

United States Fish and Wildlife Service USFWS. 2010d. Species Assessment Form for the *Chamaesyce deltoidea ssp. pinetorum*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q3HI\\_P01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q3HI_P01.pdf)

United States Fish and Wildlife Service USFWS. 2010e. Species Assessment Form for the *Digitaria pauciflora*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q1VG\\_P01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q1VG_P01.pdf)

United States Fish and Wildlife Service USFWS. 2010f. Species Assessment Form for the *Sideroxylon reclinatum ssp. austrofloridense*. United States Fish and Wildlife Service. URL: [http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q3IM\\_P01.pdf](http://ecos.fws.gov/docs/candidate/assessments/2010/r4/Q3IM_P01.pdf)

United States Fish and Wildlife Service USFWS. 2011. Everglades Snail Kite Fact Sheet. United States Fish and Wildlife Service. Retrieved July 8, 2011 URL: <http://www.fws.gov/verobeach/BirdsPDFs/EvergladesnailkiteFactSheet.pdf>

URS Corporation Southern, Institute for Regional Conservation, and Muller and Associates, Inc. 2007. Miami-Dade County environmentally endangered lands program management plan, part II: management of specific habitat types. Chapter 1: The pine rockland habitat. Miami-Dade County, Miami, Florida.

Wade, D., J. Ewel, and R. Hofstetter. 1980. Fire in South Florida ecosystems. Forest Service General Technical Report SE-17. Southeastern Forest Experiment Station, Asheville, North Carolina.

Williams, B.K., Szaro, R.C., Shapiro, C.D. 2007. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

Zouhar, Kristin; Smith, Jane Kapler; Sutherland, Steve; Brooks, Matthew L. 2008. Wildland fire in ecosystems: fire and nonnative invasive plants. Gen. Tech. Rep. RMRS-GTR-42-vol. 6. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 355 p.

## **8.0 GLOSSARY**

### **8 ½ Square Mile Area**

The portion of unincorporated Miami-Dade County that lies west of the L-31 canal, north of SW 168 Street, and east and of Everglades NP, within the Mutual Response Zone.

### **Adaptive Management**

A systematic process of continually improving management practices by learning from the outcome of operational programs.

### **Burned Area Emergency Response Teams (BAER)**

A standing or ad hoc group of technical specialists that develop and may implement portions of the Burned Area Emergency Stabilization Plans.

### **BEHAVE**

A system of interactive computer programs for modeling fuel and fire behavior.

### **Burning Index (BI)**

An estimate of the potential difficulty of fire containment as it relates to the flame length at the head of the fire.

### **Class I Airshed**

Geographic areas designed by the Clean Air Act subject to the most stringent restrictions on allowable increment of air quality deterioration. Class I areas include Forest Service wildernesses and nation memorial parks over 5,000 acres, National Parks exceeding 6,000 acres, international parks, as well as other designated lands.

### **Condition Class**

Depiction of the degree of departure from historical fire regimes, possibly resulting in alternations of key ecosystem components. These classes categorize and describe vegetation composition and structure conditions that currently exist inside the Fire Regime Groups. Based on the coarse-scale national data, they serve as generalized wildfire rankings. The risk of loss of key ecosystem components from wildfires increases from Condition Class 1 (lowest risk) to Condition Class 3 (highest risk).

### **Confinement**

The strategy employed in appropriate management responses where a fire perimeter is managed by a combination of direct and indirect actions and use of natural topographic features, fuel, and weather factors.

### **Containment**

The status of a wildfire suppression action signifying that a control line has been completed around the fire, and any associated spot fires, which can reasonably be expected to stop the fire's spread.

### **Contingency Actions**

A back-up plan of action when actions described in the primary plan are no longer appropriate. Contingency actions are required to be taken when the result exceeds its intent. Actions are taken to return the project to its intended design.

**Controlled**

The completion of control line around a fire, any spot fires there from, and any interior islands to be saved; burned out any unburned area adjacent to the fire side of the control lines; and cool down all hot spots that are immediate threats to the control line, until the lines can reasonably be expected to hold under the foreseeable conditions.

**Cooperator**

Local agency or person who has agreed in advance to perform specified fire control services and has been properly instructed to give such service.

**Coordination Center**

Term used to describe any facility that is used for the coordination of agency or jurisdictional resources in support of one or more incidents.

**Delegation of Authority**

A statement provided to the incident commander by the agency executive delegating authority and assigning responsibility. The delegation of authority can include objectives, priorities, expectations, constraints and other considerations or guidelines as needed.

**Dispersion Index**

A numerical index from 0 to infinity supplied daily by the NWS that estimates the atmosphere's capacity to distribute particles and gases emitted by a wildland fire.

**Escaped Fire**

A fire which has exceeded or is expected to exceed initial attack capabilities or prescription.

**Extended Attack**

Suppression activity for a wildfire that has not been contained or controlled by initial attack or contingency forces and for which more firefighting resources are arriving, en route, or being ordered by the initial attack incident commander.

**Fire Management Plan (FMP)**

A plan, which identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (Planned and Unplanned Ignitions). The plan is supplemented by a preparedness plan, pre-attack plan, multi-year fuels plan, and fire monitoring plan.

**Fire Management Unit (FMU)**

A land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, major fire regime groups, etc. that set it apart from the characteristics of an adjacent FMU. The FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

**Fire Planning Unit (FPU)**

A Fire Planning Unit consists of one or more Fire Management Units. FPUs may relate to a single

administrative unit, a sub-unit, or any combination of units or sub-units. FPU are scalable and may be contiguous or non-contiguous. FPU are not predefined by agency administrative unit boundaries, and may relate to one or more agencies.

### **Fire Regime**

Description of the patterns of fire occurrences, frequency, size, severity, and sometimes vegetation and fire effects as well, in a given area or ecosystem. A fire regime is a generalization based on fire histories at individual sites. Fire regimes can often be described as cycles because some parts of the histories usually get repeated, and the repetitions can be counted and measured, such as fire return interval.

### **Fire Regime Current Condition Class**

A qualitative measure classified into three classes describing the relative degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure, and fuel loadings.

### **Fire Return Interval**

A fire return interval is the number of years between fires at a specific location or plant community. Fire return interval range is the span of years between the shortest and longest periods between fires in a vegetation type.

### **Fire Return Interval Departure**

The degree of departure from the defined fire return interval.

### **Fuel**

All materials that may be burned, including duff, logs, branches, needles, and twigs. Fuel is divided into four size classes:

1-hour time lag - < ¼ inch (grass, litter, duff)

10-hour time lag – ¼ inch – 1 inch (twigs and small stems)

100-hour time lag – 1 inch – 3 inches (branches)

1000-hour time lag - > 3 inches (large branches and stems)

### **Fuel bed depth**

The fuel bed is the accumulation of dead, woody residue on the forest floor. It begins at the top of the duff layer and above. It includes litter, dead limbwood and bolewood from tree species, as well as dead material from shrub, herbaceous, and grass species.

### **Fuel Loading**

Fuel loading is the amount of fuel or flammable vegetation in a given area.

### **Fuel Management**

The act or practice of controlling flammability and reducing resistance to control of wildland fuels through non-fire, chemical, biological, or manual means, or by fire, in support of land management objectives.

### **Hazardous Fuels**

Excessive live and/or dead wildland fuel accumulations having the potential for the occurrence of

uncharacteristically intense wildland fires.

**Initial Action**

The actions taken by the first resources to arrive at a wildfire. Initial Action may include the full spectrum of responses to monitoring to aggressive containment.

**Initial Attack**

Initial action focused on the aggressive containment of the fire perimeter.

**Interagency Fire Program Management Qualifications Standards and Guide (IFPM)**

Minimum qualifications standards for key fire management positions developed by the Interagency Fire Program Qualifications Task Group and adopted by the Departments of Interior and Agriculture.

**Interagency Standards for Fire and Fire Aviation Operations (Red Book)**

A document that provides a reference for current operational policies, procedures, and guidelines for managing wildland fire and fire aviation operations.

**Incident Qualification and Certification System (ICQS)**

The fire qualifications and certification system utilized by the Departments of Agriculture and Interior and many state wildland fire agencies.

**Mean Fire Return Interval**

Arithmetic average of all fire intervals in a given area over a given time.

**Minimum Impact Suppression Techniques (MIST)**

The application of strategy and tactics that effectively meet suppression and resource objectives with the least environmental, cultural and social impacts.

**Mitigation Actions**

On-the-ground actions that will serve to increase the defensibility of the Maximum Management Area (MMA); check, direct, or delay the spread of fire; and minimize threats to life, property, resources and special values at risk.

**Mutual Response Zone (MRZ)**

A geographical area between two or more jurisdictions into which those agencies would respond on initial attack.

**National Fire Danger Rating System (NFDRS)**

A uniform fire danger rating system that focuses on the environmental factors that control the moisture content of fuels.

**National Fire Plan**

A plan prepared by agencies of the U.S. Departments of Agriculture and Interior to reduce adverse effect from unwanted wildland fires.

**National Wildfire Coordinating Group (NWCG)**

A group formed under the direction of the Secretaries of the Interior and Agriculture to improve the coordination and effectiveness of wildland fire activities and provide a forum to discuss, recommend appropriate action, or resolve issues and problems of substantive nature.

**Preparedness Plan**

A written plan providing for timely recognition of approaching critical fire situations, priority setting, the deployment of forces, and other actions to respond to those situations.

**Planned Ignition Treatment (Prescribed Fire)**

Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

**Prevention**

Activities directed at reducing the incidence of fires, including public education, law enforcement, personal contact, and reduction of fuel hazards (fuels management).

**Remote Automatic Weather Station (RAWS)**

RAWS are instruments that collect, store, and forward data to a computer system at the National Interagency Fire Center (NIFC) in Boise, Idaho, via the Geostationary Operational Environmental Satellite (GOES). The GOES is operated by the National Oceanic and Atmospheric Administration (NOAA). These data are automatically forwarded to several other computer systems including the Weather Information Management System (WIMS) and the Western Regional Climate Center (WRCC) in Reno, Nevada.

**Resource Management Plan (RMP)**

Park planning document that describes resource management goals and objectives for NPS units.

**Solution hole**

A natural depression in a land surface occurring in limestone.

**Weather Information Management System (WIMS)**

A centralized weather data processing system at which daily fire danger ratings are produced.

**Wildfire**

An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped Unplanned Ignitions events, escaped planned ignitions, and all other wildland fires where the objective is to put the fire out.

**Wildland Fire**

Any non-structure fire that occurs in the wildland. Two distinct types of wildland fire have been defined and include wildfire (unplanned ignition) and prescribed fire (planned ignition).

**Wildland Fire Decision Support System (WFDSS)**

A system that is intended to assist fire managers and analysts in making strategic and tactical decisions for fire incidents. It is designed to replace the WFS (Wildland Fire Situation Analysis), Wildland Fire Implementation Plan (WFIP), and Long-Term Implementation Plan (LTIP) processes with a single process

that is easier to use, more intuitive, linear, scalable, and progressively responsive to changing fire complexity.

### **Wildland Urban Interface**

Wildland urban interface (WUI) refers to areas where wildland fire may threaten homes, communities and other development areas. The WUI zone is defined as any area that can be impacted by a wildland fire within an 8 hour period, one operational period, from the Park boundary. The fire spread model Behave was used based on fire behavior fuel model GR 6 and moderate environmental conditions. The outputs from this analysis indicated that an ignition in this fuel type under these conditions would travel 6 miles in one operational period.

### **Unplanned Ignition (Wildfire)**

The initiation of a wildland fire by lightning, volcanoes, unauthorized human-caused fires and escaped planned, where the objective is to protect values at risk while meeting resource objectives specified in the Land Management Plan (LMP)/Resource Management Plan (RMP).

## 9.0 FIRE MANAGEMENT PLAN ACRONYMS

AAR – After Action Review  
AD – Administratively Determined  
AFMO – Assistant Fire Management Officer  
BAER – Burned Area Emergency Rehabilitation program  
BI – burning index  
CSSS – Cape Sable Seaside Sparrow  
CWN – call when needed list  
DEP – Department of Environmental Protection  
DO – Duty Officer  
DOI – Department of the Interior  
DOF – Division of Forestry  
EA – environmental assessment  
ENP – Everglades National Park  
EEWS – East Everglades Wilderness Study  
FEMO – Fire Effects Monitors  
FICC – Florida Interagency Command Center  
FMH – Fire Monitoring Handbook  
FMO – Fire Management Officer  
FMP – Fire Management Plan  
FMU – fire management units  
FONSI – Finding of No Significant Impact  
FPMA – Fire Program Management Assistant  
FPU – Fire Planning Unit  
FRCC – Fire Regime Condition Class  
FRI – Fire Return Interval  
FFS – Florida Forest Service (Formerly Florida Division of Forestry)  
FPU – Fire Planning Unit  
GMP – General Management Plan  
HID – Hole-in-the-Donut  
IA – initial attack  
IAP – incident action plans  
IC – Incident Commander/Initial Attack Incident Commander  
IDT – Interdisciplinary Team  
IFMP – Interagency Fire Program Management  
IFPM - Interagency Fire Program Management Qualifications Standards and Guide  
IQCS – Incident Qualification and Certification System  
LAL – lightning activity level  
LMP – land management plan  
LTIP – long-term implementation plan  
MIST – minimum impact suppression tactics  
MRZ – mutual response zone  
NEPA – National Environmental Policy Act  
NFDRS – National Fire Danger Rating System  
NPS – National Park Service

NWCG – National Wildlife Coordinating Group  
NWR – National Wildlife Refuge  
OAS – Office of Aviation Services  
PAM – Park Aviation Monitor  
PFS – Prescribed Fire Specialist  
RAWS – Remote Automated Weather Stations  
“red card” – incident qualifications card  
RMP – Resource Management Plan  
SEAT – single-engine air tanker  
SFNRC – South Florida Natural Resources Center  
USFWS – U.S. Fish and Wildlife Service  
WFDSS – Wildland Fire Decision Support System  
WFIP – Wildland Fire Implementation Plan  
WIMS – Weather Information Management System  
WUI – wildland urban interface