

CANAVERAL NATIONAL SEASHORE FIRE MANAGEMENT PLAN

DRAFT

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1.0 INTRODUCTION

1.1 Reason for Development of Fire Management Plan

National Park Service (NPS) policy (*Director's Order #18: Wildland Fire Management*, website <http://www.fire.nps.gov/fire/policy/do18/do18.htm>) requires that every park unit with burnable vegetation develop a Fire Management Plan (FMP) approved by the park superintendent. The FMP serves as a detailed and comprehensive program of action to implement fire management policy principles and goals, consistent with the unit's resource management objectives. This FMP outlines the fire management program for 15,700 acres at Canaveral National Seashore (hereinafter referred to as the "seashore," "park," or by NPS alpha code "CANA"). The CANA fire management program, guided by federal policy and the seashore's resource management objectives, will serve to protect life, property, and natural and cultural resources.

A CANA Fire Management Plan was completed and approved in 1999, and supported by National Environmental Policy Act (NEPA) compliance. This FMP is a revision that incorporates all changes that have occurred since that time.

1.2 Collaborative Processes

Interagency cooperation is paramount at CANA. Located at the northernmost end of Kennedy Space Center, the southern two-thirds of the property within authorized seashore boundaries are owned by the National Atmospheric and Space Administration (hereinafter referred to as NASA) (Figure 1). NASA bought this property in the 1950s and set it aside as a buffer to provide security for the space program. The NPS jointly manages the majority of this area with the U.S. Fish and Wildlife Service (hereinafter referred to as the USFWS) through a cooperative agreement. The adjacent Merritt Island National Wildlife Refuge (hereinafter referred to as MINWR) manages natural resources and general operations, including fire management, within the joint area, while the NPS is responsible for interpretation, research, and protection of archeological and historic sites (Figure 2). Authorized seashore boundaries encompass 57,662 acres. This FMP specifically pertains to the 15,700 acres for which CANA has fire management responsibility.

In regard to fire management, CANA collaborates with NASA, MINWR, the Florida Division of Forestry, area fire departments, and local law enforcement agencies.

1.3 Implementation of Fire Management Policy

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

Figure 1 - Location of Canaveral NS

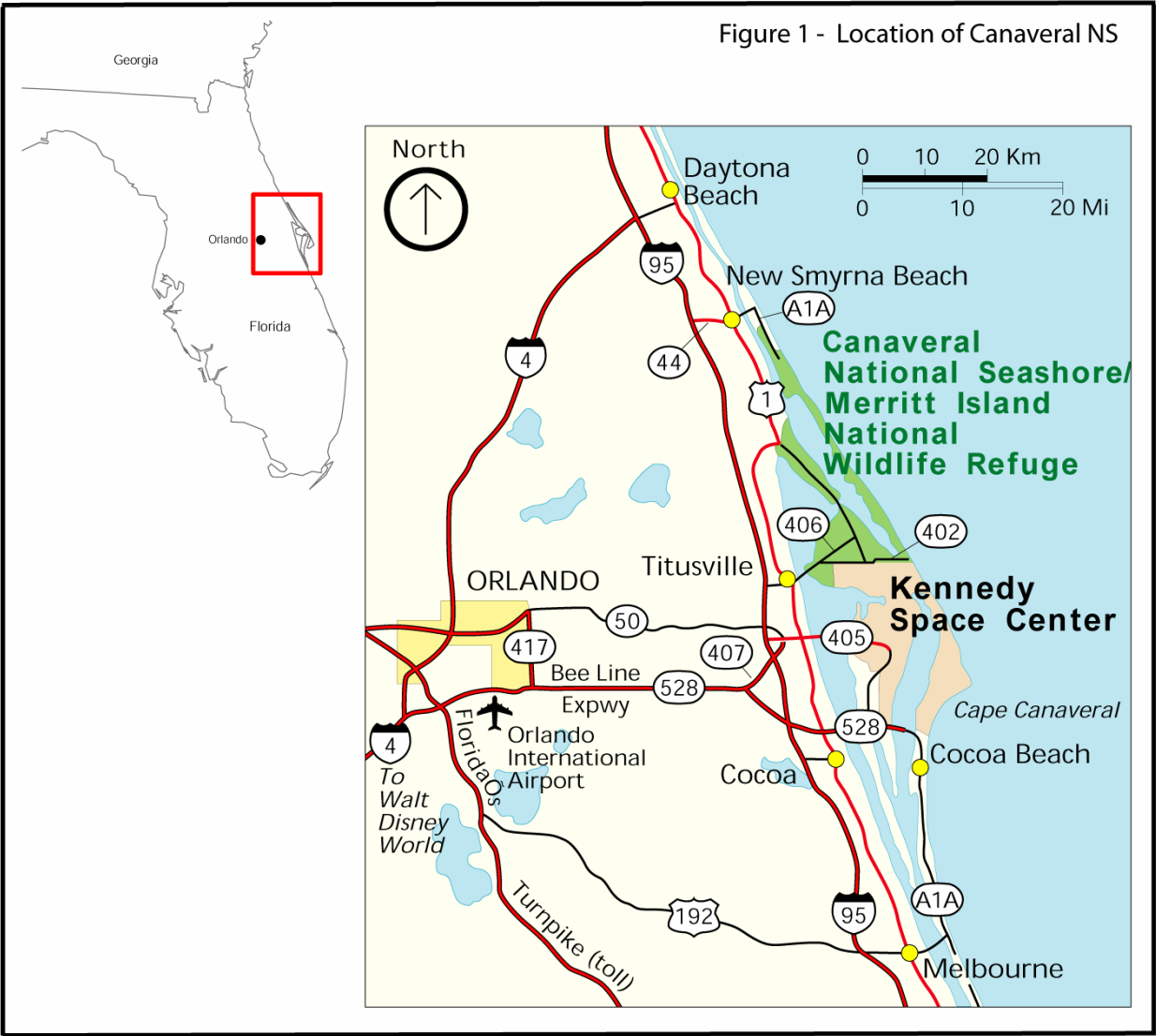
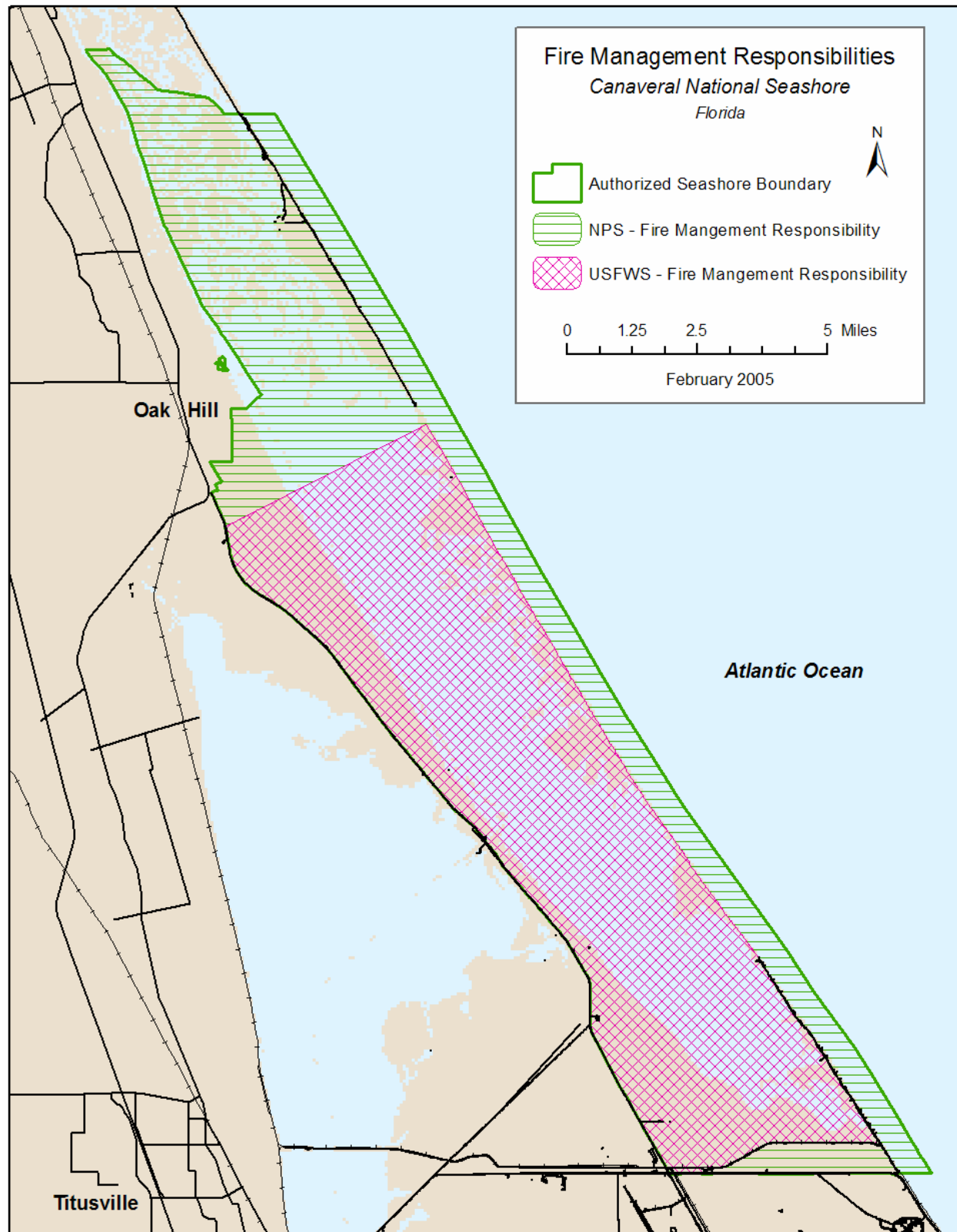


Figure 2: Fire Management Responsibilities within Authorized Seashore Boundary



1.3.1 2001 Federal Fire Policy

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

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

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

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

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

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

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

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

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

Its three guiding principles are:

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

1.4 Environmental Compliance

In association with this plan, an Environmental Assessment that meets the requirements of the National Environmental Policy Act, including compliance with Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act, is included as Appendix 13.3.

1.5 Authorities for Implementing Fire Management Plan

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

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

Authority for entering into interagency agreements includes the Organic Act of 1916; the reciprocal Fire Protection Act (1955); and the Interagency Agreement Between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service, and USDA National Forest Service (1982).

2.0 RELATIONSHIP TO LAND MANAGEMENT PLANNING AND FIRE POLICY

2.1 Federal Fire Management Policy

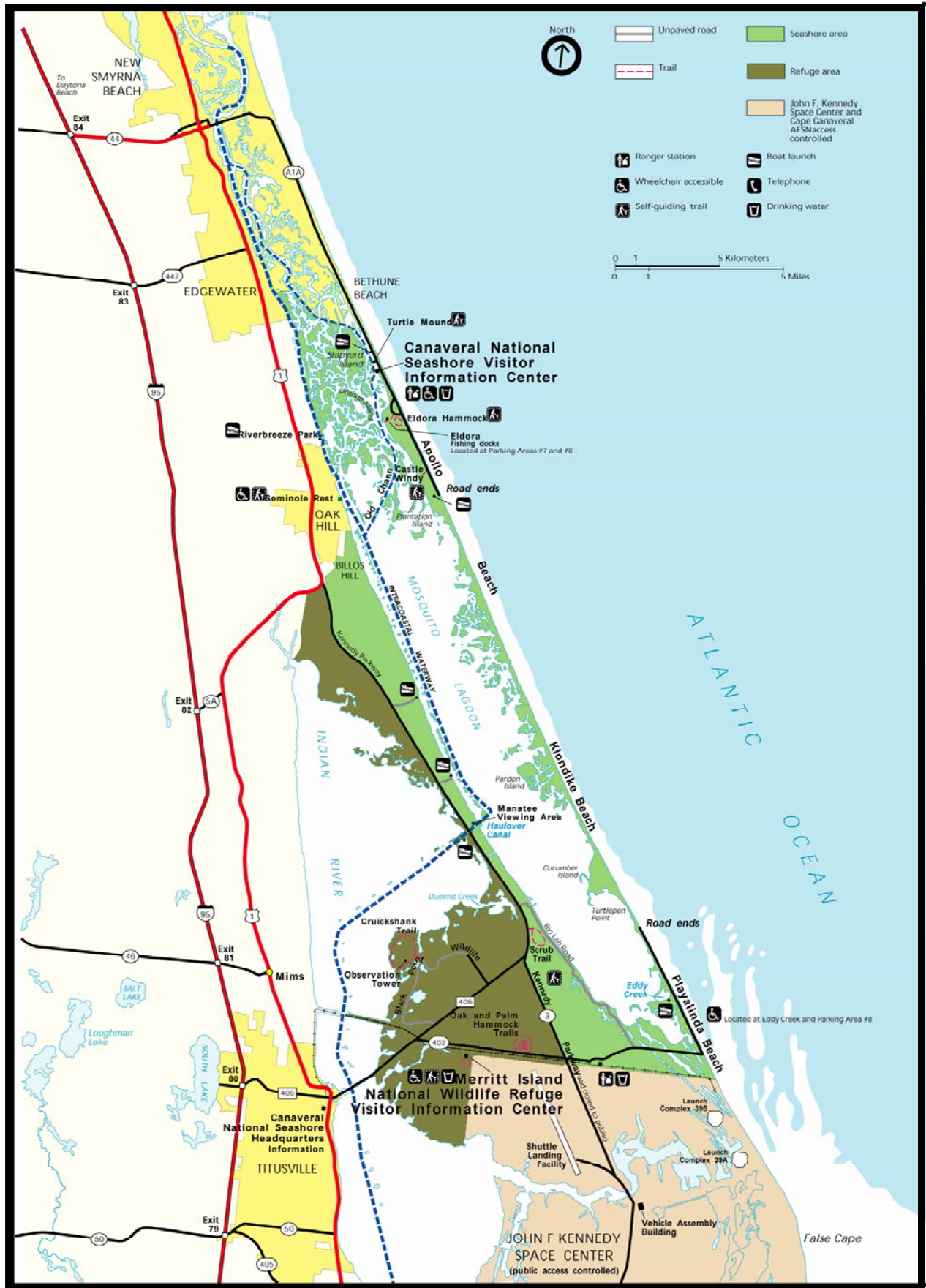
The *2001 Federal Fire Policy*, discussed in section 1.3.1, is the product of a collaborative effort involving the U.S. Department of the Interior, the U.S. Department of Agriculture, the Department of Energy, the Department of Defense, the Department of Commerce, the U.S. Environmental Protection Agency,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

2.2 Establishment of Canaveral National Seashore

Canaveral National Seashore was established in 1975 by Public Law 93-626 “...to preserve and protect the outstanding natural, scenic, scientific, ecological, and historic values of certain lands, shoreline, and waters of the State of Florida, and to provide for public outdoor recreation use and enjoyment of the same....” The authorized seashore boundary encompasses 57,662 acres, including barrier island, lagoon, coastal hammocks, pine flatwoods, and offshore waters.

Located within the Mosquito Lagoon Watershed on Florida's central Atlantic coast, CANA represents an excellent example of a relatively stable barrier beach backed by a productive lagoon system (Figure 3). Mosquito Lagoon is the northernmost water body of the Indian River Lagoon System. This estuary system contains one of the highest species diversities of any estuary in North America (Provancha et al. 1992). The far-reaching ecological importance of this area has been demonstrated by the variety of agencies that presently protect the waters and biodiversity of Mosquito Lagoon. In April of 1990, the U.S. Environmental Protection Agency designated Mosquito Lagoon, along with the rest of the Indian River Lagoon complex, an Estuary of National Significance. The State of Florida has also designated Mosquito Lagoon as an Outstanding Florida Water. Mosquito Lagoon was additionally designated an Aquatic Preserve by the State of Florida through the Florida Aquatic Preserve Act of 1975.

Figure 3 – Canaveral National Seashore



2.3 General Management Plan Objectives

The seashore's 1981 General Management Plan (GMP) includes the following objectives, which influence fire management planning and activities at CANA:

- ❖ Plan and manage the Seashore, to the extent possible, in ways that enhance natural ecological and geological processes and mitigate human impact on these processes.
- ❖ Identify, inventory and monitor the condition of the several park resources (natural, historic, prehistoric) and provide appropriately for their protection and use.
- ❖ Coordinate planning and development of the Seashore with not only NASA and FWS but with the surrounding communities in order to protect the seashore ecosystem....

Since the completion of the 1981 GMP, additional acreage has been added to the north end of CANA (the North District). A new GMP, currently under development, will reflect this addition.

2.4 Resource Management Plan Objectives

The seashore's 1997 Resource Management Plan (RMP) states that CANA's resource management planning "...is based upon protection and preservation, as well as public use, of the natural and cultural resources." The RMP includes the following objectives:

- ❖ Preserve and protect natural values (scenic, scientific, and ecologic).
- ❖ Preserve and protect historic values.
- ❖ Provide for public outdoor use and enjoyment.
- ❖ Fulfill responsibilities under generic legislation.

In regard to fire management at the seashore, the RMP states,

CANA is located in one of the most active lightning strike areas in the country. This, combined with the volatile fuels (particularly saw palmetto) and the extremely high fuel loads that have been allowed to accumulate, makes wildfire or human-ignited fire a serious threat. In addition, a number of vegetative communities and the animals that they support are dependent on periodic light to moderate fires. The past policy of complete fire suppression has resulted in a gradual change to less natural plant communities. Unless fuel loads are reduced, the danger of an excessively hot fire that would damage native vegetation and threaten adjacent developed areas is severe.

The park will utilize planned ignitions and management of unplanned ignitions, where appropriate, to maintain critical natural habitat for a number of CANA's threatened and endangered species. Implementation of a fire program will require additional staffing to record fire weather, provide initial response capability, reduce hazardous fuels, and monitor management-ignited fires.

2.5 How Fire Management Plan Supports General Management Plan and Resource Management Plan Objectives

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

- ❖ Wildland fire suppression will serve to protect human life, property, and natural and cultural resources from the adverse effects of unwanted fire.
- ❖ Prescribed fire and non-fire applications will serve to reduce hazard fuels accumulations. Reducing hazard fuels accumulations creates fuel conditions that support low-intensity fires, thereby reducing the threat of catastrophic wildland fire, and reducing the risk of negative impacts to natural and cultural resources, seashore infrastructure, and adjacent property in the event of a wildland fire. It also improves conditions for firefighter and public safety.
- ❖ Prescribed fire will serve to promote ecosystem sustainability at CANA. The plant communities here are fire-dependent or fire-adapted. Fire plays an essential role in maintaining serial stages of succession. Lack of fire favors fire-intolerant species over fire-dependent ones. The interruption of natural burn cycles also results in abnormal fuel loading and unnaturally severe fires when ignitions do occur. Prescribed fire will also serve to improve habitat for the Florida scrub jay, bald eagle, southeastern beach mouse, eastern indigo snake (all federally-and state-listed threatened species), and the gopher tortoise (state-listed species of special concern).
- ❖ Mechanically creating and/or maintaining existing firebreaks will facilitate suppression efforts and help prevent the spread of wildland fire to and from adjacent non-agency land.
- ❖ Mechanically creating and/or maintaining defensible space around seashore buildings will serve to protect them in the event of a wildland fire.

3.0 WILDLAND FIRE MANAGEMENT STRATEGIES

3.1 General Management Considerations

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

3.2 Wildland Fire Management Goals

Fire management goals at CANA are:

- ❖ Protect life, property, and seashore resources from wildland fire.
 - Suppress all wildland fire in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
 - Use prescribed fire and non-fire applications to reduce hazard fuels accumulations, which in turn:
 - Reduces the threat of catastrophic wildland fire, and reduces the risk of negative impacts to seashore resources in the event of a wildland fire.
 - Improves conditions for firefighter and public safety, and reduces suppression costs in the event of a wildland fire.
 - Mechanically create and/or maintain firebreaks, which facilitate suppression efforts and help prevent the spread of wildland fire to and from adjacent non-agency land.
 - Mechanically create and/or maintain defensible space around seashore buildings.
 - Conduct a fire prevention program to reduce human-caused wildland fires.
- ❖ Use prescribed fire to restore fire to its natural role at CANA and promote ecosystem sustainability. This includes:
 - Simulating natural fire return intervals to maintain fire-dependent or fire-adapted vegetation communities and their associated animal species.
 - Improving and/or maintaining habitat for the Florida scrub jay, bald eagle, southeastern beach mouse, eastern indigo snake, and gopher tortoise, all federally- and/or state-listed species.
 - Promoting nutrient recycling for healthy soil conditions.
- ❖ Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective fire management program.
- ❖ Provide seashore employees with fire operations training and experience so as to develop fully-qualified personnel commensurate with the normal fire year workload.

- ❖ Manage all wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics, and maximizing efficiency via interagency coordination and cooperation.
- ❖ Continue coordination with federal, state and local agencies in order to facilitate close working relationships and mutual cooperation regarding fire management activities.
- ❖ Incorporate the minimum impact suppression tactics policy into all suppression activities, to the greatest extent feasible and appropriate.
- ❖ Integrate knowledge gained through natural resource research into future fire management decisions and actions.
- ❖ Develop and conduct a monitoring program with recommended standard monitoring levels commensurate with the scope of the fire management program, and use the information gained to continually evaluate and improve the fire management program.
- ❖ Plan and conduct all fire management activities in accordance with all applicable laws, policies and regulations.
- ❖ Promote understanding, appreciation, and support among seashore visitors and neighbors for the seashore's fire management program through interpretation, public information media, and local public school programs.

3.3 Scope of Wildland Fire Management Elements to be Implemented

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

3.3.1 Wildland Fire Suppression

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

3.3.2 Prescribed Fire

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

3.3.3 Non-Fire Applications

Non-fire fuels treatment at CANA will include general grounds-care operations such as mowing and weedeating open areas during the growing season; creating and/or maintaining defensible space around seashore buildings and structures; maintaining existing firebreaks (including refurbishing existing holding lines around prescribed fire units prior to burning them); and

creating and maintaining a hazard fuels break along a section of the park perimeter to help prevent the spread of fire to and from adjacent non-agency land.

3.4 Seashore Description

3.4.1 Physical and Biotic Characteristics

3.4.1.1 Real Property

Canaveral National Seashore is located on the east coast of central Florida, in southeast Volusia and northeast Brevard counties (Figure 1). The seashore stretches from the community of Edgewater, Florida along its northern boundary, to Kennedy Space Center, along its southern boundary (Figure 3). The seashore's western boundary runs along State Road 3 in the lower two-thirds of the seashore and follows the Intracoastal Waterway in the upper one-third. The eastern boundary of CANA runs 0.5 miles offshore, paralleling the beach for a length of 24 miles. Mosquito Lagoon constitutes the majority (approximately two-thirds) of the area within the authorized seashore boundary.

The seashore includes two districts and the Seminole Rest Site. The North District, in Volusia County, is accessed by U.S. Route A1A from New Smyrna Beach. Seminole Rest is also located in Volusia County, in Oak Hill, Florida. The South District, in Brevard County, is accessed by State Roads 406/402 from Titusville. The seashore visitor information center is located seven miles south of New Smyrna Beach on U.S. A1A. CANA headquarters are located in Titusville.

The authorized seashore boundary encompasses 57,662 acres. The NPS has fire management responsibility for 15,700 of these acres, which have been divided into seven fire management units (FMUs) to facilitate the achievement of fire management objectives. (See Section 3.4.5)

3.4.1.2 Soils

The parent material for most CANA soils is unconsolidated, marine-deposited sediments of the Pleistocene and Holocene geologic periods. They consist of almost pure quartz sand, with sandy loams, clays formed through the process of weathering, and tidal marsh organic soils also occurring. High water tables, rapid soil permeability, and hazards of groundwater contamination from septic absorption fields place constraints on many development sites within the area.

Seven soil associations occur at CANA: Canaveral-Palm Beach-Welaka, Daytona-Paola-Astatula, Hydroquents-Turnbull, Myakka-Eau Gallie-Immokalee, Palm Beach-Paola-Canaveral, Paola-Pomello-Astatula, and Tidal Marsh-Tidal Swamp. Descriptions of these associations are provided in the soil surveys of Brevard and Volusia Counties, published by the USDA Soil Conservation Service, in 1974 and 1980, respectively.

3.4.1.3 Air Quality

CANA is designated a class II air shed under the 1977 amendments to the Clean Air Act. Under class II, modest increases in air pollution are allowed beyond baseline levels for particulate

matter, sulfur dioxide, nitrogen and nitrogen dioxide, provided that the national ambient air quality standards, established by the U.S. Environmental Protection Agency (EPA), are not exceeded.

CANA's air quality is generally good due to its remoteness from major sources of pollution, although air quality is periodically affected by NASA operations, heavy traffic by Kennedy Space Center employees, and offsite emission sources (USFWS 1995). Central Florida, including the seashore vicinity, has one of the lowest incidences of air stagnation in the United States (Stern 1976). Prevailing winds disperse pollutants, and topographical barriers that prevent dispersion are rare. Atmospheric inversion, which causes pollutants to retain their coherency rather than disperse, seldom occurs over the seashore area. On the few occasions that it does occur, it is readily predictable. Air quality impacts are typically of short duration, with pollutants readily dispersed.

A permanent air quality monitoring system, located at Kennedy Space Center, measures ambient air quality, including sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, and total inhalable particulates.

3.4.1.4 Water Quality

The Indian River Lagoon (IRL) System stretches 156 miles from Ponce de Leon Inlet at the northern end to Jupiter Inlet at the southern end, covering a full 40 percent of Florida's east coast. Three distinct bodies of water make up the IRL System: the Indian River, Banana River, and Mosquito Lagoon. CANA is responsible for maintaining and protecting a large portion of Mosquito Lagoon, which is the northernmost sub-basin of the IRL system.

As previously discussed, the far-reaching ecological importance of this area has been demonstrated by the variety of agencies that presently protect the waters and biodiversity of Mosquito Lagoon. In April of 1990, the U.S. Environmental Protection Agency designated Mosquito Lagoon, along with the rest of the Indian River Lagoon complex, an Estuary of National Significance. The State of Florida has designated Mosquito Lagoon as an Outstanding Florida Water. The State of Florida designated Mosquito Lagoon an Aquatic Preserve through the Florida Aquatic Preserve Act of 1975. The State has additionally designated most of Mosquito Lagoon (from Kennedy Space Center north to Edgewater) as Class II (Shellfish Propagation and Harvesting), classified according to instructions in the Federal Water Pollution Control Act (section 303).

Over the last 25 years, a large quantity of water quality data has been collected in Mosquito Lagoon by a variety of federal, state and local agencies. These data can be used to assess long-term changes in water quality, identify point and non-point sources of pollution, and determine specific actions needed to protect this valuable resource. Baseline water quality data, collected in Mosquito Lagoon between 1956 and 1995 and stored in six U.S. Environmental Protection Agency national databases, were inventoried and analyzed by the NPS Water Resources Division (1996).

3.4.1.5 Vegetation

The seashore is located along the “frost line,” resulting in a unique combination of temperate and subtropical plants found nowhere else in the western hemisphere. Several temperate species extend no further south than CANA, while a number of subtropical species occur no further north. The seashore’s hammocks exemplify this unusual mixture, with an overstory dominated by temperate species and an understory composed of subtropical plants. Approximately 1,067 native and introduced vegetation species have been recorded within the seashore and adjacent MINWR.

A number of plant surveys have been conducted in the seashore area. The first comprehensive study was by Sweet (1976) of the University of South Florida between 1972 and 1976. Based on that study, Poppleton (1981) wrote a status report for the USFWS on the occurrence and ecology of rare and endangered plants of the area. In 1979, NASA contracted the University of Central Florida (then known as Florida Technological University) to conduct a series of baseline studies on the NASA-owned (southern two-thirds) of CANA. These studies included surveys of terrestrial plant communities.

Norman (1976) of Stetson University analyzed the vegetation of Turtle Mound, a well-known archeological site containing a unique assemblage of subtropical and temperate species. A follow-up survey 20 years later by Norman and Hawley (1995) revealed that several subtropical species had been extirpated from CANA during the 1980s. In 1990 and 1991, a rare plant inventory was conducted by the Cooperative Research Unit at the University of Georgia to resurvey former known locations of rare plants and to search for new populations.

The terrestrial and submerged vegetation of the seashore has been mapped by Dynamac Corporation, using aerial photography and satellite imagery. These data have been incorporated into GIS format and are updated every two to three years. In 2005, Dynamac Corporation completed a vascular plant inventory of the northern portion of the seashore, which was not included in the 1979 survey by Florida Technological University.

The primary vegetative communities at the seashore are:

- ❖ Coastal Dune: This community occurs on the fore (eastern) side of the primary dune, which parallels CANA’s 24 miles of beach. It is dominated by sea oats (*Uniola paniculata*), beach grass (*Panicum amarum*) and slender cordgrass (*Spartina patens*), with small shrubs and herbs including croton (*Croton punctatus*), marsh elder (*Iva imbricata*), camphor weed (*Heterotheca subaxillaris*), railroad vine (*Ipomoea pes-caprae*), and morning glory (*Ipomoea imperati*).

Coastal dune vegetation is best represented by NFD RS fuel model L. Fuel models are discussed in section 3.4.4.3.

- ❖ Coastal Strand: This community occurs on the back (western) side of the primary dune. It is essentially a dense thicket of shrubs, from six to 10 feet in height. Characteristic shrubs are saw palmetto (*Serenoa repens*), sea grape (*Coccoloba uvifera*), nakedwood (*Myrcianthes fragrans*),

and wax myrtle (*Myrica cerifera*). In some areas vast thickets of saw palmetto exclude all other species. Herbs are rare and represented primarily by vines.

Coastal strand vegetation is best represented by NDFRS fuel model O.

- ❖ Oak Scrub: This dense shrub community occurs on well-drained inland sites on old dune topography. It is dominated by sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman oak (*Quercus chapmanii*), and saw palmetto, also including fetterbush (*Lyonia lucida*), rusty lyonia (*Lyonia fruticosa*), and blueberry (*Vaccinium myrsinites*). Saw palmetto increases in dominance on sites that are less well-drained.

Oak scrub vegetation is best represented by NFDRS fuel model O.

- ❖ Slash Pine Flatwoods: This community dominates lands located to the west of Mosquito Lagoon. Slash pine (*Pinus elliottii*) forms an open canopy over an understory of myrtle oak, sand live oak, Chapman oak, saw palmetto, *Lyonia* species, and wire grass (*Aristida* spp). Saw palmetto dominates the understory on wetter sites. Pockets of marsh, grassy swales, swamp, and hammock occur within the flatwoods.

Slash pine flatwoods vegetation is best represented by NFDRS fuel model D.

- ❖ Hammock: Hardwood hammocks, dominated by live oak (*Quercus virginiana*), and palm hammocks, dominated by cabbage palm (*Sabal palmetto*), are both closed-forest communities that are scattered throughout the seashore. The hardwood hammocks include nakedwood, red bay (*Persea borbonia*), red mulberry (*Morus rubra*), hackberry (*Celtis laevigata*), and wild coffee (*Psychotria nervosa*). Cabbage palm hammocks block most light to the understory, so that only a few ferns or grasses are able to grow there.

Hardwood hammock vegetation is best represented by NFDRS fuel model R. Palm hammock vegetation is best represented by NFDRS fuel model D.

- ❖ Mangrove: This community is located along the edges of Mosquito Lagoon, in some impoundments, and along the shorelines of islands within the northern portion of the lagoon. It is composed primarily of black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*), but also includes red mangrove (*Rhizophora mangle*), buttonwood (*Conocarpus erecta*), leather fern (*Acrostichum danaeifolium*), sea oxeye (*Borrchia frutescens*), and saltwort (*Batis maritima*). Many of the larger mangroves were killed by a series of freezes in the 1980s; however, resprouting and re-establishment by seed has been extensive.

The vegetation associated with this community typically does not support fire.

- ❖ Marsh: This community occurs throughout CANA, especially within the southern portion of Mosquito Lagoon. It differs in composition depending upon the salinity of the water. Brackish areas are characterized by smooth cordgrass (*Spartina alternifolia*), saltgrass (*Distichlis spicata*), seashore paspalum (*Paspalum vaginatum*), and sea oxeye. Freshwater areas contain

cattail (*Typha* spp.), sand cordgrass (*Spartina bakeri*), sawgrass (*Cladium jamaicense*), and arrowhead (*Sagittaria lancifolia*). Bladderwort (*Utricularia* spp.), water lily (*Nymphaea odorata*), spatterdock (*Nuphar luteum*), and duckweed (*Lemna minor*) occur in standing water.

Marsh vegetation is best represented by NFDRS fuel model N.

To the west of the lagoon are relict citrus groves. In order to protect citrus trees from winds and cold, lines of the exotic Australian pine (*Casurina equisetifolia* and *C. glauca*) were planted around these groves. Australian pines grew to dominate the landscape; however, most have been eradicated during the last three years as part of an exotic plant reduction program.

An exotic plant that poses a greater threat to native vegetation at CANA is Brazilian pepper (*Schinus terebinthifolius*). Brazilian pepper has spread throughout virtually all of the disturbed areas of the seashore, particularly along roadways and the dikes that encircle much of Mosquito Lagoon. To date, over 75 percent of the seashore has been treated to combat this species; dead plants are left standing, and re-vegetation is occurring through natural recruitment.

3.4.1.6 Wildlife

In 1979, NASA contracted the University of Central Florida (then known as Florida Technological University) to conduct a series of baseline studies within the southern two-thirds (NASA-owned) of CANA. These studies included surveys of finfish in Mosquito Lagoon (Snelson 1980a, 1980b), threatened and endangered species (Ehrhart 1980a; 1980b), and small mammal populations.

- ❖ **Mammals:** Terrestrial mammals at the seashore include the white-tailed deer (*Odocoileus virginianus*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), river otter (*Lutra canadensis*), round-tailed muskrat (*Neofiber alleni*), spotted skunk (*Spirogale putorius*), cotton mouse (*Peromyscus gossypinus*), golden mouse (*Ochrotomys nuttalli*), cotton rat (*Sigmodon hispidus*), marsh rice rat (*Oryzomys palustris*), opossum (*Didelphis virginiana*), raccoon (*Procyon lotor*), marsh rabbit (*Sylvilagus palustris*), and southeastern beach mouse (*Peromyscus polionotus niveiventris*). Exotic/introduced mammals include the nine-banded armadillo (*Dasypus novemcinctus*), roof rat (*Rattus rattus*), feral cats (*Felis catus*), feral hogs (*Sus scrofa*), and possibly the jaguarundi (*Felis jagouaroundi*).

Marine mammals that occur in CANA waters include the West Indian manatee (*Trichechus manatus*), right whale (*Balaena glacialis*), Atlantic bottlenose dolphin (*Tursiops truncatus*), spotted dolphin (*Stenella frontalis*), harbor porpoise (*Phocoena phocoena*), sperm whale (*Physeter catodon*), dwarf sperm whale (*Kogia simus*), pygmy sperm whale (*Kogia breviceps*), and pygmy killer whale (*Feresa attenuata*).

The University of Miami is currently conducting a small mammal inventory at the seashore. The University of Florida began a bat inventory at the seashore in 2004.

- ❖ **Birds:** Approximately 310 species of birds have been identified within CANA boundaries, including the white ibis (*Eudocimus albus*), great egret (*Casmerodius albus*), green heron (*Butorides striatus*), blue-winged teal (*Arias discors*), hooded merganser (*Lophodytes*

cucullatus), northern pintail (*Arias acuta*), least sandpiper (*Calidris minutilla*), willet (*Catoptrophorus semipalmatus*), roseate spoonbill (*Ajaia ajaja*), snowy egret (*Egretta thula*), black-bellied plover (*Pluvialis squatarola*), bald eagle (*Haliaeetus leucocephalus*), Florida scrub jay (*Aphelocoma coerulescens*), wild turkey (*Meleagris gallopavo*), and wood stork (*Mycteria americana*). CANA and neighboring MINWR are major wintering sites for migrating waterfowl; during the winter months, as many as 200,000 waterfowl can be found within their borders.

An avifaunal survey is scheduled to begin at the seashore within the next two years.

- ❖ Reptiles and Amphibians: A herpetofaunal survey of CANA and adjacent Kennedy Space Center lands was implemented in 1992 by Southeastern Louisiana University (SLU) (Seigel and Demuth 1997). SLU periodically revisits CANA and adds any newly encountered species to the seashore list. Sixty species of reptiles and amphibians are documented to inhabit the CANA vicinity, including the gopher tortoise (*Gopherus polyphemus*), Atlantic salt marsh snake (*Nerodia clarkii taeniata*), eastern indigo snake (*Drymarchon coraisi couperi*), water moccasin (*Agkistrodon piscivorus conanti*), eastern diamondback rattlesnake (*Crotalus adamanteus*), pygmy rattlesnake (*Sistrurus miliarius barbouri*), and coral snake (*Micrurus fulvius fulvius*).

Five species of marine turtles occur in the Indian River Lagoon system, especially as juveniles. The two most common are green (*Chelonia mydas*) and loggerhead (*Caretta caretta*). Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata*) and leatherback sea turtles have additionally been documented (Ehrhart 1983a; Witherington and Ehrhart 1989). Adult sea turtles nest on beaches along the east coast of central Florida, including CANA. Up to 4,500 sea turtle nests are deposited on CANA's beach each year.

- ❖ Fish: Over 788 fish species have been recorded in the Indian River Lagoon system (Snelson 1983a, 1980b; Gilmore 1994). Numerous ichthyological studies have been conducted or are presently underway to help determine if fish populations are sustainable in Mosquito Lagoon. The Florida Fish and Wildlife Conservation Commission monitored species composition and relative abundance of fishes in the estuarine waters near Ponce de Leon Inlet from January 1993 through December 1996 (Paperno et al. 2001). Dr. Grant Gilmore recently studied the critical fish spawning and nursery habitats in Mosquito Lagoon (draft report, Gilmore et al. 2000). The South Carolina Department of Natural Resources, in conjunction with the National Marine Fisheries Southeast Area Monitoring and Assessment Program, has been collecting data on coastal fish populations along CANA's beach since 1989.
- ❖ Marine Invertebrates: Commercially and/or ecologically important invertebrate species inhabiting CANA's waters include the eastern oyster (*Crassostrea virginica*), hard clam (*Mercenaria mercenaria*), blue crab (*Callinectes sapidus*), and horseshoe crab (*Limulus polyphemus*). The southernmost relatively undisturbed oyster reefs along the Atlantic coast are contained within authorized seashore boundaries.

3.4.1.7 Threatened and Endangered Species

Twenty-two federally- and/or state-listed species are documented to occur within CANA boundaries, as listed in Table 1.

Table 1: Federally- and/or State-Listed Species that Occur at CANA

Common Name	Scientific Name	Federal Status	State Status
Mammals			
Right whale	<i>Balaena glacialis</i>	E	E
Southeastern beach mouse	<i>Peromyscus polionotus niveiventris</i>	T	T
West Indian manatee	<i>Trichechus manatus latirostris</i>	E	E
Birds			
American oystercatcher	<i>Haematopus palliatus</i>	-	SSC
Arctic peregrine falcon	<i>Falco peregrinus tundrius</i>	-	E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	T
Brown pelican	<i>Pelecanus occidentals</i>	-	SSC
Florida scrub jay	<i>Aphelocoma coerulescens coerulescens</i>	T	T
Little blue heron	<i>Egretta caerulea</i>	-	SSC
Reddish egret	<i>Egretta rufescens</i>	-	SSC
Roseate spoonbill	<i>Ajaia ajaja</i>	-	SSC
Snowy egret	<i>Egretta thula</i>	-	SSC
Tricolored heron	<i>Egretta tricolor</i>	-	SSC
Wood stork	<i>Mycteria americana</i>	E	E
Reptiles			
Atlantic salt marsh snake	<i>Nerodia clarkii taeniata</i>	T	T
Eastern indigo snake	<i>Drymarchon coraisi couperi</i>	T	T
Gopher tortoise	<i>Gopherus polyphemus</i>	-	SSC
Green sea turtle	<i>Chelonia mydas</i>	E	E
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E	E
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	E	E
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E	E
Loggerhead sea turtle	<i>Caretta caretta</i>	T	T
Plants			
Sand-dune spurge	<i>Chamaesyce cumulicola</i>		E
Vervain	<i>Glandularia maritima</i>		E
Lantana	<i>Lantana depressa</i> var. <i>floridana</i>		E
	<i>Lechea divaricata</i>		E
Celestial lily	<i>Nemastylis floridana</i>		E
Hand fern	<i>Ophioglossum palmatum</i>		E
	<i>Tephrosia angustissima</i> var. <i>curtissii</i>		E
Wildpine, airplant	<i>Tillandsia fasciculate</i> var. <i>densispica</i>		E
Wildpine, airplant	<i>Tillandsia utriculata</i>		E
Naked wood	<i>Myrcianthes fragrans</i>		T
Prickly pear cactus	<i>Opuntia stricta</i>		T
	<i>Pteroglossaspis ecristata</i>		T
Beachberry, Inkberry	<i>Scaevola plumieri</i>		T

Key to table: E = Endangered, SSC = Species of Special Concern, T = Threatened

While one state-listed endangered species of plant, the night-blooming cereus (*Harrisia simpsonii eriophorus* var. *fragrans*) is documented at CANA (Norman 1976), it appears to have been eliminated by winter freezes within the last decade (Norman 1994, person communication with CANA resource management specialist).

3.4.1.8 Cultural and Historic Resources

At present, 93 sites within seashore boundaries are listed in the Archeological Sites Management Information System (ASMIS), identified in Appendix 13.13. These sites include prehistoric shell middens and mounds, prehistoric burial mounds, a Civil War salt works, historic cemeteries, two historic canals, and remnants of a circa 1900 waterway community (Eldora). A number of shipwrecks lie within seashore waters, dating back to the 1700s and possibly as far back as the 1500s. Several sites are located immediately outside of the seashore boundary on MINWR property. These include Fort Ann (a Seminole War site), several prehistoric burial mounds, and the Sugar Mill Ruins. Other sites extend across both areas, such as the Old and New Haulover canals, and the Dummett Homestead.

Cultural resources at CANA that are listed on the National Register of Historic Places (NRHP) include Seminole Rest, Turtle Mound, Old Haulover Canal, Ross Hammock Mounds and Midden, the Eldora State House, and the Confederate Salt Works. As per CANA's 1997 Resource Management Plan, several cultural resources at the seashore, including the Armstrong Site, Castle Windy, Bill's Hill burial mound, and the Max Hoeck burial mound, lack only submission for inclusion in the NRHP.

The draft report entitled *Archeological Overview and Assessment, Canaveral National Seashore* (Brewer 1988) provides a chronological list of archeological research that has occurred in the CANA area, beginning in 1823, when Charles Vignoles offered a brief description of Turtle Mound. Work by a variety of researchers took place in 1859, 1877, 1885, 1915, 1917, 1931, 1933-34, 1947, 1944-49, 1952, 1956-57, and 1963. The first comprehensive survey of Kennedy Space Center lands was conducted by George Long (1967), and included the southern two-thirds of current authorized seashore boundaries. The survey focused on the shoreline of Mosquito Lagoon and gave lesser attention to inland areas or islands. When CANA was established in 1975, the NPS conducted a limited survey of the additional seashore lands to the north (Ehrenhard 1976). In 1992 and 1996, surveys of the area adjacent to the western boundary of the seashore (along State Road 3) and the southwestern portion of CANA were funded by NASA (Deming 1992; Deming and Koski 1996).

The majority of sites have not been examined in any detail; however, a few have received additional attention. Castle Windy and Ross Hammock were investigated in the late 1950s and 1960s by Bullen et al. (1959a, 1959b, 1967). An analysis of human remains found at Ross Hammock during the Bullen excavation was conducted by Pober (1996). NPS investigations were conducted by the Southeast Archeological Center (SEAC) at the Armstrong Site in 1990 and 1995 (Brewer and Horvath 2004), and at Seminole Rest in 1993 (Horvath et al. 1994; Horvath 1995). In addition, SEAC completed a magnetometer survey of the 24 miles of beach face in 1994, searching for evidence of historic shipwrecks. SEAC is currently finalizing the *Archeological Overview and Assessment* for the seashore.

New sites are located on a regular basis through inadvertent discovery and testing for Section 106 compliance. Many as yet undocumented archeological sites undoubtedly occur within seashore boundaries. As per CANA's 1997 Resource Management Plan,

Portions of the park have been adequately surveyed for archeological sites while other sections have received only cursory survey or none at all. A thorough archeological survey needs to be conducted for the entire park. In addition, archeological evaluation studies are required to identify significant sites which require additional study and protection.

One reason much of the park has yet to be thoroughly surveyed for archeological resources is the dense vegetative undergrowth. Prescribed burning temporarily reduces the vegetation and provides an excellent opportunity to schedule such surveys through the Southeast Archeological Center (SEAC) or other archeological firm whenever funding and staff availability permits. In all cases, park staff will walk through the burned area and record any previously undocumented sites utilizing a GPS.

Post-fire surveys also allow an assessment of fire effects on archeological resources, which is poorly understood at this time.

The seashore has a museum collection consisting of over one million items. The vast majority of these are shellfish remains collected from midden sites, and housed at SEAC in Tallahassee. Approximately 300 items are retained at the seashore; a small number are on display in the North District visitor information center, while the rest are stored in a specially constructed concrete block structure erected in the South District in 1997. Many additional artifacts collected from the area prior to the seashore's establishment are retained in a variety of museum, university and private collections.

3.4.2 Management Considerations

- ❖ Ensure that firefighter and public safety remains the primary consideration in planning and conducting all fire management activities.
- ❖ Ensure that archeological/cultural/historic resources are considered in planning and conducting all fire management activities.
- ❖ Ensure that smoke management is considered in planning and conducting all fire management activities.
- ❖ Ensure that all applicable laws, policies and regulations are considered in planning and conducting all fire management activities.
- ❖ Ensure that socio-political economic impacts, including wildland urban interface, are considered in planning and conducting all fire management activities.
- ❖ Ensure that appropriate fire prevention and suppression actions are included in the right-of-way plans of development/vegetation management/contingency documents associated with and required for electrical transmission lines located on agency land.

- ❖ Ensure that fire management activities are coordinated as appropriate with all affected parties. This includes any federally recognized Indian tribes that have historical, cultural, economic or other interests in the proposed action or its effects (required, for example, by 36 CFR 800, 40 CFR 1508, and 43 CFR 10).

3.4.3 Past Role of Fire

In order to perpetuate ecological processes and preserve the natural conditions at CANA, the past role of fire must be understood. Fire was a component of Florida ecosystems for tens of thousands of years prior to human occupation of the area. During the summer, the central Florida coast has one of the highest thunderstorm frequencies in the world, with an extremely high incidence of lightning-caused fires. Charcoal deposits in lake sediments of south-central Florida indicate that fires have occurred there for 50,000 years (Watts and Hansen 1988). The same authors report that 18,000 years ago the climate here was similar to that of the present, in all likelihood producing thunderstorms between the late spring and early fall. It is therefore probable that lightning-caused fires occurred during the same time period, and burned large areas in the absence of human-made barriers. Frequent fire over time resulted in the fire-dependent or fire-adapted flora and fauna of this area; 90 percent of the vegetative communities at CANA are considered fire subclimax.

- ❖ Aboriginal Fire Use: Although it is difficult to substantiate purposeful landscape burning by American Indians from the archeological record, diaries, letters, reports, and books by eyewitnesses of Indian fire use from the 1600s to the 1900s have yielded considerable evidence that American Indians did use fire to modify ecosystems (Barrett 1980, 1981; McClain and Elzinga 1994; Russell 1983; Whitney 1994), with profound cumulative effects on the landscape.

While the earliest evidence of humans in the CANA vicinity dates to some 4,000 years BP, aboriginals are known to have been in Florida as far back as 12,000 BP. The first groups of aboriginals contacted by Europeans in the CANA area were the Ais and Timucuans. While the Ais were primarily hunters and gatherers, the Timucuans cleared plots of land for crops, and may have used fire for this purpose (Davison and Bratton 1986).

Fire may also have been used to clear areas for easier passage. One such area is the isthmus between the Indian River and Mosquito Lagoon, an important portage site for Indians and early settlers. An 1835 account by Dr. Motte, an army surgeon, describes the vegetation of the area as palmetto prairie, rather than the expected live oak savanna (Sunderman 1953). This indicates that the vegetation may have been manipulated through frequent burning to maintain a haulover trail between the two waterways (Davison and Bratton 1986).

Recent evidence uncovered at Seminole Rest may indicate the use of fire to clear vegetation from the site after prolonged absences or to destroy refuse that was attracting flies (Horvath 1995). Thin layers of ash were noted between layers of clamshells. Whether this was intentionally done is unknown, although such deliberate burning at shell beds has been noted among the modern-day Anbarra of Australia (Meehan 1982).

- ❖ Spanish Colonial Periods: Spain controlled Florida for two periods—1565 to 1768, and 1784 to 1821. The Spanish introduced open range cattle ranching into the pine-wiregrass areas of eastern Florida, and periodically burned the pine flatwoods and marshes to improve grazing. This practice became a tradition that continued within present seashore boundaries up until the 1940s (Davison and Bratton 1986).
- ❖ English Period and American Settlement: British planters began to settle the CANA area in 1767. They cleared land for the planting of crops, and also raised hogs, cattle, sheep and horses. They, and later American settlers, used fire to clear land, maintain pasture, control insects, and hunt game. Concurrent fire exclusion, to protect houses and crops, caused changes in vegetative composition in areas.
- ❖ Post-Civil War: After the Civil War, citrus cultivation expanded. Because of the incompatibility with fire, fire exclusion became an integral tool of the industry.
- ❖ Modern Era: Fire frequency fluctuated during the 1900s, mainly in response to changing livestock policies (Davison and Bratton 1986). During the first few decades of the century, marsh, pine and scrub were deliberately burned every year between November and February to provide better livestock range.

Controversy between the cattle and timber industries over fire use became intense during the early 1940s. Lumber companies began to purchase and fence vast pinelands previously used for free-range. They promoted fire exclusion to protect timber resources. Severe drought in the early 1940s led to intense fires, which strengthened the anti-burning argument. Laws prohibiting deliberate burning of wildlands (unless the owner kept the fire from spreading to adjacent properties) were passed by the mid-1940s. Annual range burns were discontinued as early as 1925 in Brevard County and after 1947 in Volusia County. Exceptions were properties surrounded by water or other wide firebreaks.

Cattle ranchers, restricted from burning range and faced with newly fenced-off lands, often resorted to arson. However, most could no longer afford to own the large amounts of land needed for range and eventually went out of business (Stoddard 1962). A reduction of major fires in the 1950s (with the exception of 1955) may reflect the diminishing number of cattle ranchers, a major source of fire ignitions (Davison and Bratton 1986).

Even with a ban on burning, brush fires were common in the area prior to the NASA purchase in the 1950s, and especially severe during droughts. Local residents reported intense brush fires south and west of Mosquito Lagoon in the early 1920s and in 1944. Fires were also common along the beach strand scrub and palmetto. These fires were allowed to burn, however, since no houses or communities were threatened. Many fires were started when the beach strand was used for bombing and strafing practice during World War II (Davison and Bratton 1986). A well-known landmark, Target Rock, received its name from this activity. Local residents recount a fire started during a practice strafing run which swept the length of the barrier island (at least 30 miles).

The mid-1900s saw the era of complete fire exclusion begin in the vicinity. Modern firefighting equipment such as bulldozers and plows, as well as ample personnel, allowed for more successful suppression efforts than during previous years. Fire exclusion was continued on land purchased by NASA, ~40,000 acres of which would later constitute the southern two-thirds of CANA. The result of this practice was abnormal fuel loading and unnaturally severe wildland fires when they occurred, causing extreme resource damage. NASA, whose developed areas were essentially islands surrounded by volatile fuels, delegated fire management responsibilities for this acreage to the USFWS, already managing a portion of NASA property as the MINWR.

It became evident that in spite of a vigorous fire prevention program, fires were inevitable, and the USFWS concluded that total fire exclusion was not possible or beneficial. Studies had shown that periodic, light fires that reduced rough to three years old or less were manageable, and reduced the hazard of intense fire. In 1972, the USFWS began a limited prescribed burning program, with approximately 1,000 acres of land burned under specific, prescribed conditions. By 1981, the program had been expanded to 18,000 acres.

The year of 1981 was a pivotal one for fire management at MINWR. That year 41 wildland fires burned over 16,000 acres on the refuge and the jointly managed portion of CANA, and two firefighters were killed. As a result, MINWR greatly expanded its prescribed fire program over the following years. Aerial ignition combined with backfires to protect sensitive areas reduced hazard fuels accumulations throughout the refuge on a two- to three-year fire rotation.

The earliest recorded fire history for the seashore area has been maintained by the Kennedy Space Center Safety and Fire Department. Beginning in 1970, they have recorded all wildland fires on NASA-owned lands. In 1972, the Florida Division of Forestry began keeping fire records of lands north of the NASA boundary, which would later be incorporated into the seashore. CANA has maintained complete fire records of the NPS-administered land within its authorized boundary since 1977. Table 2 lists wildland fires that occurred between 1981 and the present within the 15,700 acres at CANA for which the NPS has fire management responsibility.

Table 2: CANA Wildland Fires, 1981 to Present

	Date	Acres	Cause	Fuel Model	FMU
1	01/81	1.0	Unknown	n/a	Apollo Beach
2	02/81	1.0	Unknown	n/a	Apollo Beach
3	06/81	15.0	Lightning	D	Bill's Hill
4	06/81	1000.0	Lightning	D	Bill's Hill
5	07/81	225.0	Lightning	D	Max Hoeck
6	07/81	1200.0	Lightning	D	Max Hoeck
7	08/81	1.0	Debris Burning	n/a	Apollo Beach
8	05/82	25.0	Campfire	O	Klondike Beach
9	10/82	1.0	Smoking	L	Playalinda Beach
10	01/83	<1	Campfire	L	Playalinda Beach
11	04/83	<1	Electrical	Building	Apollo Beach
12	07/83	<1	Lightning	D	Bill's Hill
13	07/83	4.5	Lightning	O	Max Hoeck
14	09/83	1.0	Smoking	O	Playalinda Beach
15	04/84	<1	Debris Burning	n/a	Apollo Beach
16	07/84	<1	Fireworks	O	Playalinda Beach

17	05/85	4.0	Arson	n/a	Apollo Beach
18	10/85	0.1	Debris Burning	n/a	Apollo Beach
19	04/87	5.0	Arson	O	Bill's Hill
20	06/87	40.0	Lightning	O	Apollo Beach
21	06/87	0.2	Lightning	O	Apollo Beach
22	08/87	2.0	Lightning	O	Klondike Beach
23	10/88	120.0	Flare	O	Apollo Beach
24	08/89	0.3	Lightning	D	Bill's Hill
25	06/90	0.5	Lightning	O	Bill's Hill
26	07/90	0.3	Lightning	O	Bill's Hill
27	05/91	8.0	Lightning	D	Bill's Hill
28	07/92	0.3	Lightning	O	Apollo Beach
29	01/94	1.5	Arson	O	Apollo Beach
30	05/94	0.1	Arson	O	Apollo Beach
31	08/94	0.1	Lightning	D	Apollo Beach
32	03/95	3.0	Lightning	D	Bill's Hill
33	04/95	0.5	Arson	O	Apollo Beach
34	06/95	0.3	Arson	O	Playalinda Beach
35	11/95	0.5	Unknown	D	Bill's Hill
36	02/96	1.5	Vehicle Exhaust	D	Bill's Hill
37	02/96	0.5	Smoking	D	Bill's Hill
38	09/96	0.5	Vehicle Fire	O	Playalinda Beach
39	11/96	0.2	Lightning	O	Apollo Beach
40	11/96	20.0	Arson	O	Apollo Beach
41	05/97	70.0	Lightning	O	Apollo Beach
42	8/20/97	80.0	Lightning	D	Bill's Hill
	Date	Acres	Cause	Fuel Model	FMU
43	4/25/98	706.0	Lightning	D	Bill's Hill
44	5/07/98	1.2	Lightning	O	Apollo Beach
45	11/26/98	0.1	Powerline	R	Apollo Beach
46	2/18/99	0.1	Smoking	L	Max Hoeck
47	2/27/99	0.3	Unknown	O	Playalinda Beach
48	5/7/99	0.2	Unknown	O	Playalinda Beach
49	8/1/99	0.5	Lightning	D	Bill's Hill
50	7/16/00	200.0	Lightning	D	Max Hoeck
51	6/12/01	1.1	Lightning	R	Apollo Beach
52	4/7/02	0.2	Arson	R	Apollo Beach
53	5/5/03	2.9	Lightning	O	Klondike Beach
Total acres burned		3,751.5			

As per Table 2, 53 recorded wildland fires have occurred between 1981 and the present within the 15,700 acres at CANA for which the NPS has fire management responsibility, burning a total of approximately 3,751.5 acres. Of these wildland fires, 35 (66%) occurred between the months of April and August, determined to be the seashore fire season. These 35 fires burned approximately 3,598 acres, or 96 percent of the total acres burned between 1981 and the present. The primary cause of the 35 April-August fires was lightning (23 fires, or 66%), burning a total of approximately 3,559 acres, or 99 percent, of the total acreage burned during those months, and typically involving NFDRS fuel models D or O. Of the remaining 12 fires that occurred between April and August, 11 were human-caused, burning a total of approximately 39 acres, and one was of unknown cause, burning 0.2 acres.

Eighteen of the 53 recorded wildland fires occurred outside of the fire season, burning a total of approximately 153 acres. Twelve of these were human-caused, burning a total of approximately 147 acres. Four were of unknown cause, burning a total of 2.8 acres. Only two were lightning-caused, burning a total of 3.2 acres.

Of the 53 recorded wildland fires, 41 were of size class A or B (.1 to 9.9 acres), six were of size class C (10 to 99.9 acres), three were of size class D (100 to 299.9 acres), one was of size class E (300 to 999.9 acres), and two were of size class F (1000 to 4999.9 acres). Five of the six fires that burned more than 100 acres were caused by lightning, and occurred during the CANA fire season (April through August).

The seashore has used prescribed fire within the Apollo Beach, Max Hoeck, and Bill's Hill FMUs.

3.4.4 Wildland Fire Management Situation

3.4.4.1 Historical Weather Analysis

CANA has a subtropical climate with short, mild winters. Summer temperatures average 79 degrees F, with midday temperatures hovering around 90 degrees. The relative humidity averages about 90 percent in the early morning, declining to approximately 70 percent by early afternoon. The average annual rainfall is about 56 inches, with 70 percent occurring between the months of May and October. Average monthly precipitation during the wet season is 6.5 inches, with the greatest amount occurring in September. Between May and October, the dominant weather pattern is characterized by southeast winds traveling around the Bermuda Anticyclone. These moist, warm air currents create almost daily thundershowers, which can be quite localized, drenching one portion of CANA while leaving other portions dry. In general, fall winds are from the east to northeast, winter winds from the north to northwest, spring winds from the southeast, and summer winds from the south.

During the late spring/summer, the central Florida coast has one of the highest thunderstorm frequencies in the world. Averages of 3.9 ± 2.4 lightning strikes per square kilometer per month are common (Eastern Space and Missile Center 1989). Within-cloud and cloud-to-ground discharges average 2.4 per minute per storm, with a rate of 30.6 discharges per minute recorded during a storm in July, 1980 (NASA 1984). For the months of May through September, the average number of days per month with thunderstorms are: May, 8; June, 13; July, 16; August, 14; and September, 10 (Eastern Space and Missile Center 1982). Long term precipitation data indicate a drought cycle of 23 ± 5 years (Davison and Bratton 1986).

While tropical depressions and hurricanes occur throughout the wet season, the number of hurricanes that actually impact the seashore area is relatively low. (Three hurricanes did affect the seashore in the fall of 2004.) The annual probability of a tropical storm (wind speed 40 - 74 mph) is 7 percent, and the annual probability of a hurricane (wind speed 75+ mph) is 5 percent. The hurricane season extends from June to November, with 70 percent of the storms occurring from August to October.

Weather patterns in the dry season (November to April) are influenced by cold continental air masses. Temperatures average 64 degrees F but have sharp gradients when cold air masses move over the area. Extreme low temperatures usually do not fall below freezing and generally last for less than a full day; however, CANA has experienced severe freezes in the past, most recently during the years of 1981, 1983, 1985, and 1989. Droughts and freezes stress plants, causing their tissues to lose water and making them more flammable. Relative humidity during the dry season averages 55 percent.

During the dry season, rainless periods may last for weeks or months until frontal systems of cold, moist air pass over the area. Then rain, often accompanied by strong winds, occurs. Unlike the localized thunderstorms of the wet season, the rains are light and uniform in distribution. Rainfall averages 2.8 inches per month during the dry season.

Website <http://www.city-data.com/city/Cape-Canaveral-Florida.html> provides the following temperature and precipitation information for Cape Canaveral:

Table 3: Average Weather for Cape Canaveral, Florida

Month	High Temp. (°F)	Low Temp. (°F)	Average Temp. (°F)	Precip. (inches)	Wind Speed (mph)
January	71.1	49.8	60.5	2.5	8.9
February	72.6	50.9	61.8	2.6	9.5
March	77.2	55.6	66.4	3.3	9.9
April	80.9	60.1	70.5	2.4	9.4
May	85.7	66.4	76.1	3.8	8.9
June	89.1	71.4	80.3	6.1	8.0
July	91.0	72.6	81.8	6.2	7.2
August	90.5	73.1	81.8	6.5	7.1
September	88.5	72.2	80.3	6.9	7.6
October	83.4	66.8	75.1	4.4	8.6
November	78.1	59.4	68.8	3.2	8.6
December	72.8	52.8	62.8	2.4	8.4

3.4.4.2 Fire Season

The fire season at CANA spans the months of April through August, based upon an analysis of CANA and MINWR fire history, and historic weather patterns/lightning activity. While wildland fires can and do occur throughout the year, it is during the period of April through August that weather patterns facilitate a significant increase in acres burned per fire as compared to the rest of the year. As previously discussed, within the portion of CANA for which the NPS has fire management responsibility, 66 percent of the recorded wildland fires between 1981 and the present occurred between the months of April and August, burning approximately 96 percent of the total acres burned.

3.4.4.3 Fuel Characteristics and Fire Behavior

3.4.4.3.1 Fuel Characteristics

The primary fuel types represented at CANA have been classified according to the National Fire Danger Rating System (NFDRS) and the Northern Forest Fire Laboratory Fire Behavior Prediction System (FBPS) (Deeming et al 1978:30; Anderson 1982). Figures 5a through 5d delineate NFDRS fuel models within the seven fire management units outlined in this FMP. These data originated from vegetation cover maps produced by Dynamac Corporation in 2005. Acreages were determined via Geographic Information System (GIS).

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

Fuel model D represents slash pine flatwoods and cabbage palm hammocks at the seashore.

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

Fuel model L represents coastal dune grass at the seashore.

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

Fuel model N represents marsh grasslands at the seashore.

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

Fuel model O represents coastal strand and oak scrub at the seashore.

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

Fuel model R primarily represents hardwood hammocks at the seashore, although it may also represent areas of wetland hardwood forest.

Relict citrus groves within seashore boundaries are vegetated with perennial grasses, scattered palmettos or cabbage palms, and vines. These areas are too small to logically delineate and manage as separate fuel models.

3.4.4.3.2 Fire Behavior

- ❖ Pine Flatwoods (NFDRS Fuel Model D): Pine flatwoods ignite readily, as demonstrated by the fact that the greatest number of lightning-caused fires at CANA have occurred in this vegetation type. The flatwoods have a large flammable live fuel component and a high moisture of extinction (defined as the one-hour fuel moisture upper limit beyond which the fuels described by the given model will not burn). Rates of spread are generally between 10-20 chains (one chain equals 66 feet) per hour with flame lengths of 6-8 feet (USFWS 1995). In areas with heavy fine fuel loads or with a large palmetto component, fires can be very intense. Moderately intense fires occur every three to five years, with two to three years required to rebuild sufficient fuel loads to carry a fire (USFWS 1995).

Under extreme conditions, rates of spread from 30-50 chains per hour and flame lengths of 12-15 feet are not uncommon. Significant spotting can occur, with burning palm fronds carrying several hundred feet in only moderate winds.

In January of 1984, a research burn was conducted within the Bill's Hill hammock and surrounding pine flatwoods (Simon 1986). The burning index was 31, and winds were from the west at 7 mph. The burn was intense in the pine area and carried well through uniform stands of saw palmetto. Fine fuels, consisting of pine cones and needles around the bases of pines, burned very hot. Where fuel ladders existed, fire spread to the lower branches of the pines. Due to the discontinuous nature of these fuels, the fire was confined to individual trees. Under these conditions, fire was unable to carry through areas dominated by oak scrub and other brush-like fuels.

- ❖ Cabbage Palm Hammock (NFDRS Fuel Model D): According to Paul Schmalzer, plant ecologist at Kennedy Space Center, cabbage palm hammocks can burn vigorously if there is a relatively continuous understory of cabbage palm reproduction. When dry, the cabbage palm litter can support a fire but it will not be as intense if there is not much of a shrub layer. The canopy of cabbage palm is also flammable, but it is generally well above the litter and shrub layers. It can support a crown fire, but there have to be sufficient fuels and appropriate conditions to get flames into the canopy.

Fred Adrian, forester at MINWR, states that if the fire stays on the ground and is just burning the forest floor, he would call it FBPS fuel model 8 (NFDRS fuel model R). However, because ladder fuels are common in palm hammocks, the fire can easily get into the crowns. Typically, when the fire gets into the crowns, it does not spread from tree top to tree top unless it is very dry and very windy. Rather, it is a "passive" crown fire, with the surface fire

providing the heat and the palm boots and material caught in them providing a ladder to the crowns. If the surface fire diminishes in intensity, there is no longer sufficient heat energy to support the burning crowns and they go out. However, the crowns of the cabbage palm can hold fire for quite a while. Also, due to the physical configuration of the fronds, cabbage palms can cause a significant spotting problem. Neither the Fire Behavior Prediction System nor the NFDRS fuel models are designed to model crown fires.

- ❖ Hardwood Hammock (NFDRS Fuel Model R): Hardwood hammocks provide a fairly fire-resistant environment. The tree canopy reduces the rate of drying, so fuel moisture is usually higher here than in surrounding areas. There are fewer fine fuels on the floor of the hammock, and these consist largely of deciduous leaves that fall in autumn. Fires within hardwood hammocks are usually slow moving, cool burns that spread across the forest floor. Under normal conditions, rate of spread is 1-2 chains per hour, with flame lengths seldom exceeding 1 foot (USFWS 1995). Occasionally, ladder fuels will allow fire to spread to the treetops, but since these fuels are fairly discontinuous, spread is limited.

During the above-mentioned Bill's Hill research burn, fire was unable to carry through the floor of the Bill's Hill hammock. With the trees acting as a barrier to the wind, the fire only penetrated a distance of 10 feet into the hammock.

While no fires at CANA have been observed carrying through the ground litter in a hardwood hammock since at least 1972, fire scars of six to eight feet are common on hammock trees. This indicates that fires have carried through these areas in the past, probably under conditions of prolonged drought. Robertson (1953) reported that under extreme burning conditions, fire is capable of crossing the largest hammocks, killing many trees and consuming the organic soil.

- ❖ Coastal Strand (NFDRS Fuel Model O): The areas at CANA with the second-highest incidence of lightning-ignited fire are the heavy brush-like expanses of palmetto located along the western side of the primary dune. Coastal strand is similar to the pine flatwoods, but lacks the pine overstory and has a greater component of brush, including wax myrtle, salt bush, gallberry, and scrub oak. The secondary overstory is nearly continuous, with a deep litter layer. A rate of spread of 10-25 chains per hour and flame lengths of 7-9 feet can be expected under moderate conditions (USFWS 1995). Under extreme conditions, suppression is very difficult. Local residents recount a fire started during a practice strafing run near Target Rock during World War II which swept the length of the barrier island (at least 30 miles).

The natural fire return interval in palmetto-scrub oak is probably seven to eight years (Adrian 1996, personal communication with CANA resource management specialist). However, due to the volatility of saw palmetto and other scrub species, fuel loading is sufficient to carry very intense fire three to four years after a burn. Even when fuel loading is moderate, fire danger is still high under drought conditions or when strong surface winds are present.

- ❖ Oak Scrub (NFDRS Fuel Model O): Oak scrub does not normally burn well during the wet summer season when lightning is most common (Davison and Bratton 1986), and it burns much less readily than neighboring pine flatwoods (Webber 1935). However, under drought

conditions it can burn with great intensity, killing all above-ground vegetation. At such times, winds of 12 mph or more will carry fire through the crown layer with rates of spread of 20-30 chains per hour and flame lengths of 40 feet (USFWS 1995). Under extreme conditions, rates of spread can reach 40-50 chains per hour with flame lengths of 50-60 feet.

Summer droughts occur roughly every 23 years and last three to seven weeks (Davison and Bratton 1986). During the average summer, however, plants are not drought-stressed and the rain which usually accompanies lightning quickly extinguishes ignitions. The majority of scrub fires at CANA during the past 20 years have been human-caused dry winter blazes when scrub burns more readily.

In September 1983, a research burn was conducted on 28 acres of oak scrub within the southern portion of CANA. The burning index was 30, relative humidity near 50 percent, and a southerly wind was at six mph. The burn was somewhat discontinuous, exhibiting a wide range of fire intensities. In areas that contained a large palmetto component, available fuel was almost totally consumed. In areas where oak scrub carried the fire, there was less intensity, with some areas remaining unburned.

- ❖ Salt Marsh (NFDRS Fuel Model N): Even though there have been no recent fires involving CANA's coastal marshes, the fuels accumulation does not appear to be significant. The most flammable portion of marsh vegetation is the dead material located in the aerial portion of the plant. However, live portions are also flammable under many conditions. During extended periods of drought, organic matter in the soil will smolder indefinitely, causing serious damage to the resource and generating excessive amounts of smoke (USFWS 1995).

Marsh fires are typically intense, with high rates of spread under the influence of wind. Average fire spread is 100-200 chains per hour with flame lengths of 20 feet (USFWS 1995). In tall grasses, under extreme conditions, the rate of spread can reach 300 chains per hour with 30-35 foot flame lengths. Shorter grasses burn with much less intensity, averaging a rate of spread of 2-3 feet per hour and flame lengths of 1-2 feet.

- ❖ Dune Grass (NFDRS Fuel Model L): The dune grass at CANA, located along the eastern side of the primary dune, is flammable, perennial and coarse. However, fuel loading is light and fairly discontinuous. Fire typically does not spread very rapidly in this vegetation type.

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

Table 4: Flame Length Interpretations

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

At the seashore, hardwood hammock is typically the only vegetative community within which direct attack is feasible.

3.4.4.4 Fire Regime Alteration

As previously discussed, the plant communities at CANA are fire-dependent or fire-adapted, with fire playing an essential role in maintaining serial stages of succession. Fire exclusion favors fire-intolerant species, resulting in changes to natural species composition. It also results in abnormal fuel accumulations and unnaturally severe fires when ignitions do occur.

At the seashore, the slash pine flatwoods, cabbage palm hammocks, and xeric hardwood hammocks are Fire Regime I (0- to 35-year frequency, low severity). The coastal strand, oak scrub, and marsh grasslands are Fire Regime II (0-35-year frequency, stand-replacement severity). Mesic hardwood hammocks and mangroves do not typically support fire.

Overall, both fire regimes are in condition class 3, as defined in the same report: “Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.” The proposed prescribed burning of 3,742 acres over the next five years should begin moving these acres from condition class of 3 to a better condition class.

See Appendix 13.12 for a discussion of natural fire return intervals and fire effects within specific vegetation communities at the seashore.

3.4.4.5 Control Problems and Dominant Topographic Features

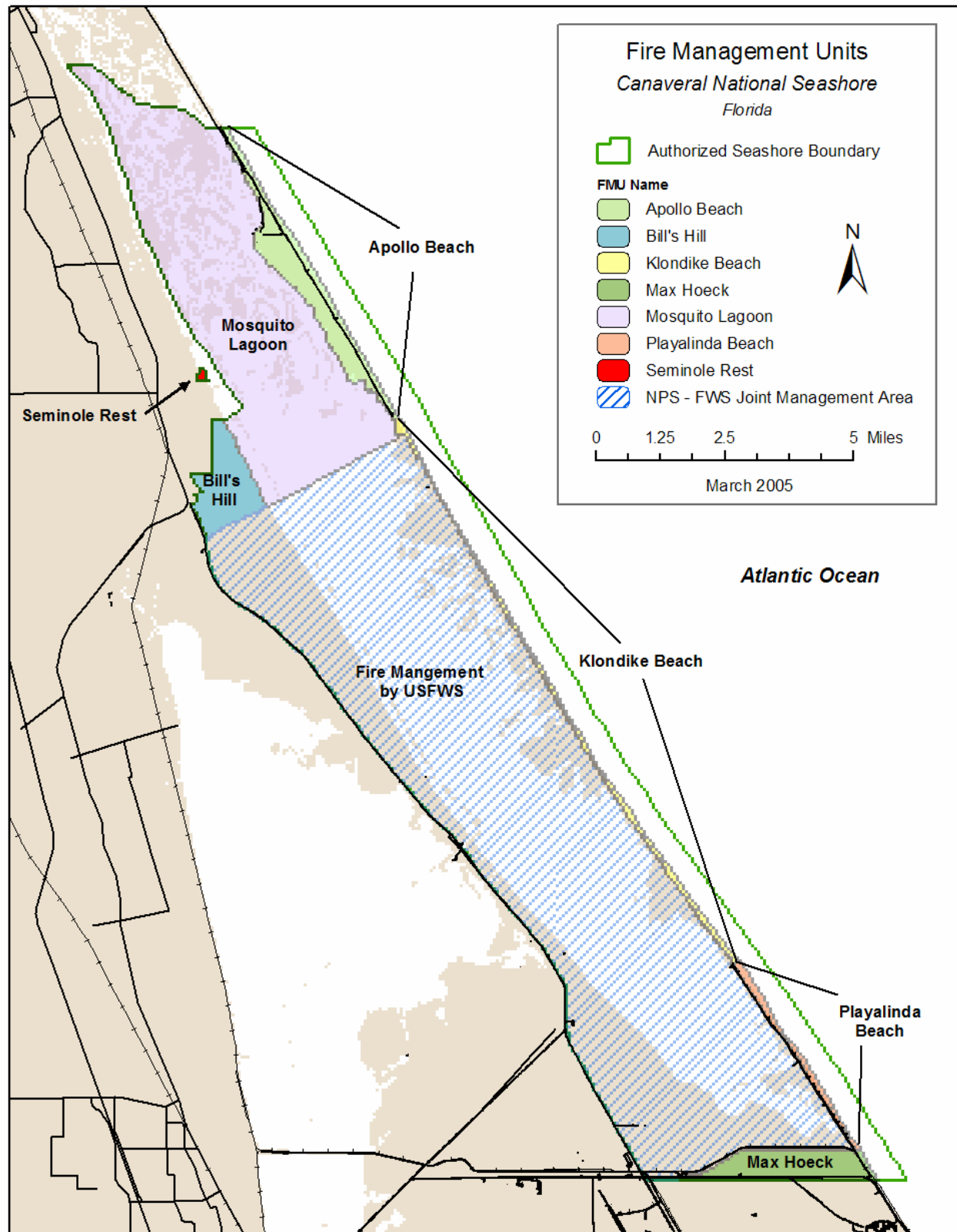
Weather and fuels are the primary influences on fire behavior at CANA. Due to the flat topography, fire behavior is not affected by slope or aspect. As previously noted, hardwood hammock is typically the only vegetative community at CANA within which direct attack is feasible. Fire behavior within the other vegetative communities will involve flame lengths that preclude such tactics. See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

Unnaturally high fuels accumulations exist in many areas of the seashore, exacerbating resistance to control. Lack of roads, numerous waterways, proximity of the water table to the surface, and fragility of soils and plants in some sites are important management considerations during suppression activities.

3.4.5 Fire Management Units (FMUs)

As previously stated, seven fire management units (FMUs) have been established within CANA in order to facilitate the accomplishment of fire management objectives (Figure 4). Acreages were determined via Geographic Information System (GIS), and differ slightly from previously determined acreages for the same FMUs, as per the CANA 1998 Fire Management Plan.

Figure 4: Seashore Fire Management Units



3.4.5.1 Fire Management Unit #1: Apollo Beach

This FMU, containing 1,445 acres, comprises the northern six miles of CANA's barrier island, including the developed areas of Eldora and Apollo Beach (Figures 4 & 5a). It consists of a narrow isthmus between the Atlantic Ocean and Mosquito Lagoon, with the center bulging out into Mosquito Lagoon. It is bounded by the seashore boundary along its northern side, the Klondike Beach FMU along its southern side, the Atlantic Ocean along its eastern side, and the Mosquito Lagoon FMU along its western side. The unit is accessed by State Highway A1A, from New Smyrna Beach.

The unit is uniformly flat, rising from the Atlantic Ocean to only 20 feet above sea level at the highest elevation (with the exception of the prehistorically constructed Turtle Mound, which is 35 feet above sea level). The aforementioned bulge is covered by a hammock (Eldora Hammock) of mixed hardwood and cabbage palm. Bordering the Eldora Hammock to the east is an expanse of dense, continuous coastal scrub, with volatile fuels including saw palmetto, gallberry, wax myrtle, scrub oak, and cabbage palm.

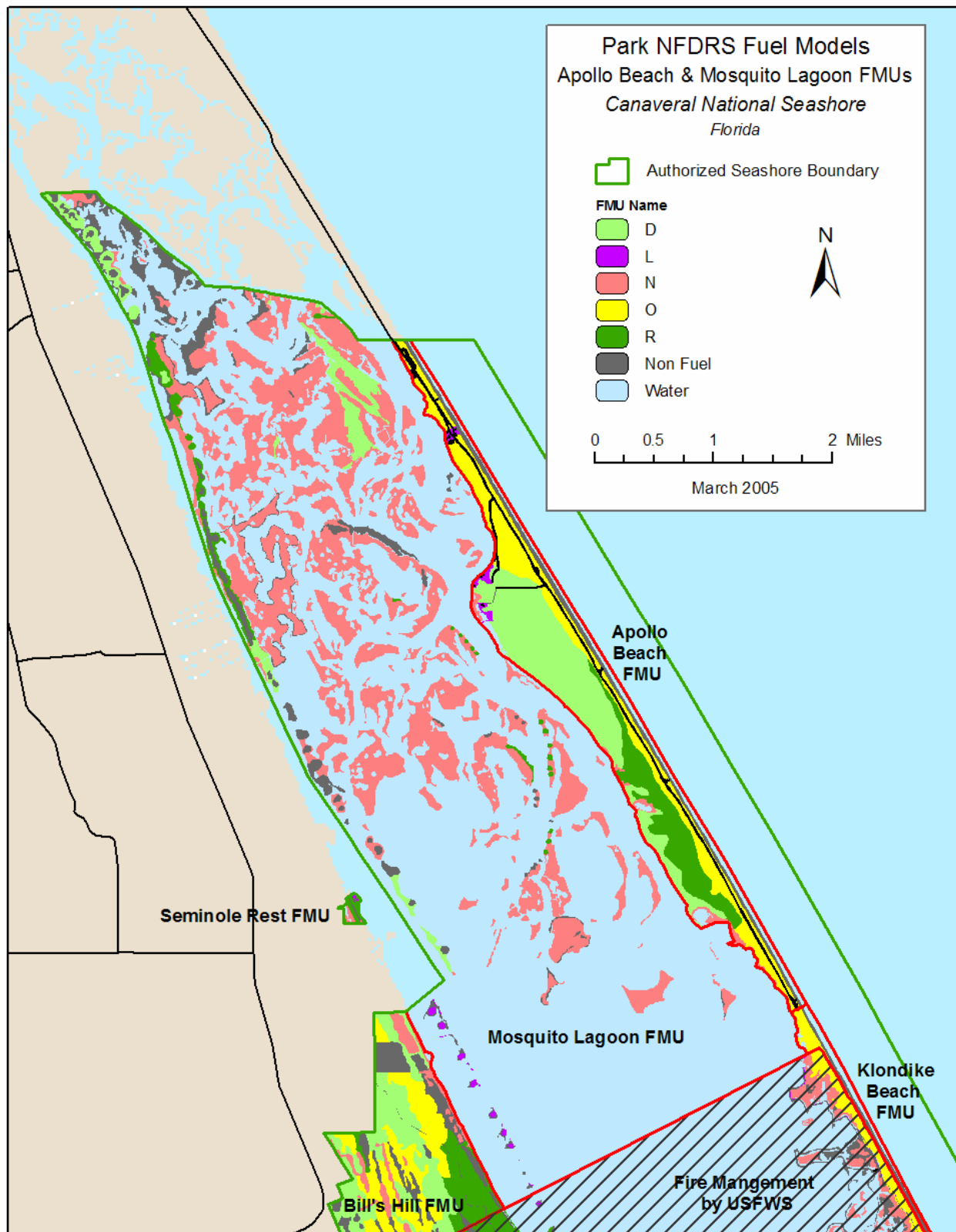
Development/seashore infrastructure within this FMU includes the seashore maintenance complex; visitor center; North District ranger station and boat house; seven comfort stations; the former retained-use Feller's House (used as an environmental education/research center by the University of Central Florida); two trailers (one used as a field station by Daytona Beach Community College); a retained-use house; eight boardwalks; three docks; and six garages associated with past retained-use houses (removed), that are presently used for equipment and vehicle storage. The Bethune Beach community, with privately owned residences, is located along the northern FMU/seashore boundary.

Cultural resources located within this FMU include remnants of the historic community of Eldora, including the State House; the 1927 Schultz House; Turtle Mound; Castle Windy; the Armstrong Site, and some small, subsurface prehistoric sites.

This FMU includes southeastern beach mouse, gopher tortoise, and eastern indigo snake habitat. Prescribed fire is necessary to reduce hazard fuels accumulations and to improve and maintain this habitat.

A fire hydrant is located at the visitor center. All buildings within this FMU, with the exception of the seashore maintenance complex and the six former retained-use garages, have a radius of defensible space ranging from 30-100 feet. In the case of a wildland fire within this FMU, seashore firefighters will typically conduct initial attack, with assistance as needed from the New Smyrna Beach Volunteer Fire Department (VFD) and MINWR firefighters. The New Smyrna Beach VFD will conduct any structural fire suppression. If wildland fire threatens the Eldora State House or the Schultz House, the structures can be protected by soaking them and surrounding fuels with water pumped directly from the lagoon. During suppression activities, the MINWR helicopter can conduct bucket drops.

Figure 5a: NFDRS Fuel Models; Apollo Beach (FMU #1) and Mosquito Lagoon (FMU #5)



3.4.5.1.1 Fire Management Objectives for FMU #1

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 20 minutes of the time a wildland fire report is received.
- ❖ Mechanically create and/or maintain defensible space around seashore buildings and along boardwalks.
- ❖ Prescribed burn 11 units over the next five years, totaling 1,269.2 acres, to reduce hazard fuels accumulations and to promote ecosystem sustainability. This includes improving and maintaining southeastern beach mouse, gopher tortoise and eastern indigo snake habitat) and providing key openings for state-listed plants including *Glandularia maritima*, *Tephrosia angustissima* var. *curtissii* and other species. Individual burn units are shown in Appendix 13.11, Figure 13.11.1.

3.4.5.1.2 FMU #1 Fire History

Since 1981, 22 recorded wildland fires have occurred within this FMU, burning a total of approximately 265 acres, and involving NFDRS fuel models D, O, and R (Table 2). Twelve of these fires were human-caused, eight were lightning ignitions, and two were of unknown cause. The largest fire was ignited by a flare, involved fuel model O, and reached 120 acres in size.

3.4.5.1.3 FMU #1 Fuel Characteristics/Fire Behavior

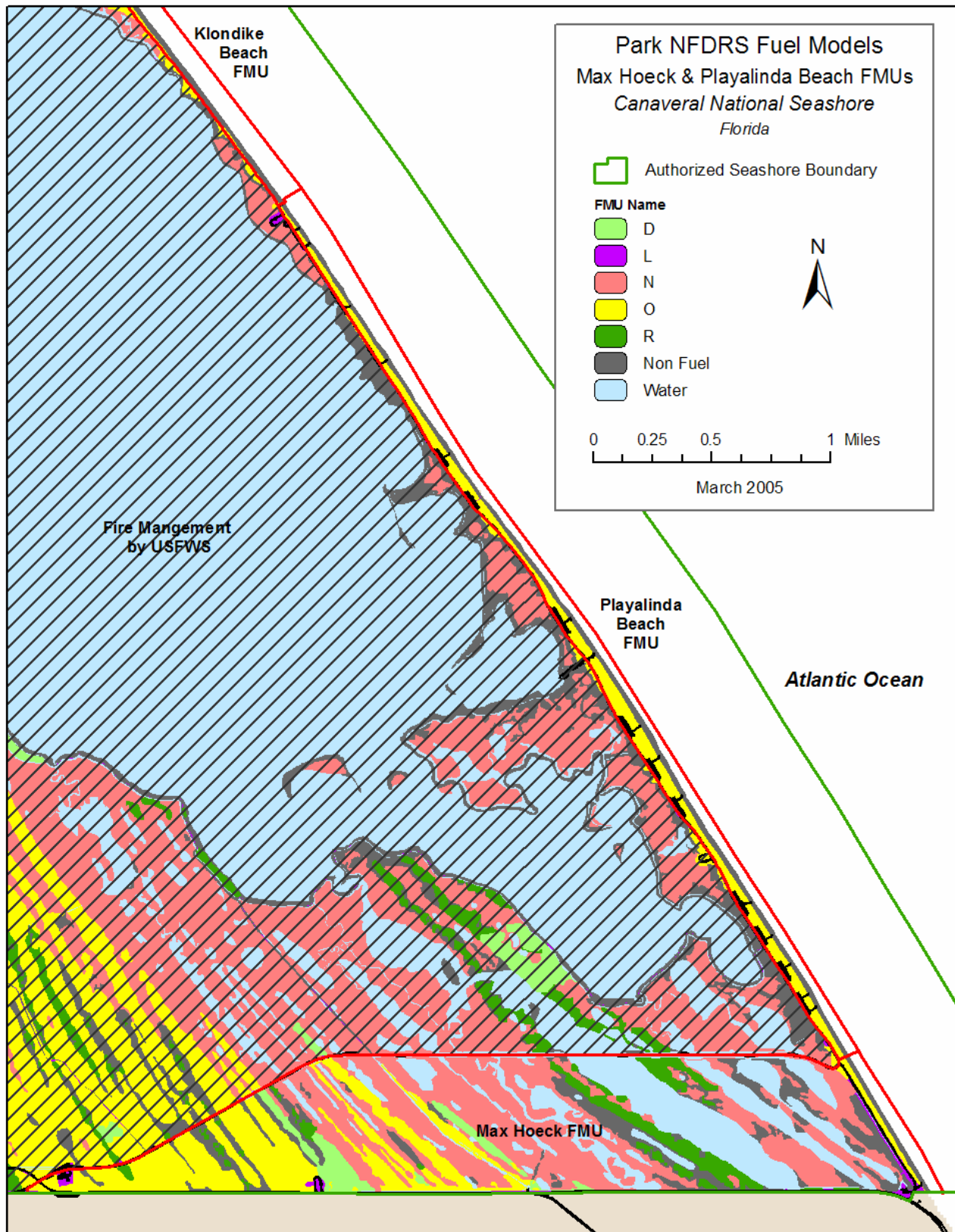
NFDRS fuel models represented within FMU #1 are D (~42.5%), O (~33.5%), R (~18%), L (~3%), and N (~3%) (Figure 5a). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.2 Fire Management Unit #2: Playalinda Beach

This narrow, linear FMU, containing 144 acres, is located along the eastern edge of the southern six miles of CANA's barrier island (Figures 4 & 5b). Adjoining the northeastern corner of the Max Hoeck FMU, the unit extends northward to the end of the paved road, which runs roughly north and south along the back side of the primary dune. The FMU is bounded by the Klondike Beach FMU along its northern side, the Max Hoeck FMU along its southern side, the Atlantic Ocean along its eastern side, and the paved road along its western side. The property located to the west of the road lies within the area jointly managed by the NPS and the USFWS, in which MINWR is responsible for fire management. The NPS and USFWS will therefore coordinate any fire management activities. The unit is accessed by State Highway 402 (the beach access road).

Vegetation consists primarily of dense stands of saw palmetto six to 10 feet high, interspersed with areas of grassy vegetation in the northern portion of the unit. Shrubby vegetation is cut back along the sides of the boardwalks.

Figure 5b: NFDRS Fuel Models; Playalinda Beach (FMU #2) and Max Hoeck (FMU #3)



This is CANA's most visited area during the summer months, making public safety a primary objective. Spaced along the roadway are 14 parking areas, each with a comfort station. Sixteen boardwalks allow visitors and seashore staff to reach the beach without damaging dune vegetation. At the Eddy Creek parking area (in the middle of the unit), a pavilion is located on the dune. Additional development within this FMU includes two NASA camera pads, one located between parking areas 4 and 5, and the other located at the northern end of the road, by parking area 13. An NPS dock/boat launch is located along the edge of Mosquito Lagoon, within the area jointly managed by the NPS and the USFWS.

Cultural resources located within this FMU include several small, subsurface prehistoric sites.

This FMU includes southeastern beach mouse, gopher tortoise, and eastern indigo snake habitat. Prescribed fire is necessary to reduce hazard fuels accumulations and to improve and maintain this habitat.

In the case of a wildland fire within this FMU, seashore firefighters or MINWR firefighters will typically conduct initial attack, with assistance as needed from NASA firefighters. NASA will conduct any structural fire suppression. During suppression activities, water may be pumped directly from the lagoon, or the MINWR helicopter can conduct bucket drops.

3.4.5.2.1 Fire Management Objectives for FMU #2

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 20 minutes of the time a wildland fire report is received.
- ❖ Mechanically create and/or maintain defensible space around seashore buildings and along boardwalks.
- ❖ Prescribed burn two units over the next five years, totaling 123.5 acres, to reduce hazard fuels accumulations and to promote ecosystem sustainability. This includes improving and maintaining southeastern beach mouse, gopher tortoise and eastern indigo snake habitat and providing key openings for state-listed plants including *Glandularia maritima*, *Tephrosia angustissima* var. *curtissii* and other species. Individual burn units are shown in Appendix 13.11, Figure 13.11.2

3.4.5.2.2 FMU #2 Fire History

Since 1981, eight recorded wildland fires have occurred within this FMU, burning a total of approximately five acres, and involving NFDRS fuel models L and O (Table 2). Six of these fires were human-caused, and two were of unknown cause. None of the fires exceeded an acre in size.

3.4.5.2.3 FMU #2 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #2 are O (~92%) and L (~8%) (Figure 5b). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.3 Fire Management Unit #3: Max Hoeck

Located within the southeastern portion of the seashore, this FMU is approximately five miles long, three-quarters of a mile wide, and contains 1,075 acres (Figures 4 & 5b). The unit is bounded by the beach access road (following an old mosquito control dike) along its northern and western sides, the NASA railway along its southern side, and the Atlantic Ocean along its eastern side.

This unit is a typical Florida coastal lowland environment in which seasonal flooding, perennially wet marshes, and swamps predominate. The western end of the unit is slightly elevated and contains cabbage palm, saw palmetto, scrub oak and wax myrtle. Exotics such as Australian pine and Brazilian pepper occur on disturbed sites, but have been greatly reduced by recent exotic plant removal efforts.

The South District ranger complex is located within the western portion of the FMU, surrounded by scrub oak and saw palmetto. The complex contains the South District ranger station, a visitor contact booth, a four-bay garage, two small outbuildings, and a curatorial storage building. Defensible space of at least 30 feet is maintained around each building. A resource management office and maintenance garage are located within the eastern end of the unit. They sit in a large grassy area close to a marsh and can easily be defended from fire.

No recorded cultural resources are located within this FMU.

Habitat for the Florida scrub jay overlaps the ranger complex. The FMU also includes gopher tortoise and eastern indigo snake habitat. Prescribed fire is necessary to reduce hazard fuels accumulations and to maintain these habitat areas.

As this FMU is completely surrounded by natural and human-created barriers, the chance of wildland fire spreading to or from adjacent lands is greatly reduced. In the case of a wildland fire within this FMU, seashore firefighters or MINWR firefighters will typically conduct initial attack, with assistance as needed from NASA firefighters. NASA will conduct any structural fire suppression. During suppression activities, the MINWR helicopter can conduct bucket drops.

Since the FMU shares a boundary with Kennedy Space Center (launch pads A and B are less than three miles away) and MINWR, any decision to conduct prescribed burning will be done in consultation with both agencies.

3.4.5.3.1 Fire Management Objectives for FMU #3

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

- ❖ Conduct initial attack within 20 minutes of the time a wildland fire report is received.
- ❖ Mechanically maintain existing defensible space around seashore buildings.
- ❖ Prescribed burn two units over the next five years, totaling 1,066 acres, to reduce hazard fuels accumulations, and to promote ecosystem sustainability. This includes maintaining Florida scrub jay, gopher tortoise, and eastern indigo snake habitat and providing key openings for state-listed plant species including *Lechea divaricata*, *Pteroglossaspis ecristata*, and other species. Individual burn units are shown in Appendix 13.11, Figure 13.11.3

3.4.5.3.2 FMU #3 Fire History

Since 1981, five recorded wildland fires have occurred within this FMU, burning a total of approximately 1,630 acres, and involving NFDRS fuel models D, L, and O (Table 2). Four of these fires were lightning ignitions, and one was human-caused. The largest fire was caused by lightning, involved fuel model D, and reached 1,200 acres in size. In 2003, 399 acres of this unit were treated with mechanical reduction and prescribed fire to reduce hazard fuels and restore habitat for several protected animal species.

3.4.5.3.3 FMU #3 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #3 are N (~53%), O (~29%), R (~9%), D (~6%), and L (~3%) (Figure 5b). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

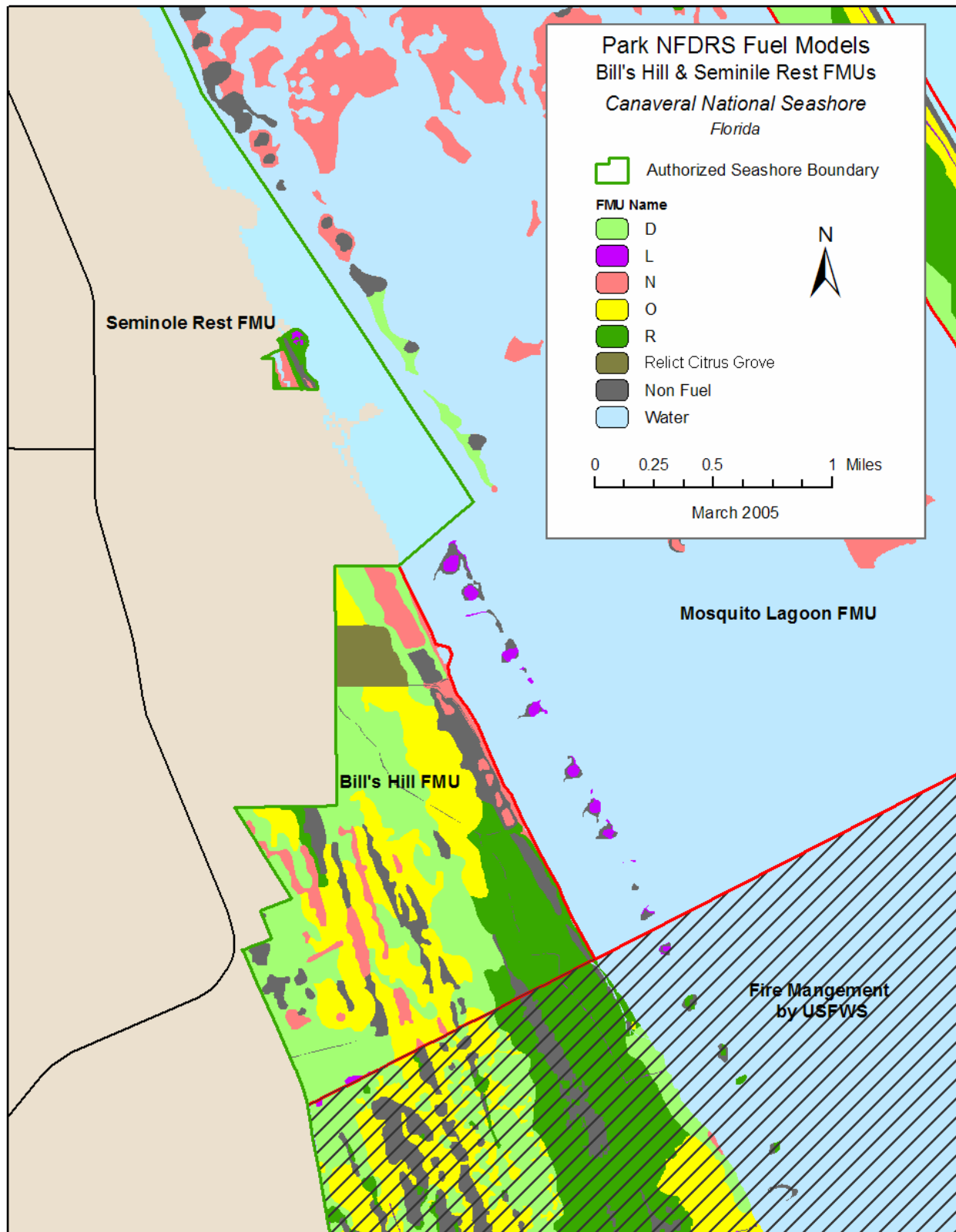
3.4.5.4 Fire Management Unit #4: Bill's Hill

This FMU, containing 996 acres, is located on the mainland on the western side of Mosquito Lagoon, immediately south of the community of Oak Hill (Figures 4 & 5c). It is bounded by the seashore boundary along its northern side, the Gomez-Grant Line (a 30-foot wide USFWS firebreak) along its southern side, Mosquito Lagoon along its eastern side, and Kennedy Parkway along most of its western side. The area south of the Gomez-Grant Line lies within the area jointly managed by the NPS and the USFWS, in which MINWR is responsible for fire management. The NPS and USFWS will therefore coordinate any fire management activities.

The unit is composed primarily of open slash pine flatwoods with a substory of live oak species and saw palmetto. Scrubby flatwoods in Bill's Hill have all three common scrub oak species, including *Quercus chapmanii*, *Q. geminata*, and *Q. myrtifolia*. Mesic flatwoods have runner oak (*Quercus elliotii*) present. Pockets of marsh, grassy swale, swamp, and hammock also occur.

Dirt roads constitute the only development within this unit. However, the community of Oak Hill, with privately owned residences, abuts the northern seashore/FMU boundary. Several mobile homes sit in a heavily wooded area to the immediate north. Hazard fuels reduction within the unit is therefore critical to protect the community of Oak Hill. The unit is partially separated from

Figure 5c: NFDRS Fuel Models; Bill's Hill (FMU #4) and Seminole Rest (FMU #7)



properties to the north by a large mosquito control ditch and dirt road. Several other roads criss-cross the unit, providing access and control lines for prescribed fire.

Cultural resources located within this FMU include two recorded prehistoric sites along the edge of Mosquito Lagoon.

Potential bald eagle nest sites, and habitat for the Florida scrub jay, gopher tortoise, and eastern indigo snake, are located within the unit. Prescribed fire is necessary to reduce hazard fuels accumulations and to maintain habitat for these species.

In the case of a wildland fire within this FMU, seashore firefighters, MINWR firefighters, the Oak Hill Volunteer Fire Department, or the Florida Division of Forestry may conduct initial attack. During suppression activities, the MINWR helicopter can conduct bucket drops.

3.4.5.4.1 Fire Management Objectives for FMU #4

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 45 minutes of the time a wildland fire report is received.
- ❖ Create and maintain a 7,435-foot (1.4 miles) long, 50-foot wide hazard fuels break (totaling 8.5 acres) along the northern FMU boundary, bordering the community of Oak Hill.
- ❖ Manually reduce hazard fuels accumulations for a radius of 20-40 feet around the bases of potential bald eagle nest trees prior to prescribed burning. Hand burn around such trees during prescribed burn operations.
- ❖ Prescribed burn five units over the next five years, totaling 996 acres, to reduce hazard fuels accumulations and to promote ecosystem sustainability. This includes the maintenance of bald eagle, Florida scrub jay, gopher tortoise, and eastern indigo snake habitat, and provides key openings for state-listed plants, including *Lechea divaricata*, *Pteroglossaspis ecristata*, and other species. Individual burn units are shown in Appendix 13.11, Figure 13.11.4.

3.4.5.4.2 FMU #4 Fire History

Since 1981, 15 recorded wildland fires have occurred within this FMU, burning a total of approximately 1,822 acres, and involving NFDRS fuel models D and O (Table 2). Eleven of these fires were lightning ignitions, two were human-caused, and one was of unknown cause. The two largest fires, one reaching 1,000 acres and the other reaching 706 acres in size, were both caused by lightning and involved fuel model D. In 2005, 556 acres of the unit were treated with mechanical reduction and prescribed fire to reduce hazard fuels and improve habitat for several protected animal species.

3.4.5.4.3 FMU #4 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #4 are D (~42%), O (~33%), R (~14%), N (~10%), and L (~1%) (Figure 5c). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.5 Fire Management Unit #5: Mosquito Lagoon

This FMU, containing 11,603 acres (8,531 of which are water), comprises the northern end of Mosquito Lagoon and contains numerous small islands (Figures 4 & 5a). The unit is bounded by the seashore boundary along its northern side, open water along its southern side, the Apollo Beach FMU along its eastern side, and the Intracoastal Waterway along its western side.

The terrestrial portion of this unit is composed primarily of oak hammock, red cedar, mixed mangrove, and high marsh.

The only development within this unit includes 13 primitive backcountry campsites, each consisting of a small clearing with a low, heavy cast-iron grill cemented onto a concrete pad. Some also have wooden picnic tables. Except for the tables, fire effects on the campsites would be negligible. Since the Intracoastal Waterway runs along the western side of the lagoon, smoke management and difficulty in contacting seashore visitors during emergency situations are important considerations.

Cultural resources located within this FMU include a number of prehistoric sites on the islands.

In the case of a wildland fire within this FMU, seashore firefighters or MINWR firefighters will typically conduct initial attack. During suppression activities, the MINWR helicopter can conduct bucket drops.

3.4.5.5.1 Fire Management Objectives for FMU #5

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 45 minutes of the time a wildland fire report is received.

3.4.5.5.2 FMU #5 Fire History

Since 1981, no recorded wildland fires have occurred within this FMU (Table 2).

3.4.5.5.3 FMU #5 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #5 are N (~87%), D (~9%), R (~3%), L (less than 1%), and O (less than 1%). See section 3.4.5.3 for a discussion of seashore fuel characteristics and fire behavior (Figure 5a).

3.4.5.6 Fire Management Unit #6: Klondike Beach

This narrow, linear FMU, containing 295 acres, comprises the eastern edge of the middle 12 miles of CANA's barrier island (Figures 4 & 5d). The unit is bounded by the Apollo Beach FMU along its northern side, the Playalinda Beach FMU along its southern side, the Atlantic Ocean along its eastern side, and a sand/dike road (closed to the public), which runs roughly north and south along the western side of the primary dune. As with the Playalinda Beach FMU, the area to the west of the road lies within the area jointly managed by the NPS and the USFWS, in which MINWR is responsible for fire management. The NPS and USFWS will therefore coordinate any fire management activities. The sand/dike road provides access to the unit.

Vegetation within the unit is primarily coastal strand. Development/seashore infrastructure includes a small wooden shelter and a U.S. Air Force weather tower. No recorded cultural resources are located within this FMU.

This FMU includes southeastern beach mouse, gopher tortoise, and eastern indigo snake habitat. Prescribed fire is necessary to reduce hazard fuels accumulations and to improve and maintain this habitat.

In the case of a wildland fire within this FMU, seashore firefighters or MINWR firefighters will typically conduct initial attack. Since the island is quite narrow at both ends of the unit, control lines using sprinkler systems and pumps can easily be established to hold any fire. During suppression activities, the MINWR helicopter can conduct bucket drops.

3.4.5.6.1 Fire Management Objectives for FMU #6

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 30 minutes of the time a wildland fire report is received.
- ❖ Manually maintain existing defensible space around the shelter.
- ❖ Prescribed burn three units over the next five years, totaling 287.2 acres, to reduce hazard fuels accumulations and to promote ecosystem sustainability. This includes improving and maintaining southeastern beach mouse, gopher tortoise and eastern indigo snake habitat and providing key openings for state-listed plants, including *Glandularia maritima*, *Tephrosia angustissima* var. *curtissii*, and other species. Individual burn units are shown in Appendix 13.11, Figure 13.11.5.

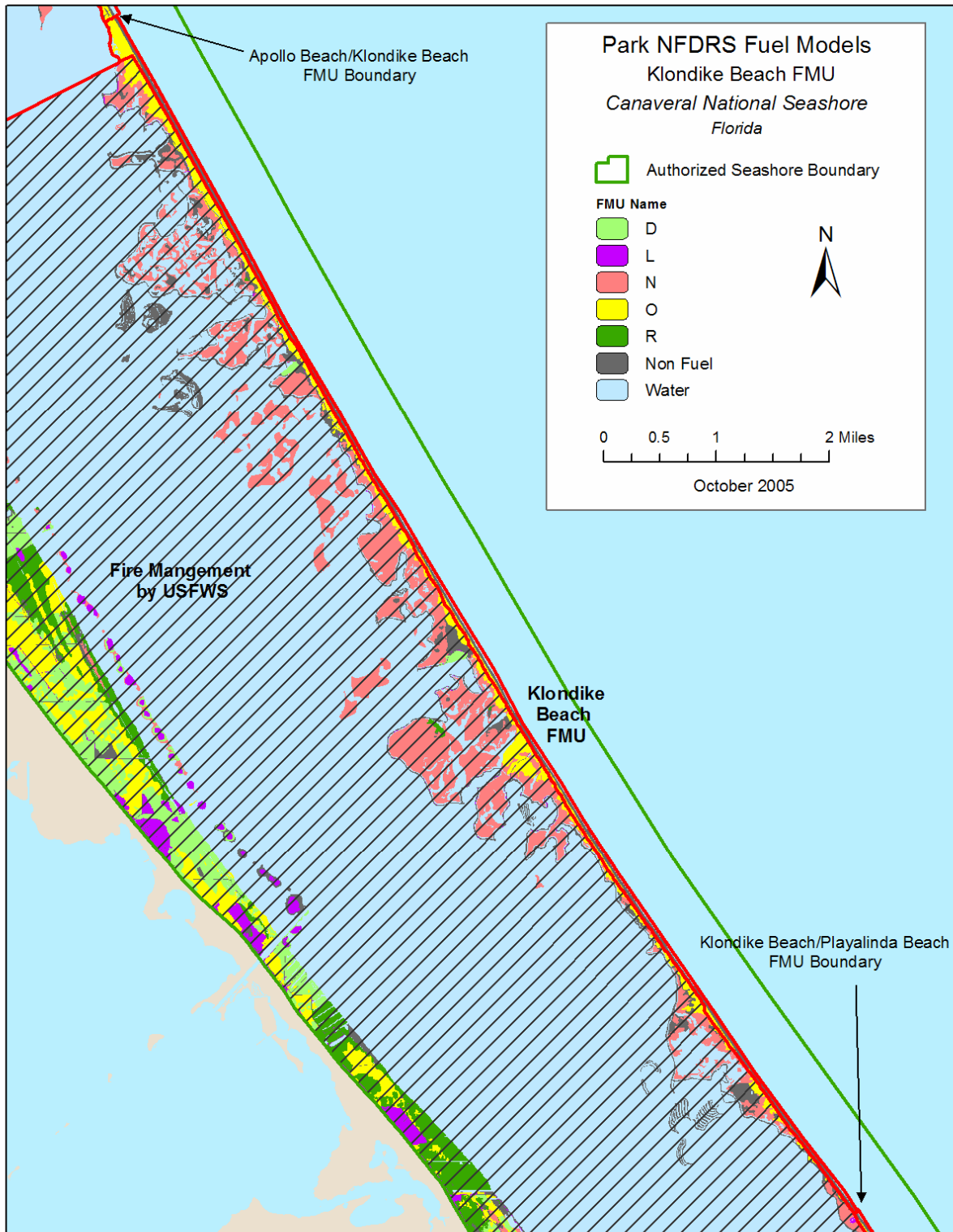


Figure 5d: NFDRS Fuel Models; Klondike Beach (FMU #6)

3.4.5.6.2 FMU #6 Fire History

Since 1981, three recorded wildland fires have occurred within this FMU, burning a total of approximately 30 acres, all involving NFDRS fuel model O. Two of these fires were lightning ignitions, and one was human-caused. The largest of these fires, caused by an escaped campfire, was 25 acres in size.

3.4.5.6.3 FMU #6 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #6 are O (~99%) and L (~1%) (Figure 5d). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

3.4.5.7 Fire Management Unit #7: Seminole Rest

This small, 20-acre unit is located along the western side of Mosquito Lagoon, situated in a rural residential section of the Oak Hill community (Figures 4 & 5c). It is composed primarily of marsh vegetation and mowed grass, with scattered trees. Chances of intense fire in this unit are low due to the fact that the marsh vegetation is generally inundated, and the mowed grass should not support fire.

Development/seashore infrastructure within this FMU includes a parking area with a restroom facility.

Cultural resources located within this FMU include two prehistoric mounds (Snyder's Mound and Fiddle Crab Mound). Two historic multi-story houses are built on top of Snyder's Mound. One of these houses will be used as a visitor contact station with interpretive exhibits in the future. The other may be used as a first aid station.

In the case of a wildland fire within this FMU, seashore firefighters, MINWR firefighters, or the Oak Hill Volunteer Fire Department will typically conduct initial attack. The Oak Hill Volunteer Fire Department will conduct any structural fire suppression. Engines or pumper units can supply water during suppression activities.

3.4.5.7.1 Fire Management Objectives for FMU #7

- ❖ Suppress all wildland fires in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected.
- ❖ Conduct initial attack within 15 minutes of the time a wildland fire report is received.
- ❖ Mechanically maintain existing defensible space around seashore buildings.

3.4.5.7.2 FMU #7 Fire History

Since 1981, no recorded wildland fires have occurred within this FMU (Table 2).

3.4.5.7.3 FMU #7 Fuel Characteristics/Fire Behavior

NFDRS fuel models represented within FMU #7 are R (~46%), N (~39%), and L (~15%). See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior (Figure 5c).

3.4.6 Values to Protect, Manage, or at Risk

- ❖ Human health and safety: Firefighter and public safety is the highest priority in every fire management activity. In light of this:
 - Only fully qualified (i.e. meeting NPS qualifications and accepted interagency knowledge, skills and abilities for the assigned fire job) personnel will be assigned fire management duties (unless assigned as trainees, in which case they will be closely supervised by an individual fully qualified for the given position).
 - No fire management operation will be initiated until all personnel involved have received a safety briefing describing known hazards and mitigating actions (LCES*), current fire season conditions, and current and predicted fire weather and behavior. Hazards specific to the seashore include:
 - Snags and dead trees with weak root systems.
 - Stinging/biting insects, scorpions, ticks, and poisonous snakes.
 - Dehydration, heat exhaustion and heat stroke.
 - Wildland fire incident commanders and prescribed fire bosses will minimize firefighter exposure to heavy smoke by incorporating the recommendations outlined in the publication *Health Hazards of Smoke* (Sharkey 1997), available from the Missoula Technology and Development Center.
 - Prescribed burning will not be conducted when atmospheric conditions exist that could permit degradation of air quality to a degree that negatively affects public health. Federal, state, and local air quality standards will be the basis for this decision.
 - Seashore neighbors, visitors and local residents will be notified of all planned and unplanned fire management events that have the potential to impact them.
 - The CANA superintendent or designee may, as a safety precaution, temporarily close parts of the seashore to the visiting public. In the case of prescribed fire, areas needing to be closed for visitor protection will be closed prior to the initiation of prescribed burning.
 - Smoke on roadways will be monitored and traffic control provisions taken to ensure motorist safety during fire events at the seashore (see section 4.3.3).

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

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

4.0 WILDLAND FIRE MANAGEMENT PROGRAM COMPONENTS

4.1 General Implementation Procedures

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

4.2 Wildland Fire Suppression

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

4.2.1 Range of Potential Fire Behavior

Wildland fires may occur throughout the year at CANA, although, as previously discussed, the fire season spans the months of April through August. Forty-two (or ~79%) of the 53 recorded wildland fires at CANA from 1981 through the present burned less than 10 acres each, and were suppressed with relative ease (in some cases they were naturally extinguished by rainfall).

Generally, wet conditions exist during the summer and winter and dry conditions during the spring and fall. While dry conditions can exist during the winter months, the cooler temperatures and reduced evapotranspiration rates tend to keep live fuel moistures high. Fire behavior is normally less intense than during other periods of the year, and fires can be held using existing control features.

During periods of drought, the Keetch-Byram Drought Index has reached the mid 500s in the seashore vicinity. The volatile nature of CANA's vegetation, particularly saw palmetto, combined with unnaturally high fuel loading, make severe wildland fire a serious threat during times of drought; during the drought year of 1981, two of the 53 recorded fires at CANA reached or exceeded 1,000 acres in size.

From late March through September, several three- to six-week periods without significant rain have occurred over the last 20 years. The dryness combined with summer winds of 12-14 miles per hour can result in a burning index of 50. Fires under these conditions in the flatwoods would exhibit flame lengths of eight to ten feet and rates of spread of between 1/4 and 1/2 mile per hour. Frequent torching and spotting could allow the fire to easily cross most existing barriers.

See section 3.4.4.3 for a discussion of seashore fuel characteristics and fire behavior.

4.2.2 Preparedness Actions

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

- ❖ Equipment and supply readiness: The North and South district rangers are responsible for maintaining the district fire caches and equipment in a state of readiness throughout the year. This will include:
 - Maintaining the fire caches to the minimum standards listed in Appendix 13.4.
 - Ensuring that all equipment is functional and repaired/replaced as needed.
 - Issuing personal protective equipment to firefighter-qualified personnel.

- ❖ Step-up plan based upon staffing classes derived from the National Fire Danger Rating System: See section 4.2.2.5 for the CANA step-up staffing plan.
- ❖ Maintaining fire records, weather data, maps and other associated information: The seashore fire coordinator will submit CANA data, including daily situation reports during fire events, to the Southeast Regional Office FMO (hereinafter referred to as the SERO FMO) for entry into the appropriate reporting system. The seashore chief ranger will utilize other system options as appropriate to maintain data on employee qualifications, hazard fuels, FIREPRO, etc.
- ❖ Fire detection: Early detection of wildland fires is integral to suppression activities. All personnel assigned to or working in field locations have a responsibility for fire detection. CANA wildland fire detection includes:
 - Within the South District, NASA security often relays information on smoke sightings to the seashore. This system is cost effective during periods of normal fire danger.
 - NASA operates a lightning detection system which shows any ground strikes in the area. Episodes of unusual activity are reported to the seashore.
 - CANA personnel increase the level of motor vehicle and boat patrols during periods of high fire danger.
 - Aerial reconnaissance is conducted by MINWR after lightning activity during periods of high fire danger.
 - The Volusia County Sheriff's Department and East Volusia Mosquito Control District routinely fly over the seashore and report smoke sightings.
 - Seashore visitors, and seashore neighbors frequently detect and report fires.

As fire danger increases, CANA will take specific steps to detect wildland fires as described in the step-up staffing plan (see section 4.2.2.5). During periods of low or moderate fire danger (staffing class levels 1 or 2, respectively), rangers will conduct periodic patrols of the seashore.

When fire danger becomes high (staffing class level 3), additional patrols will be conducted in areas of high risk or ignition potential, particularly when visitor use is high. These include Bill's Hill, Eldora, and the northern seashore boundary. When NASA's lightning detection system indicates that ground strikes have occurred, aerial patrols will be made by MINWR over the seashore and adjoining refuge.

If fire danger reaches very high or extreme levels (staffing class levels 4 and 5, respectively), daily ground detection patrols will be conducted in addition to aerial patrols after lightning events. East Volusia Mosquito Control District and the Volusia County Sheriff's Department will be advised of the fire danger.

If MINWR or other cooperating agencies are unable to provide aerial coverage of the seashore, commercial air services may be contacted for overflights following lightning storms.
- ❖ Dispatch system for mobilizing CANA resources to local and out-of-area incidents: See Appendix 13.6 for CANA's dispatch plan/fire call-up list.

The seashore chief ranger will conduct an annual preseason fire readiness inspection, as outlined in the *Interagency Fire Readiness Review Guide*. The inspection will address detection, communication, dispatch, and response capabilities. It will also serve to determine whether or not CANA's current training levels, equipment, and organizational structure meet the standards described in this FMP.

4.2.2.1 Fire Prevention Activities

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

- ❖ Education: Educating the public regarding the importance of wildland fire prevention can change people's behavior. At CANA:
 - Pertinent signs, posters and notices will be posted on bulletin boards at parking areas and boat ramps. In all fire prevention messages, it will be stressed that any individual starting a fire deliberately or unintentionally can be held civilly liable for the cost of its suppression, as well as being charged criminally.
 - Fire prevention messages will be included in park interpretive handouts and a site bulletin describing CANA's fire management program.
 - Pertinent messages will be included in visitor center exhibits and interpretive talks. During the fire season (April-August), a display showing daily fire danger will be exhibited at key visitor contact points.
 - During periods of very high to extreme fire danger, all trailheads will be posted with "No Smoking" signs.
 - Appropriate information will be shared by uniformed CANA personnel through informal contacts with visitors and neighbors.
 - Wood fires will be restricted to fire grills at backcountry campsites.
 - Any restrictions deemed necessary during periods of extreme fire danger will be announced on the radio, television, and in local newspapers.
- ❖ Engineering: Engineering involves reducing or eliminating fire risks (ignition sources) and hazards (fuels). Seashore methods include creating and/or maintaining a minimum of 30 feet of defensible space around buildings. Formal annual fire safety building inspections will be the responsibility of the seashore chief ranger. The seashore chief ranger and facility manager will eliminate any hazards identified during the inspections as soon as possible. The seashore will also use non-fire applications to reduce hazard fuels accumulations. Roadway and parking area borders, and firebreaks will be mowed or cleared of excess vegetation prior to the fire season, and fuels in these areas will be maintained at low loading levels throughout this period.

- ❖ Enforcement: Enforcement involves activities that ensure compliance with fire regulations and ordinances (including public use and access restrictions during times of high fire danger). Any wildland fire at the seashore will be investigated, both to identify the responsible party if human-caused, and to gain information that can be applied to future prevention efforts.

4.2.2.2 Annual Training Needs of Fire Staff

NPS fire management training meets criteria specified within the training curriculum approved by the National Wildland Coordination Group (NWCG), which is tiered to positions described in the NWCG *Wildland Fire Qualifications*, *Prescribed Fire Job Qualifications*, and *Incident Command System Wildland Fire Job Performance* guides. The seashore chief ranger will conduct annual training need analyses, and coordinate training courses as appropriate. Courses identified will be based upon employee needs, seashore fire management needs, and regional priorities. Training will be conducted on an interagency basis to the greatest extent possible, with particular advantage taken of opportunities to participate in and co-sponsor coursework and prescribed fire exercises conducted at MINWR. All firefighter-qualified seashore staff will receive at least eight hours of annual safety refresher training (see section 8.1). The seashore chief ranger will submit all pertinent employee data to the SERO FMO for entry into IQCS (or the appropriate reporting system).

4.2.2.3 Annual Equipment and Supply Readiness Procedures

Prior to and during the fire season, the following readiness actions will be taken to ensure adequate fire preparedness at CANA. The responsible positions for meeting specific target dates are in parentheses.

- ❖ October 1 through March 31 (chief ranger, district rangers): Qualified fire management personnel will be recruited and trained as sources and funds allow. On the job training and fire management correspondence courses will be used to upgrade the skill levels of seashore staff.
- ❖ January 1 through February 28 (district rangers): All firefighter-qualified and permanent personnel will be evaluated for physical fitness. Seasonals with fire-related responsibilities may be tested as they enter on duty.
- ❖ March 1 (district rangers): Inventory of all fire-related equipment will be complete and a copy of the inventory sent to cooperating agencies. Fire packs will be given to employees most likely to be called to fire duty. Ten packs will be reserved in the fire cache for other available fire personnel as needed. Worn out and missing equipment will be replaced.
- ❖ March 1 through September 30 (district rangers): Fire-related equipment and supplies will be maintained in serviceable condition and in constant readiness. Defective or worn out items will be replaced. Appendix 13.4 provides lists of supplies and equipment for each district.
- ❖ April 1 through August 31 (chief ranger): During fire season, all firefighters and key overhead personnel will provide the chief ranger with their availability during off duty hours. Each employee subject to fire duty will have a fire pack available for immediate use.

- ❖ April 1 through August 31 (MINWR): A helicopter will normally be onsite at MINWR. The aircraft is used for aerial reconnaissance of CANA and the refuge following lightning storms, transporting personnel, equipment and supplies to fires, and aerial reconnaissance of ongoing fires. Additional aircraft are available through TICO-Gateway and Merritt Island Flying Services.
- ❖ June 1 (district rangers): Fire training for seasonal employees will be completed.

4.2.2.4 Fire Weather and Fire Danger

4.2.2.4.1 Weather Station

The seashore fire coordinator will access weather data from NASA, MINWR, or Patrick Air Force Base, all of whom have weather stations which measure pertinent fire danger parameters, facilitating accurate fire behavior predictions and safety for fire personnel.

4.2.2.4.2 National Fire Danger Rating System

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

4.2.2.4.2.1 Burning Index

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

4.2.2.4.2.2 Keetch-Byram Drought Index (KBDI)

The KBDI is a mathematically-calculated drought indicator relating to the amount of moisture in the top seven inches of soil or duff. It ranges from 0-800, with 0 being saturated and 800 indicating maximum drought. Drought directly influences the flammability of all fuel/vegetation complexes (as drought progresses the upper soil layers dry, increasing the amount of dead and cured live fuels available for consumption), which in turn influences fire behavior and control

efforts. For a description of fire behavior and effects that can be expected at increasing levels of drought in the southeast, see website <http://www.tncfire.org/resource/keetch.htm>.

4.2.2.5 Step-Up Staffing Plan

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

Table 5, below, illustrates the correlation between BI and step-up staffing class levels and actions. Break points were established by MINWR fire staff via a FireFamily Plus analysis, with weather inputs from the MINWR Weather Station (ID number 084402). Staffing classes 4 and 5 were calculated at the 90th and the 97th percentiles, respectively. (Conditions exceeding the staffing class 4 parameters should occur only 10% of the time, and conditions exceeding the staffing class 5 parameters should occur only 3% of the time.) NFDRS fuel model D was utilized for step-up staffing purposes.

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

Table 5: Burning Index, Staffing Class Levels, and Step-Up Actions

Burning Index	Staffing Class	Step-Up Actions
0-16	1 (Low)	Normal tours of duty for initial attack personnel. Fire-related equipment and fire caches meet fire readiness standards. All seashore firefighters are qualified and organized for initial attack. Obtain fire weather daily. Fire danger rating posted on public bulletin boards.
17-32	2 (Moderate)	All staffing class 1 actions continue, plus: Initial attack equipment checked daily. Inspect buildings within CANA for adequate defensible space. Mount slip-on units to truck or trailers (exclude if Type 6 engines acquired).
33-66	3 (High)	All staffing class 1 and 2 actions continue, plus: Designate person to handle dispatch duties between 0800-2000 hours. Inform park personnel, cooperators and public of high fire danger. Firefighters carry radios during on and off duty hours. Analyze requests for leave. Ensure fire packs and initial attack equipment are readily accessible. Conduct ground detection patrols after lightning storms. Conduct aerial reconnaissance over CANA after severe lightning storms or periods of heavy visitor use. Staffing class moved up to 4 if fuel moistures are sufficiently low to allow rapid fire spread in the presence of wind (wind velocities often increase in the afternoon after indices have been obtained for the day).
67-75	4 (Very High)	All staffing class 1, 2 and 3 actions continue, plus: No prescribed burning or other seashore operations that have high potential for fire hazard. Conduct daily ground prevention and detection patrols. Conduct aerial recon following lightning activity. Request capability of cooperators to assist with fire suppression (NASA, MINWR, FL Division of Forestry). Leave requests re-evaluated for all firefighters. Qualified firefighters to carry initial attack gear while on duty. Notify SERO FMO and obtain presuppression (249) account number. Possible actions include: increased shift length and work week for fire personnel; utilize overtime to speed repair of inoperative equipment; preposition initial attack teams in areas of highest fire danger; and closure of backcountry permits in high fire potential areas.
76+	5 (Extreme)	All staffing class 1, 2, 3 and 4 actions continue, plus: Determine fire weather and potential fire weather each morning and afternoon. Notify KSC security, EG&G Duty Officer and NASA Test Director of extreme conditions. Brief all fire personnel on current fire activity, expected fire behavior and potential for new starts at beginning of all shifts. Increase shift lengths and workweek for fire personnel. Additional personnel placed on and keep CANA notified of whereabouts. Closure of critical areas by press release from the superintendent's office. Press release will be prepared by CRO or RM and hand-carried to superintendent's office for issuance. Notify SERO FMO of possible need for additional resources and/or submit resource order to Florida Interagency Coordination Center. Hire emergency firefighters as needed. Open blanket purchase order at local vendors for: food, lodging, hardware and other small purchases.

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

ONPS and FIREPRO fund routine preparedness actions conducted in staffing classes 1 through 3. During periods of very high to extreme fire danger (staffing class levels 4 and 5, respectively), emergency preparedness funds are available from the Southeast Regional Office (SERO) to accomplish approved step-up activities. If severity funding is necessary, the seashore fire coordinator, with superintendent approval, will submit a written assessment of the current and potential situation, including a description of mitigating actions and costs to the SERO FMO. A separate Project Management Plan (form 10-451) will be prepared for each period of emergency preparedness.

Personnel assigned to most emergency preparedness activities must be physically able to perform firefighting or monitoring duties. Exceptions may be made for persons assigned to detection, communication or prevention responsibilities.

Appropriate expenditures include:

- ❖ Overtime and other premium pay for all personnel involved in step-up plan activities.
- ❖ Travel associated with transportation and positioning of initial attack personnel and aircraft, organized crews, equipment and overhead teams.
- ❖ Hiring of emergency firefighters.
- ❖ Emergency lease of equipment.
- ❖ Hiring of aircraft.
- ❖ Enforcement of closed area restrictions.
- ❖ Backfilling of positions used for step-up plan activities.
- ❖ Extending employment period for firefighters at the beginning or end of the normal fire season due to step-up plan activities.

4.2.3 Pre-Attack Plan

RM-18, chapter 7, provides a pre-attack planning checklist that will serve as a reminder of various elements to be considered at the seashore (as applicable) upon reaching staffing class levels or 4 or 5.

4.2.4 Initial Attack

The district ranger will ensure that all fire reports are promptly investigated. Initial attack forces comprise the first suppression personnel to arrive at a fire, as well as any reinforcements that arrive during the first burning period. Initial attack on a wildland fire is the primary responsibility of the on-scene incident commander (IC), with support from CANA staff. The IC will perform or designate an individual to size-up the fire, and complete a Wildland Fire Observation Record. Size-up will include:

- ❖ Fire name
- ❖ Location
- ❖ Access
- ❖ Terrain and fuels
- ❖ Size of fire

- ❖ Anticipated control problems
- ❖ Values threatened
- ❖ Cause (if known)
- ❖ Weather (winds, humidity, temperature)
- ❖ Resources on fire (number and type)
- ❖ Resources needed (if any)
- ❖ Fire behavior

The IC will relay size-up information to the district ranger, and request personnel and equipment as needed. The district ranger or designee will assign a qualified employee to assume the role of dispatcher. Dispatcher duties are outlined in section 5.1, and the seashore dispatch plan/fire call-up list to follow is included as Appendix 13.6. The CANA chief ranger and resource management specialist will be notified of the wildland fire as soon as possible. The resource management specialist will provide information and make recommendations regarding known cultural sites in the area.

The IC will develop an appropriate initial attack response to the incident, organize and direct the fire resources on hand (or as they arrive) toward safe, efficient implementation of that response, monitor the effectiveness of the suppression tactics, and adjust strategy and tactics accordingly. The IC will remain apprised of current and predicted fire weather and fire behavior, and conduct fire operations until the fire is declared out or until relieved. The IC is responsible for completion of all fire documents, including a written fire report (DI-1202) submitted to the SERO FMO within five days after the fire is declared out.

Small fires will be controlled if possible by an initial attack hand crew. Initial attack crews will be composed of at least two persons fully equipped with personal protective equipment. In addition, a radio and tools such as rakes, back-pack pumps, etc., will be carried in all patrol vehicles. Additional equipment such as fire engines, pumps, hose, fuel, etc., if needed, may be provided by back-up crews. The allocation of personnel will be accomplished with a minimum of disruption to district visitor services or operations. In order to effectively meet this objective, members of the maintenance division or off-duty personnel will be used when necessary to supplement ranger division crews for initial attack, and project fire operations.

The point of origin will be established and protected so that an investigation can determine or confirm the cause of the fire. That area should be treated as a crime scene and left undisturbed for future investigation. Vehicles observed while enroute to the fire should be noted (license number, make, color, etc.) and the information given to the investigating officer. All evidence which may indicate arson as the cause shall be preserved and the investigating officer informed. The IC may request a fire investigator on all suspected arson fires. The cause of ignition for each fire will be properly reported, using the NWCG *Wildfire Cause Determination Handbook* as a guide. The chief ranger or designee will be responsible for wildland fire investigation and law enforcement.

The district ranger or designee shall keep MINWR, NASA and the Florida Department of Forestry updated on wildland fires which may impact their lands and/or resources. The CANA superintendent and chief ranger will be notified whenever there is a probability of movement of a fire from one jurisdiction to another.

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

4.2.4.1 Information Used to Set Initial Attack Priorities

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

4.2.4.2 Criteria for Appropriate Initial Attack Response

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

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

4.2.4.3 Confinement as an Initial Attack Suppression Strategy

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

4.2.4.4 Typical Fire Response Time

The response time to a fire by initial attack hand crews or engines/pumpers will vary by FMU. Response time to a fire within the Seminole Rest FMU (#7) should take no more than 15 minutes from the time the fire report is received. Response time to a fire within the Apollo Beach FMU (#1), Playalinda Beach FMU (#2), or Max Hoeck FMU (#3) should take no more than 20 minutes from the time the fire report is received. Response time to a fire within the Bill's Hill FMU (#4) or Mosquito Lagoon FMU (#5) should take no more than 30-45 minutes from the time the fire report is received. Response time to a fire within the Klondike Beach FMU (#6) should take no more than 45-60 minutes from the time the fire report is received.

When available, the MINWR helicopter can conduct bucket drops on wildland fires within FMUs #1-#6. Response time for the helicopter to any of these FMUs should take no more than 40 minutes from the time the fire report is received.

4.2.4.5 Restrictions and Special Concerns

Chainsaws, hand tools and drip torches may be used at any time for fire management purposes to the extent that their use is unlikely to affect readily visible archeological or historical resources. Fire engines/pumpers, portable pumps, and the MINWR helicopter may be used as water sources. Water or type A (biodegradable) foam will be used in lieu of fire retardant whenever possible. (If retardant must be used, a non-fugitive type will be chosen, and bodies of water avoided.) Heavy equipment such as bulldozers and plows for constructing fireline will be used only in extreme situations to protect human life and property, and then only with the authorization of the seashore superintendent or designee. Fireline explosives will not be used at the seashore.

4.2.4.6 Work/Rest Guidelines, Rest and Recuperation

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

4.2.5 Extended Attack and Large Fire Suppression

4.2.5.1 Determination of Extended Attack Needs

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

4.2.5.2 Implementation Plan Requirements—WFSA Development

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

4.2.5.3 Complexity Decision Process from Initial to Extended Attack

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

4.2.5.4 Incident Commander Delegation of Authority

Only the superintendent or designee is authorized to order an incident management team (IMT). When an IMT is mobilized to a CANA fire event, the seashore fire coordinator will prepare a briefing package for the IMT which includes incident documentation to date (e.g., detailed maps of the incident, fuels, fire complexity analysis), values at risk, aviation hazards, copies of current interagency fire management agreements, the current FMP, and a limited delegation of authority (see Appendix 13.9). The seashore superintendent or designee will conduct the eventual close-out and evaluation of the team.

4.2.6 Exceeding Existing WFIP, Selecting New Strategy

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

4.2.7 Minimum Impact Suppression Tactics

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

- ❖ Restricting the use of heavy equipment for constructing fireline. A bulldozer or plow may be used for fireline construction only in extreme situations to protect human life and property, and then only with the authorization of the seashore superintendent or designee.
- ❖ Not using fireline explosives.
- ❖ Using existing natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of fireline construction whenever possible.
- ❖ Keeping fireline width as narrow and shallow as possible when it must be constructed.
- ❖ Avoiding ground disturbance within known natural (e.g. T&E species) and archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations, it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
- ❖ Using water or type A (biodegradable) foam in lieu of fire retardant. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- ❖ Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.
- ❖ Minimizing cutting of trees.
- ❖ Scattering or removing debris as prescribed by the incident commander.
- ❖ Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

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

4.2.8 Rehabilitation Guidelines and Procedures

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

Rehabilitative actions may include obliterating firelines, flush cutting stumps, removing cut logs, erosion control, and scattering brush piles and debris. Severe dune fires may require such mitigation measures as storm fencing, planting of native species, and netting to prevent dune erosion. Generally, burned areas will not be reseeded. Residual seed and sprouting from surviving rootstocks will provide natural rehabilitation.

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

4.2.9 Reporting and Documentation

When CANA reaches staffing class levels of 4 or 5, the seashore fire coordinator will notify the SERO FMO of such daily. In the event of a wildland fire, the SERO FMO and the Florida Department of Forestry will be notified at the first possible opportunity and each succeeding day

until the fire is declared out, and the seashore fire coordinator will submit a daily situation report to the SERO FMO. For each wildland fire, the seashore fire coordinator will submit an individual fire report (DI-1202) to the SERO FMO.

The seashore fire coordinator will also complete a final record for each wildland fire, to be kept on file at CANA, which will include:

- ❖ Individual fire report
- ❖ Narrative
- ❖ Wildland fire implementation plan
- ❖ Daily weather forecasts and spot weather forecasts
- ❖ Cumulative fire map showing acreage increase by day
- ❖ Total cost summary
- ❖ Monitoring data

GPS/GIS data should be the norm for recording locational information whenever practical. Copies of reports and records will be submitted to cooperating agencies.

4.3 Prescribed Fire

For many years fire has been excluded from its natural role in the CANA ecosystem. Prescribed fire will be applied to designated burn units within specified weather and fuel moisture parameters, and will serve primarily to reduce hazard fuels accumulations and to promote ecosystem sustainability. The frequency and intensity of natural fires will be simulated to the maximum extent possible, provided that safety and control can be ensured.

The prescribed fire program will create and maintain a mosaic of burned and unburned areas that approximate natural conditions. The goal is to treat each burn unit on a 3- to 15-year cycle, depending on the vegetation type. Each unit will be monitored to identify ecosystem response to fire at that fire return interval. Prescriptions may be adjusted as appropriate based upon monitoring results and information gained from research burns and further refinement of the prescribed fire program. Research burns may be conducted with the approval of the CANA superintendent and must meet all requirements of any other prescribed fire application.

Priorities for prescribed fire will be determined by the length of time since the previous burn, current fuel loading and vegetative conditions, topographic advantage, and by personnel and logistical requirements. Particularly volatile areas will be burned during wetter periods when surrounding areas are too moist to burn. Once these areas are burned off, they will act as fuel breaks for fires that occur in adjacent areas during drier seasons of the year.

To the extent feasible, prescribed fire will be applied with the direct aid and cooperation of the agency or agencies whose lands are contiguous with the burn unit. Interagency and cooperative agreements already exist between CANA and NASA, the USFWS, and the Florida Division of Forestry (see section 5.3). CANA will coordinate with these agencies to develop burn plans and action plans that will allow fires to cross from one jurisdiction into another when the prescription criteria and management objectives of each agency can be met.

4.3.1 Planning and Documentation

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

Prior to all CANA prescribed fires, the seashore fire coordinator will obtain a burning permit from the Florida Division of Forestry. Nearby landowners and other interested parties, such as local law enforcement and fire departments, will be notified prior to and on the day of the planned ignition.

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

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

4.3.1.1 Long-Term Prescribed Fire Strategy

See Appendix 13.11 for CANA's five-year fuels treatment plan.

4.3.1.2 Personnel Requirements for Program Implementation

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

4.3.1.3 Prescribed Fire Monitoring

See section 6.3 for a discussion of prescribed fire monitoring.

4.3.1.4 Prescribed Fire Project Critiques

The burn boss will conduct a critique of each prescribed burn with personnel involved in the project. This will be done as soon as possible after the burn has been completed. Topics to be covered in the critique include:

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

4.3.1.5 Reporting and Documentation Requirements for Accomplishments and Escaped Fires

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

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

4.3.1.6 Prescribed Fire Plan

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

4.3.2 Exceeding Existing Prescribed Fire Plan

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

4.3.3 Air Quality and Smoke Management

As a chemical air pollutant, smoke is subject to scrutiny under federal legislation established by the Environmental Protection Agency. In addition to posing health risks, smoke can reduce visibility many miles away from its source, affecting the safe operation of automobiles and aircraft and diminishing the quality of scenic views.

The fire management program at CANA will manage smoke in compliance with federal, state, and local requirements, so as to minimize its effects on seashore visitors, firefighters, adjoining lands and neighbors, natural and cultural resources, and roads and highways. Smoke management will be incorporated into all CANA fire management planning and operations. CANA will inform the Florida Division of Forestry (DOF) of all fire management activities within the seashore as follows:

- ❖ A copy of CANA's annual prescribed fire program will be sent to the DOF prior to the burning season, and DOF personnel invited to observe prescribed burns.
- ❖ A burning permit will be obtained from the DOF for each prescribed burn. The seashore will comply with all limitations stated therein.
- ❖ Notification will be given to the DOF within 24 hours of the scheduled burn and when the burn is declared out.

CANA's guidelines for avoiding unacceptable smoke discharge are as follow:

- ❖ Each prescribed burn plan will include smoke trajectory maps and identify smoke-sensitive areas, and will consider factors such as fuel type(s), mixing of smoke with human-made pollutants, and atmospheric stability. Mitigation measures will be defined in the plan and arrangements made prior to ignition to ensure that designated resources are available if needed to implement the mitigation measures.
- ❖ Fire weather forecasts will be used to correlate prescribed fire ignitions with periods of optimal combustion and smoke dispersal. Information on mixing height, atmospheric stability, stagnation index, wind speed, and wind direction will be obtained. Prescribed fire will not be implemented when atmospheric conditions exist that could permit degradation of air quality

to a degree that negatively affects public health. (e.g., prescribed burning will not be conducted during pollution alerts or temperature inversions. The stagnation index must be less than 7, mixing height 500 meters [1,640 feet] or greater, and atmosphere stability class between 2 and 6.)

- ❖ Test fires will be used prior to all prescribed fire ignitions to confirm that smoke dispersal and direction are acceptable.
- ❖ Backing fires will be used where appropriate to increase fuel consumption and reduce smoke output.
- ❖ Smoke dispersal will be monitored continuously during prescribed burns. Any smoke situation that arises and threatens any smoke-sensitive areas will entail immediate suppression action. If smoke creates a hazard or nuisance, the fire will be extinguished immediately.
- ❖ Night burns will only be allowed when a definite forecast of optimum conditions has been made, due to the tendency of wind to die down, causing smoke to stay near the ground.
- ❖ Burn out and mop-up will be conducted as soon as possible to reduce residual smoke effects on visibility and health.

Whenever visibility on a paved road is affected by smoke, “Smoke on Road” signs will be posted on either side of the affected area, and the incident commander or burn boss will assign people to manage traffic flow. The following speed limits are recommended for varying levels of visibility:

<u>Visibility</u>	<u>Speed Limit or Control</u>
>564 feet	45 mph speed limit
372-563 feet	35 mph speed limit
372-563 feet	25 mph speed limit
206-371 feet	15 mph speed limit
<205 feet	One-way controlled traffic

If visibility is severely reduced, the road may be closed to traffic.

4.4 Debris Burns

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

Fire may be used to dispose of wildland fuels generated from maintenance activities (such as grass or brush mowing or clippings), hazard tree removal, or during construction activities. These materials must be deemed infeasible or impractical to mechanically remove and must be in a non-wildland fuel environment (parking lot, boneyard, gravel pit, etc.). All such activities and all new debris burning projects will be reviewed by a fire management officer, or appointed staff person, having wildland fire knowledge, in areas without a fire management officer.

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

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

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

For debris burns, all personnel will wear appropriate personal protective equipment. The supervisor of the burn will notify appropriate agencies (air quality, local fire departments, etc.) and neighbors and obtain all needed permits, and will develop an appropriate safety and evacuation plan in case of injuries or other emergencies.

A firefighter-qualified individual will be present during all debris burns at CANA.

4.5 Non-Fire Fuel Treatment Applications

Non-fire fuels treatment at CANA will include general grounds-care operations such as mowing and weedeating open areas during the growing season; creating and/or maintaining defensible space around seashore buildings and structures; maintaining existing firebreaks (including refurbishing existing holding lines around prescribed fire units prior to burning them); and creating and maintaining a hazard fuels break along a section of the seashore perimeter (Bill's Hill) to help prevent the spread of fire to and from adjacent non-agency land.

Creation of a hazard fuels break will entail clearing a 20-foot wide corridor for 7,435 linear feet (1.4 miles) along the perimeter itself, and selectively thinning hazard fuels inside of that corridor (on the seashore side) for an additional 30 feet. Fuels considered to be "hazards" will primarily be dead and down timber, ladder fuels, and timber/brush of less than 4 inches dbh (diameter at breast height). Total area affected will be 8.5 acres.

4.5.1 Equipment and Seasonal Use Restrictions by FMU

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

4.5.2 Effects Monitoring

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

4.5.3 Project Critiques

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

4.5.4 Cost Accounting

General grounds-care operations and maintenance of existing defensible space should be funded by PMIS. Funding for the creation of defensible space, hazard fuels reduction along the seashore perimeter, and hazard fuels reduction within units prior to prescribed fire application, is available through Wildland Urban Interface, Hazard Fuels (both distributed by the National Interagency Fire Center in Boise), and PMIS. The seashore fire coordinator will ensure that expenditures are tracked in the appropriate accounting system.

4.5.5 Reporting and Documentation

The seashore fire coordinator will document all non-fire applications at the seashore, and report accomplishments to the SERO FMO for entry into the appropriate reporting system.

4.5.6 Annual Planned Project List

See Appendix 13.11 for CANA's five-year fuels treatment plan.

4.6 Emergency Rehabilitation and Restoration

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

5.0 ORGANIZATIONAL AND BUDGETARY PARAMETERS

5.1 Organizational Structure of Fire Management Program

CANA does not have a formal fire management organization. The seashore fire coordinator (collateral duty) and chief ranger provide oversight and assistance as described in this FMP. Additional support will be provided by or requested through the Southeast Regional Office (SERO) FMO. The park superintendent is responsible for the approval of all planning documents pertaining to fire management activities, and will specifically certify, in writing, each day of a

prescribed burn that resources and funding are available to manage the fire. The burn boss will apply the decision criteria each day during a prescribed fire to ensure that the criteria are being met.

5.2 FIREPRO and Fire Program Analysis (FPA) Funding

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

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

However, by November, 2008, the NPS is targeted to transition to the Fire Program Analysis (FPA) System, along with the other four federal wildland fire management agencies (United States Forest Service, Bureau of Land Management, Fish & Wildlife Service, Bureau of Indian Affairs). FPA will provide a common, interagency process for fire management planning and budgeting. Utilizing a common performance measure - weighted acres managed - it will allow an evaluation of the effectiveness of alternative fire management strategies through time to meet the land management goals and objectives of each agency.

Where FIREPRO is specific to a particular park, FPA will support interagency, landscape level preparedness planning and budgeting. FPA combines units of different agencies into regional Fire Planning Units (FPU's) based on common land mgt goals and similar fuel conditions, requiring coordinated fuel treatments or initial response strategies. The nation is divided into approximately 40 regional FPU's. CANA is a member of the Central Florida (SA_FL_003) FPU with Ocala National Forest, and four National Wildlife Refuges - Merritt Island, lake Woodruff, Saint Johns and Lake Wales. Essentially, FPA will support better decisions for credible budget allocation and maximum utilization of resources.

5.3 Interagency Coordination

CANA coordinates fire management with NASA, MINWR, the Florida Division of Forestry, the Florida Interagency Coordination Center, area fire departments, and local law enforcement (see chapter 5 of *RM-18* for authority and guidelines regarding interagency coordination).

5.4 Interagency Contacts

See Appendix 13.7 for fire-related telephone numbers.

5.5 Fire-Related Agreements

CANA maintains agreements with NASA, MINWR, and the Florida Division of Forestry.

- ❖ Description/Summary of Agreement with NASA: As the owner of approximately 40,000 acres within authorized seashore boundaries, NASA has an agreement with the Department of the Interior for the use of said lands. NASA will furnish structural fire support, emergency police/property protection assistance, and secondary emergency medical/ambulance service on an “as available” basis. The NPS is responsible for control of prescribed fire ignitions.
- ❖ Description/Summary of Agreement with MINWR: This agreement acknowledges that the USFWS has overall fire management responsibility for the jointly managed portion of the seashore, the boundaries of which are also identified. The NPS and USFWS will cooperate in fire suppression, assistance with prescribed fire operations in each agency’s jurisdiction, and sponsoring fire training courses, on an “as available” basis.
- ❖ Description/Summary of Cooperative Agreement with Florida Division of Forestry: Each unit, upon request of the other, will provide assistance with fire suppression, while adhering to the suppression and mop-up standards of the requesting unit. When assistance is provided, the requesting unit may reimburse the other based on actual costs. When land of one unit is threatened by fire on the other, the threatened unit may reinforce or relieve the unit at the scene without expectation of reimbursement. Upon request, each unit will provide the other with fire reports, incident reports and other pertinent records related to the agreement.

Each unit will keep the other informed of changing conditions within its unit. An Annual Operating Plan will be written delineating mutual threat zones, policies, standards and procedures for arson investigation, communications and reports.

The CANA superintendent and chief ranger will review fire-related agreements annually and update them as necessary.

While the seashore does not presently have any formal agreements with area fire departments, it does provide personal protective equipment and firefighting equipment (e.g. chainsaws) through the rural fire assistance program.

CANA also coordinates with the Florida Interagency Coordination Center (FICC) at Tallahassee. If CANA and local cooperators cannot supply needed resources for an incident, FICC will be contacted to fill orders.

Appendix 13.8 includes copies of fire-related agreements.

6.0 MONITORING

6.1 NPS Fire Monitoring Handbook

NPS policy requires managers to monitor the effects of all wildland and prescribed fires. CANA will conduct its fire monitoring program in accordance with the *NPS Fire Monitoring Handbook* (2001), which outlines standardized methods to be used for monitoring fire effects.

The handbook provides a system to document burning conditions and fire behavior, ensure that fires remain within certain parameters, verify completion of burn objectives, and follow long-term trends. This information can help managers in burn prescription refinement when objectives are not met or long-term undesirable trends occur, and to identify research needs.

6.2 Recommended Standard Monitoring Levels

The *NPS Fire Monitoring Handbook* provides recommended standards, divided into four monitoring levels, which constitute the lowest level of fire monitoring to be conducted by NPS units. Table 6 illustrates how these monitoring levels correspond to the given management strategy.

Table 6: Management Strategies and Recommended Standard (RS) Monitoring Levels

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

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

6.3 Wildland and Prescribed Fire Monitoring

Wildland Fire Monitoring

As indicated, wildland fire suppression requires level 1 and the first stage of level 2 monitoring. Level 1 monitoring involves environmental or planning data that provide the basic background information needed for decision-making when a wildland fire occurs. The reconnaissance stage of level 2 monitoring, coordinated by the incident commander, provides a basic overview of a fire event. Monitoring the effect of suppressed wildland fire on vegetation or other area-specific variables can identify specific threats to seashore resources, facilitate adjustments to suppression actions, and identify the need for a rehabilitation response.

In regard to the reconnaissance stage of fire observation, the following information will be recorded for each wildland fire at CANA:

- | | |
|---------------------------------|--------------------------------|
| ❖ Fire cause, location and size | Fuel(s) and vegetation type(s) |
| ❖ Resource or safety threats | Current and forecasted weather |

The seashore will additionally monitor fire conditions, including:

- ❖ Ambient conditions
- ❖ Fire weather variables
 - Air temperature
 - Relative humidity
 - Wind speed
 - Wind direction
 - Percent shading and cloud cover
 - Drought index
- ❖ Fuel model(s)
- ❖ Fire characteristics
 - Linear rate of spread
 - Perimeter and area growth
 - Flame length
 - Fire spread direction
- ❖ Smoke Characteristics
 - Visibility
 - Total smoke production
 - Mixing height
 - Transport and surface wind speeds and direction
 - Documented complaints from downwind areas

Monitoring to measure short- and long-term change to ecosystem structure and dynamics will also be implemented at the seashore.

Prescribed Fire Monitoring

Prescribed fire use requires all four monitoring levels to determine changes/trends in fuel loading and vegetative composition over time. These changes, sometimes subtle, can be critical indicators of whether the prescribed fire program is meeting specific objectives. At CANA, fire weather will be recorded by the burn boss or designee for at least 14 days, and preferably 30 days, prior to the ignition date. Fuel moisture sticks will also be placed in all characteristic fuel types.

Prescribed fire monitoring will be the same as that for wildland fire monitoring (see above). Fire monitoring is critical during prescribed burning to monitor predetermined parameters as well as documenting the conditions in which the fire took place.

Short-term change monitoring will provide information on fuel reduction, vegetative change and other objective-dependent variables. It will include the use of index plots and transects to be monitored prior to and after fire. Some of the variables to be measured include:

- ❖ Tree layer
 - Density by species
 - Diameter by species
 - *Pinus* seedlings
 - *Pinus* pole sized trees
 - Tree damage
- ❖ Fuels
 - Litter depth
- ❖ Shrubs
 - Density
 - Height
- ❖ Post-burn conditions
 - Average/range of char height
 - Mortality

Additional recommended variables listed in the *NPS Fire Monitoring Handbook* may be added to CANA's monitoring program.

Long-term change monitoring will measure the influence of fire on ecosystem structure and dynamics, identify areas for future research, and validate the use of prescribed fire in perpetuating CANA ecosystems. The variables to be monitored will be the same as those for short-term change, as well as variables which have been determined to be primary indicators of long-term change. CANA will determine primary indicators by examining seashore fire management goals and objectives and by consulting appropriate specialists and experts.

Upon its completion, the CANA prescribed fire monitoring plan will be included as Appendix 13.10.

7.0 FIRE RESEARCH

Dynamac and FWS have been actively studying fire effects on area plant communities since the early 1980s (see articles by Breininger, Duncan, Foster, Hinkle and Schmalzer, et al.). Simon (1986) of the University of Georgia conducted a 7-12 month post-burn evaluation in coastal strand, oak shrub and pine communities at CANA. In addition, Breininger and Schmalzer (1990) studied the effects of fire on birds in oak/palmetto scrub. This information will serve as important baseline data to guide the development of a fire management program at CANA that will maintain natural plant and animal communities.

Other studies are still needed to:

- ❖ Develop specific fuel models for CANA which can be used with BEHAVE to refine fire prescriptions and make fire behavior projections. The coastal strand element at CANA is particularly incompatible with current fuel and fire behavior models (Simon 1986).
- ❖ Determine the natural fire cycle in the CANA vegetation types.

- ❖ Provide detailed information on long-term fire effects in CANA's major vegetation types (species composition, dominance, vegetation height, percent of bare ground).
- ❖ Determine the presence, if any, of charcoal sediments and pollen deposits that will allow the development of a complete fire history for the seashore area. The vegetative history is well documented by European accounts dating as far back as 1605 (Davison and Bratton 1986). However, specific research is lacking on fire history of the seashore area prior to that time.
- ❖ Quantify differences in fire patterns associated with wide range of seasons, meteorology and landscapes with different arrangements of fire frequencies, seasonal fire patterns and vegetation (Breininger, Duncan and Dominy 2002).

8.0 FIREFIGHTER AND PUBLIC SAFETY

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

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

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

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

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

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

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

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

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

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

8.2 Public Safety Issues/Concerns, and Mitigation Procedures

Human safety will take priority over all other fire management considerations. A qualified wildland fire safety officer will be assigned to all large wildland fires and prescribed fires. Employees responsible for any wildland fire management activities will never subordinate human lives to other values. Consistent, accurate evaluation of fire behavior in CANA will provide the basis for plans and actions to ensure public and firefighter safety.

Public safety considerations at CANA are as follow:

- ❖ There is only one two-lane road leading into CANA in each district, dead-ending about six miles into the seashore on either end. Therefore, evacuating traffic and suppression resources entering the seashore will have to utilize the same route.
- ❖ The city waterline only extends about two miles into the North District, leaving Eldora with only well water to service its needs. Therefore, sufficient water to fight a fire would have to be trucked in, flown in, or pumped out of Mosquito Lagoon.
- ❖ The vast majority of visitation at CANA is concentrated on the beach. The second largest area of visitor usage is Mosquito Lagoon. In both areas, people face little danger of being overrun by fire. The greatest danger would be in evacuating them from the seashore if the road were blocked by fire.

The CANA resource management specialist will inform other divisions of high fire danger or potentially hazardous fires within the seashore. The CANA chief ranger will then confer with the superintendent to determine appropriate action. If there is a risk to visitors or neighbors, they will be informed of the potential hazards and evacuated if necessary. Fire danger factors used to determine a need for closures or evacuations include:

- ❖ Burning index of 75 or above or drought index of 600 or above.
- ❖ Crowning or spotting observed.
- ❖ Rate of spread of one chain per five minutes or greater.
- ❖ Fire size of 100 acres or more.
- ❖ More than one size class C fire burning concurrently.
- ❖ Initial attack forces committed (CANA firefighters).
- ❖ CANA cooperative agreement crews committed.
- ❖ Fire remaining unmanned after commitment of CANA forces.
- ❖ Access route likely to be heavily utilized by suppression traffic.
- ❖ Extensive air operations in vicinity of developed areas.
- ❖ Fire east of Eldora, proceeding westward.
- ❖ Fire north or south of Apollo Beach developments proceeding into developed areas.
- ❖ Any vehicular route directly threatened to the extent that traffic cannot safely get through.

Successful evacuation requires early recognition of potential problems so that timely and orderly departure may be made by private transportation. Eldora and Apollo Beach visitors will be evacuated by road when possible. If not, evacuation will be conducted by boat into Mosquito Lagoon by NPS boat crews.

Additional actions to ensure public safety include:

- ❖ Fires or camping in the backcountry may be prohibited if the fire danger is high.
- ❖ Press releases will be sent to local media and visitors will be contacted to create an awareness of fire danger (see sections 4.2.2.1 and 9.1).

- ❖ When a wildland fire is ongoing, information concerning the fire such as location, expected dangers, areas to avoid, and precautions to be taken will be posted at visitor contact stations and on seashore bulletin boards. Under no circumstances will an individual be permitted near a wildland fire at CANA without the appropriate training and required personal protective equipment (PPE). Members of the press may be allowed in the vicinity of a fire only if they are determined to meet the standards established for the light fitness rating, wear the required PPE, and are accompanied by a trained, qualified firefighter who can assist them.
- ❖ Every prescribed fire plan will outline safety measures. Actions will be taken as needed to ensure public safety, including contacting CANA neighbors with as much advance notice as possible for them to properly prepare for the event, posting signs at the seashore alerting visitors of the planned event, ensuring that areas to be ignited are cleared of all visitors prior to ignition, closing portions of the seashore as appropriate, and posting “Smoke on Road” signs and managing traffic flow as needed. During the prescribed burn, NPS personnel will patrol the perimeter to inform visitors of the role of prescribed fire, explain the risk of getting too close to the fire, and enforce the closure.
- ❖ Trails, campsites, and day use areas that have been recently burned will remain closed until all hazard trees can be removed.

9.0 PUBLIC INFORMATION AND EDUCATION

9.1 Public Information Capabilities and Needs

Educating the public regarding the natural role of fire and its beneficial aspects is crucial to gaining public support for any program utilizing prescribed fire. The following steps will be taken to inform the public about CANA’s fire management program:

- ❖ The seashore resource management specialist will work closely with the district interpreter to most effectively interpret the fire management program.
- ❖ Ecological concepts upon which the FMP is based will be incorporated into seashore brochures, wayside exhibits, and bulletin boards.
- ❖ The fire management program will be featured in interpretive walks, talks, slide shows, and off-site programs.
- ❖ During ongoing fires, news articles will be written and released to local newspapers, radio, and television stations.
- ❖ Whenever prescribed burns will be visible to visitors, hand-outs will be prepared and disseminated which explain the benefits of prescribed fire and the seashore’s fire management program. Interpreters may be stationed near ongoing fires to answer questions. Local media will be invited to observe at least one prescribed fire a year.

- ❖ Every employee at CANA will be educated about the fire management program and the status of ongoing fires to effectively handle visitor questions.
- ❖ The USFWS visitor center at MINWR and the local Chamber of Commerce will be apprised of all fire management activities at CANA to aid in handling visitor inquiries.
- ❖ CANA neighbors will be invited to comment on the FMP. Informal discussions will be held with these groups to fully explain the seashore's reasoning and to address any concerns they might have.
- ❖ Following approval of the FMP and prior to implementation, press releases will be sent to the local media describing the fire management program.

9.2 Step-Up Public Information Activities and Capabilities

Table 5 includes step-up public information activities corresponding with escalating fire danger.

10.0 PROTECTION OF SENSITIVE RESOURCES

10.1 Archeological/Cultural/Historic Resources

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

- ❖ The CANA resource management specialist will continue coordination with the Southeast Archeological Center to ensure that CANA has the most current data regarding archeological resources within its boundaries. S/he will provide recommendations on how to mitigate adverse effects to these resources during fire management activities, and will coordinate compliance with Section 106 of the National Historic Preservation Act, as appropriate.
- ❖ The CANA resource management specialist will be consulted prior to any fire management activities that would involve ground disturbance. S/he will provide the incident commander or burn boss with maps showing the location of archeological/cultural/historic resource locations, and will serve as a cultural resource advisor during suppression or prescribed fire events.
- ❖ When fire management activities must be conducted in the proximity of cultural resource locations, special flagging will be used to delineate these areas to the greatest extent feasible (it may not be possible during some suppression events). The CANA resource management specialist or an archeologist will accompany firefighters whenever feasible to provide mitigation recommendations during suppression events.
- ❖ A photographic record will be maintained of archeological materials exposed during fire management and rehabilitation activities.

- ❖ Any use of heavy equipment will be monitored by the CANA resource management specialist to avoid unnecessary damage to archeological sites.
- ❖ Historic buildings will be protected from wildland fire via the creation and/or maintenance of defensible space around each (a minimum of 30 feet).
- ❖ During all suppression activities, the minimum impact suppression tactics policy (see section 4.2.7) will be incorporated to the greatest extent feasible and appropriate for the given situation. Tactics directly or indirectly facilitating the protection of archeological/cultural/historic resources include:
 - Restricting the use of heavy equipment for constructing fireline. A bulldozer or plow may be used for fireline construction only in extreme situations to protect human life and property, and then only with the authorization of the seashore superintendent or designee.
 - Not using fireline explosives.
 - Using existing firebreaks and natural fuel breaks and human-made barriers, wet line, or cold trailing the fire edge in lieu of fireline construction whenever possible.
 - Keeping fireline width as narrow as possible when it must be constructed.
 - Avoiding ground disturbance within known archeological/cultural/historic resource locations. When fireline construction is necessary in proximity to these resource locations, it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.
 - Using soaker hose, sprinklers or foggers in mop-up; avoiding boring and hydraulic action.
- ❖ MINWR conducts prescribed burns within the jointly managed portion of the seashore. As CANA is responsible for cultural resource management in this area, MINWR consults CANA whenever activities involving ground disturbance are being considered.

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

10.2 Natural Resources

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

- ❖ Avoiding ground disturbance within known natural (e.g. T&E species) resource locations. When fireline construction is necessary in proximity to these resource locations, it will involve as little ground disturbance as possible and be located as far outside of resource boundaries as possible.

- ❖ Using water or type A (biodegradable) foam instead of fire retardant. If retardant must be used, using a non-fugitive type, and avoiding bodies of water.
- ❖ Minimizing cutting of trees.
- ❖ Protecting air and water quality by complying with the Clean Air Act, the Clean Water Act, and all other applicable federal, state, and local laws and requirements.

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

10.3 Development/Infrastructure

Development/infrastructure at the seashore includes:

- ❖ FMU #1 (Apollo Beach): the seashore maintenance complex; visitor center; North District ranger station and boat house; seven comfort stations; former retained-use Feller's House (used as an environmental education/research center by the University of Central Florida); two trailers (one used as a field station by the Daytona Beach Community College, eight boardwalks; three docks; and six garages associated with past retained-use houses (removed), that are presently used for equipment and vehicle storage. The Bethune Beach community, with privately owned residences, is located along the northern FMU/seashore boundary. Historic buildings within the FMU include the Eldora State House and the 1927 Schultz House.
- ❖ FMU #2 (Playalinda Beach): 14 parking areas, all with a comfort station, spaced along the roadway; 16 boardwalks; pavilion; and two NASA camera pads, one located between parking areas 4 and 5, and the other located at the northern end of the road, by parking area 13.
- ❖ FMU #3 (Max Hoeck): the South District ranger complex, containing the South District ranger station, a visitor contact booth, a four-bay garage, two small outbuildings, and a curatorial storage building; a resource management office; and maintenance garage.
- ❖ FMU #4 (Bill's Hill): no development within the unit beyond dirt roads. The Oak Hill community, with privately owned residences, is located along the northern FMU/seashore boundary.
- ❖ FMU #5 (Mosquito Lagoon): 13 primitive backcountry campsites, each consisting of a small clearing with a low, heavy cast-iron grill cemented onto a concrete pad. Some also have wooden picnic tables.
- ❖ FMU #6 (Klondike Beach): a small wooden shelter and a U.S. Air Force weather station mounted on a telephone pole.
- ❖ FMU #7 (Seminole Rest): a parking area with a restroom facility. Historic buildings within the FMU include two multi-story houses.

All buildings will be protected from wildland fire via the creation and/or maintenance of defensible space around each (a minimum of 30 feet). A hazard fuels break will be created and maintained along the seashore perimeter bordering the community of Oak Hill.

11.0 FIRE CRITIQUES AND ANNUAL PLAN REVIEW

11.1 Critiques

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

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

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

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

11.2 Annual Plan Review

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

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

12.0 CONSULTATION AND COORDINATION

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

- ❖ Thomas (Rick) Anderson, Everglades National Park
- ❖ Fred Adrian, Forester/Fire Management Officer, Merritt Island National Wildlife Refuge
- ❖ Clint Cross, former Wildland Urban Interface Coordinator, NPS Southeast Regional Office
- ❖ Dean Gettinger, Fire GIS Specialist, NPS Southeast Regional Office
- ❖ Tim Morgan, (former Chief Ranger), CANA
- ❖ Caroline Noble, Fire Ecologist, NPS Southeast Regional Office
- ❖ Paul Schmalzer, Plant Ecologist, Kennedy Space Center
- ❖ John Stiner, Resource Management Specialist/Fire Coordinator, CANA
- ❖ Kevin Walsh, former Prescribed Fire Specialist, NPS Southeast Regional Office

CANAVERAL NATIONAL SEASHORE FIRE MANAGEMENT PLAN

DRAFT

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Appendix 13.02 - Definitions of Terms, as they pertain to Fire Management

Burning index (BI): A relative number related to the contribution that fire behavior makes to the amount of effort needed to contain a fire in a specified fuel type. Doubling the burning index indicates that twice the effort will be required to contain a fire in that fuel type as was previously required, providing all other parameters are held constant.

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

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

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

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

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

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

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

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

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

- ❖ 1-hour time lag - <1/4" diameter (grass, litter, duff)
- ❖ 10-hour time lag – 1/4" to 1" diameter (twigs, small stems)
- ❖ 100-hour time lag – 1" to 3" diameter (branches)

❖ 1000-hour time lag - >3" diameter (large branches and stems)

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

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

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

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

IQCS: Incident Qualifications and Certification System

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

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

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

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

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

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

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

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

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

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

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

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

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

Appendix 13.03 - NEPA Compliance

The National Environmental Policy Act (NEPA) of 1969 (42 United States Code (USC) 4321 et seq.) requires an environmental analysis for major Federal Actions having the potential to impact the quality of the environment.

This document establishes a revised Fire Management Plan (FMP) for Canaveral National Seashore. Implementation of a FMP is considered to be a major Federal Action that has potential to impact the quality of the environment. Therefore, an Environmental Assessment that meets the requirements established by the National Environmental Policy Act (NEPA) and National Park Service policy has been completed for this FMP.

Appendix 13.04 - Preparedness Inventory - October 2005

Normal Fire Cache Inventory, North District

1 Mark3 pumper w/accessories	9 Geri bags	6 flappers
1 Stihl chainsaw (NP00000 3856)	3 red packs	11 single blade axes
1 extra bar	1 Helo rigging cable	6 council rakes
19 Rolls red flagging	1 yellow pack	2 McCleod rakes
300 feet 1 inch hose	4 sleeping bags	1-5 gallon gas can
12 50-feet 1 inch hose	1 Helo cargo net	2-5 gallon water cans
2 100-feet 1 ½ inch hose	Assorted files	18 goggles
2 50-feet 1 ½ inch hose	10 hard hats	3 tents
800 feet 1 ½ inch hose	7 head lamps, D-cell	1 mop-up kit
4 100-feet 2 inch hose	1 AAA head lamp	2 drip torches
300 feet 2 inch hand-line fire hose	3 pair small gloves	9 fire shelters (old style)
2 drafting hose	7 pair medium gloves	50 quart bottles
100 feet garden hose	2 pair large gloves	2 drinking water bags
Assorted nozzles and hose fittings	4 combination tools	2 wool blankets
6 bladder bags	2 Pulaskis	5 pair nomex pants 30-34W
	13 shovels	20 pair nomex pants 26-30
	3 brush axes	

Normal Fire Cache Inventory, South District – October 2005

1 200 gallon gasoline slip-on pumper with approximately 300 feet hose on Ford F-350 type 6 engine (I253616)	9 Large nomex shirts 6 Extra large nomex shirts
1 Stihl chainsaw (NP500000 3898)	9 hard hats 1 Large brush jacket
1-2 gallon gas can for chain saw	3 sleeping bags 100 canteens
1 pair chain saw chaps	1 food cooler
12 rolls flagging tape (red)	1 water cooler
6 rolls flagging tape (blue/white)	5 lanterns (AAA type) 2 Lanterns (D-cell)
6 rolls flagging tape (green)	8 bladder bags with hand pumps
1/2 box ear plugs	5 pairs Small gloves 15 pairs Medium gloves 20 pairs Large gloves 3 pr Extra large gloves
1 case fuses 2 Drafting hoses	6 fire shelters (old type)
350 feet garden hose	9 fire shelters (new type)
800 foot 1 inch fire hose 200 foot 1 ½ inch fire hose	1 tent
Various nozzles, fittings, and couplings	4 drip torches w/holders
1 Medium Vest	12 Pulaskis 4 pack test vests
6 pair nomex pants 28-32W	9 fire shovels
6 pair nomex pants 30-34W	6 Council fire rakes
6 pair nomex pants 36-40W	2 swatters
3 red packs	6 McCleod rakes
3 day packs (yellow)	2 single bit axes
1 complete fire pack excluding pants/shirts	
1 Small nomex shirt	
1 Medium nomex shirt	

Minimum Standards: CANA Fire Caches

Cache Items	North District	South District
Hand tools	2 per crew member	2 per crew member
Backpack pumps (bladder bags)	5	5
PPE*	10	10
Type 6 engine	-	1
200-gal slip-on pump w/ 250-foot hard-line hose & foam capability	1	-
Portable pump with 2-foot hose	2	2
Chainsaw kit #	2	2
Rations	Supplied as needed	Supplied as needed
Sleeping bags #	10	10
Belt weather kit #	5	5
First-aid kit	2	2
Drip torch #	3	3
Fire monitoring kit #	2	2
Chainsaw files #	3	3
Bastard files #	3	3

* Personal Protective Equipment per set: red backpack (personal gear), yellow field backpack, hardhat, goggles, fire shelter, 4 nomex shirts, 4 nomex pants, headlamp and spare batteries, 2 one-quart canteens, first-aid kit, insect repellent, compass, gloves

Does not meet the minimum standards

Other recommended fire cache supplies and equipment:

Type 6 engine for North District

Backpacks

Individual tents

Snake leggings

Rain gauges

Recommended Equipment for Fire Monitoring Kits:

Belt weather kit

Moisture sampling containers

Soil thermometer

Increment borer

Pruning shears

Clinometer

Transparent ruler

Flagging ribbon

Mylar for overlay of maps

Pin flags

Plastic acreage grid

Anemometer

Diameter tape

Fire temperature templates

Grass shears

100-foot tape

Stopwatch or watch with second hand

1-hr dead fuel moisture tables

7-1/2 minute quad maps

Felt pens or grease pencils

Scales (weighing)

Camera and film (35 mm, slides recommended)

Forms and notebooks, including:

- ❖ Monitoring notebook
 - Initial condition report
 - Fire monitoring record
 - Hourly observation forms
 - Fuel and soil moisture record
 - Photographic record form
 - Spot weather forecast request
 - BEHAVE worksheets
- ❖ Fireline handbook
- ❖ Monitoring decision record
- ❖ Fire zone maps and decision logic charts from FMP
- ❖ Wildland fire observation record
- ❖ Reference materials
 - Anderson, H.E. 1982. Aids to determining fuel models for estimating fire behavior.
 - Brown, J.K. and M.A. Marsden. 1976. Estimating fuel weights of grasses, forbs, and small woody plants.
 - Rothermel, R.C. 1983. How to predict the spread and intensity of forest and range fires.
 - Rothermel, R.C. and J.E. Deeming. 1980. Measuring and interpreting fire behavior for correlation with fire effects.

Appendix 13.05 - Fire Personnel and Equipment - November 2005

1. Personnel

<u>Canaveral National Seashore</u>	<u>NWCG Qualifications</u>	<u>Home Phone</u>	<u>Cell</u>
Scott Anderson	Dispatch	321-267-1459	
Candace Carter	Observer	321-268-5856	321-863-5132
Mark Hempe	FFT2	386-423-3155	
Michael Jones	FFT2	321-267-2562	
Dennis Klimek	FFT2, EMT-B, SEC1	321-449-0134	321-403-5661
Rob Leonard	FFT2, SEC1	386-788-9325	321-403-5654
Jon Steil	FFT2	321-784-3328	
John Stiner	FFT2	321-268-5346	321-403-5680
(Seasonal Staff)			
Kristen Kneifl -604	FFT2	321-409-0437	
Sean McKenna -602	FFT2	321-631-2201	

<u>Merritt Island NWR</u>	<u>NWCG Qualifications</u>	<u>Cell</u>
Fred Adrian	FBAN, ICT3, RXB1	321-403-7633
Cynthia Branham	EDRD(T)	
Mike Good	FF1, HECM(T), ENOP, FALA, ICT5	
Kris Kasper	FALB, TTOP, TPL, ENGB	
Rich Kautter	EDRD	321-453-9304
Paul Koch	FF1, ENOP, FALB	321-443-6820
Wayne Lindsey	FFT2, ENOP	321-454-7971
Ralph Lloyd	FFT2, ENOP	321-403-7629
David Myers	FFT1, RXCM	321-403-7630
David Moran	FFT1, PLDO, HECM, ENOP, ENGB(T)	
Jay Mickey	ENGB, TTOP, ICT4, HECM, HCWN(T)	321-302-1576
Glen Stratten,	DIVS, HCWN, ICT3, RXB1, HELB	386-345-4081
Jeff Schardt	CRWB, ENGB, ICT4, PLDO, TTOP, RXB2, FALB, HELB, HCWN, TFLD(T)	321-863-8408
Jason Vehrs	Law Enforcement	321-403-7639

NWCG Qualification Codes

CRWB - Crew Boss
 ENOP - Engine Operator
 ENGB - Engine Boss
 FALA - Faller Class A
 FALB - Faller Class B
 FBAN - Fire Behavior Analyst
 FFT1 - Advanced Firefighter/Squad Boss
 FFT2 - Firefighter
 HECM - Helicopter Crew Member
 HELB - Helicopter Boss
 HCWN - Helicopter Manager Call When Needed
 ICT3 - Incident Commander Type 3
 ICT4 - Incident Commander Type 4

ICT5 - Incident Commander Type 5
 RXB1 - Prescribed Fire Burn Boss Type 1
 RXB2 - Prescribed Fire Burn Boss Type 2
 RXCM - Prescribed Fire Crew member
 SEC1 - Security w/Gun
 TFLD - Task Force Leader
 TPL - Tractor Plow Operator
 PLDO - Premo Mark 3 Operator
 TTOP - Terra Torch Operator
 EDRD - Extended Dispatch Record
 DIVS - Division Supervisor
 EMT – Emergency Medical Technician

NASA

NASA manpower support is that of 24-hour manned structure-airport fire suppression capability. Some assistance is available from Roads and Grounds for equipment operators.

2. Equipment

Canaveral National Seashore

<u>Quantity</u>	<u>Item</u>
1	Type 6 fire engine

Merritt Island National Wildlife Refuge

<u>Quantity</u>	<u>Item</u>
4	Type 6 fire engine
1	Type 3 (900 gallon) engine
1	Type 3 (1200 gallon) fire engine – to be retired in 2006
1	JD 450 tractor with 2 disc plow
2	D-6 tractor and root rake
1	Marsh master Type 6 tracked engine
1	Terra torch
2	6 disc fire plow
1	Rework disc
6	Chainsaw
4	Ministrikers
500 foot	CJRL Hose 1 inch diameter
150 foot	CJRL Hose 1 ½ inch diameter

NASA

NASA can provide structural fire support on the south end of CANA. One paved-road pumper and some heavy equipment support can be supplied as an available basis.

Appendix 13.06 - Seashore Dispatch Plan/Fire Call-Up List – October 2005

1. When report of smoke or fire is received, record time of report and begin to maintain log. Get as much information from caller as possible, including:

- Location of smoke or fire
- Name, telephone number, and location of caller
- Time fire first observed
- Color of smoke
- Size of fire
- Type of fuel - vegetation burning
- Fire behavior - crowning, ground fire, smoldering
- Anyone fighting the fire
- Cause if known
- Anyone seen in vicinity or vehicles leaving area

2. Notify District Ranger: North District (386-427-1670 or cell 321-403-5645), South District (321-867-4077 or cell 321-403-5681), pass along information, wait for instructions concerning mobilization.

3. Notify Chief Ranger, Resource Management Specialist (267-1110), MINWR (861-0846), and KSC Security (867-2121).

After Hours: Contact CANA staff in the following order:

Chief Ranger	Eric Lugo	321-269-8399
Res. Mgt. Spec	John Stiner	321-268-5346
South District Ranger	Dan Gillam	321-449-8578
North District Ranger	Mike Chambers	386-427-1806

4. When requested, obtain additional firefighters or personnel to backfill vital positions vacated in combating the fire. Priority callout will include: 1) firefighter-qualified personnel on duty; 2) firefighter-qualified off-duty personnel when available; and 3) other CANA headquarters and visitor center non-critical personnel.

5. Notify state fire district office and determine availability of equipment for support (856-6512).

6. Notify SERO FMO, 404-562-3108 ext. 653, or after hours: Florida Interagency Coordination Center, 850-523-8600.

7. Contact Island Aviation (453-2222) and determine availability of aircraft and pilot (must be OAS approved).

8. Obtain latest weather report and forecast for fire location from Melbourne (KMLB) web site. Confirm weather report with 45th Weather Squadron, Cape Canaveral Air Force station (321-853-8485).

9. Maintain a log of all radio and telephone communications.

10. Remain on duty and dispatch further assistance as ordered from fire.

Appendix 13.07 - Fire-Related Telephone Numbers – October 2005

Area code is 321 unless otherwise indicated.

Canaveral National Seashore

Headquarters	267-1110
North District	(386) 428-3384, (386) 427-1670
South District	867-4077

NPS, Southeast Regional Office

Fire Management Officer	(404) 562-3108 x653
Prescribed Fire Specialist	(404) 562-3108 x684

U.S. Fish & Wildlife Service

Regional Fire Management Coordinator	(404) 679-7191
Regional Dispatcher	(678) 320-3000
RFMC Fax	(404) 679-7272
SACC Fax	(678) 320-3036
Dispatch Office	(850) 580-6410 (Dial 0 for dispatcher)

Merritt Island National Wildlife Refuge

Refuge Headquarters	861-0667
Maintenance Shop	861-0661
Fire Cache	861-0846

NASA and Patrick Air Force Base

Emergency	911
Shuttle Landing Facility	867-2100
Fire Control Center, 1P10	867-7627
Aircraft Operations	494-9167
Security Control Center	867-2121
KSC Fire Station #2 (VAB)	867-3073
NASA Weather Forecast (CCAFS)	853-8485
Current Weather Condition (SLF)	867-7619
Weather Recording (PAFB)	494-7181
NASA Public Information	867-2468
GSA Fleet Service Rep	453-1046

Florida Division of Forestry

Brevard County	690-6465
Volusia County	(386) 446-6787
Orlando	(407) 856-6512
Ocala	(352) 732-1201

National Interagency Fire Center (NIFC)

Director, Fire Management	(208) 387-5225
Suppression	(208) 387-5226
Fire Technology Specialist	(208) 387-5214
Fire Qualifications/Training	(208) 387-5221
Firepro/NPS Computer	(208) 387-5210
Structural Fire	(208) 387-5209

Interagency Coordination Centers

Florida Interagency Coordination Center	(850)-523-8600
Southern Area Coordination Center	(678)-320-3000

Area Fire Departments

Emergency (Brevard & Volusia Counties)	911
Oak Hill VFD	(386) 345-5515
Edgewater	(386) 424-2000
New Smyrna Beach VFD	(386) 424-2215
Scottsmoor & Mims VFD	267-9652
Titusville (Headquarters)	383-5708

OAS Approved Contract Air Services

DeLand Aviation	(386) 740-5808
Merritt Island Aviation	453-2222

Non-Contract Air Services

Tyco Airport	267-8780
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Radio

Relm Inc.	1-800-821-2900
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<u>Civil Defense</u>	(386) 423-7424 or emergency (386) 405-2359
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Ambulance

Kennedy Space Center	911
Titusville Emergency	911
Volusia EVAC	911

Hospitals

KSC Occupational Health	867-3346
Parrish Medical Center	268-6111, 268-6130
Wuesthoff (Cocoa/Rockledge)	636-2211
Fish Memorial (NSB)	(386) 427-3401

Police

Titusville	269-7800
New Smyrna Beach	(386) 424-2000
Edgewater	(386) 424-2427
Oak Hill	(386) 345-3621
Volusia County Sheriff	(386) 248-1777
Brevard County Sheriff	264-5208 or 267-2511 (after 5:00 p.m.)

Area Bridges

Haulover Canal	867-4859
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Appendix 13.08 - Fire-Related Agreements

See next pages:

1. Agreement between NPS and NASA
2. Agreement between NPS and FWS
3. Memorandum of Understanding between the U.S. Department of Interior (NPS & FWS, Southeast Region) and the Florida Department of Agriculture and Consumer Affairs (Division of Forestry)

APPENDIX B

AGREEMENT BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
DEPARTMENT OF THE INTERIOR
FOR
USE OF PROPERTY AT
JOHN F. KENNEDY SPACE CENTER, NASA,
AS A PART OF
THE CANAVERAL NATIONAL SEASHORE

WHEREAS, the National Aeronautics and Space Administration has acquired certain lands and adjacent waters located in Brevard and Volusia Counties, Florida; and

WHEREAS, these lands include launch operation areas and necessary buffer zones; and

WHEREAS, a portion of these lands and adjacent waters have now been included within the boundaries of the Canaveral National Seashore by Public Law 93-626, 88 Stat. 2121; and

WHEREAS, the Congressional enactment requires the Administrator of the National Aeronautics and Space Administration to grant to the Secretary of the Interior such use and management authority of that portion of the John F. Kennedy Space Center included within the Canaveral National Seashore as the Administrator determines is not inconsistent with public safety and the needs of the space and defense programs of the Nation;

NOW, THEREFORE, the National Aeronautics and Space Administration (hereinafter called NASA) makes available to the Department of the Interior (hereinafter called the Department) for the purposes set forth in the Act and subject to the terms and conditions hereinafter set forth, all those lands, submerged lands and waters, comprising approximately 41,000 acres described in the Act and located within the perimeters of the John F. Kennedy Space Center, NASA (hereinafter called KSC), less and except those areas on which Space Program facilities have heretofore been constructed, as described in Attachment A hereto.

I. AREA I

That portion of KSC transferred by the Act to the Department, described in the Act as bounded by the northern boundary of the H. M. Gomez Grant and containing 1,088 acres more or less (hereinafter referred to as "Area I") which is

depicted on Attachment B, shall be used in accordance with the Act for the purpose of establishing such facilities as are needed for the administration of the Seashore, for the construction of the principal Visitor Center and for a central access to the Seashore; Provided, however, that the siting and nature of any such construction shall be coordinated with KSC to assure consistency with public safety and with the needs of the space and defense programs of the Nation; and Provided, further, that the entire Area I or any part so transferred shall, upon request of the Director of KSC, be closed to the public when necessary for space operations.

II. AREA II

The Department shall enter upon and use the remainder of the property (comprising approximately 39,912 acres and hereinafter referred to as "Area II") which is depicted on Attachment B, covered by this Agreement for Seashore and Refuge purposes. The Department shall have primary administration over Area II for all purposes unrelated to the Space Program of the United States of America, subject to the following conditions:

1. Programs and/or activities of the Department shall be carried out on a basis of noninterference with the space and defense programs and any program or activity shall be terminated by the Department upon a determination by NASA of incompatibility with the space and defense programs; Provided, however, that prior to arriving at such a determination NASA shall obtain and consider the views of the Department.

2. The Department shall, upon request by the Director of KSC, close all or any part of Area II to the public during checkout, launch and landing periods or during emergencies involving safety and/or security of property and/or personnel; Provided, that NASA will furnish on request from the Department assistance on an as-available basis in such closing.

3. The use and occupation of Area II by the Department shall be without cost or expense to NASA, except as hereinafter provided.

4. NASA shall furnish fire protection in Area II at no cost to the Department, provided that in the event of controlled burning by the Department, control of such fire

shall be the primary responsibility of the Department and assistance by NASA shall be furnished on an as-available basis. Further, NASA may, at its discretion, continue to furnish telephone and electrical service, and when local and Department services are unavailable or insufficient to meet the need, secondary riot or other emergency police/property protection assistance, and secondary emergency medical/ambulance service in Area II; Provided, that NASA will not alter policies in this regard without adequate notice to the Department which would give the Department a reasonable time to obtain replacement services.

5. The Department is authorized to construct, alter, operate and maintain dikes, impoundments, subimpoundments, and water control structures in Area II which do not interfere with or adversely affect NASA operations. These activities will be coordinated with KSC and the Brevard Mosquito Control District to assure an effective mosquito control program which as nearly as possible is compatible with good recreational, wildlife, and habitat management of the area.

6. The Department is authorized to construct, alter and maintain in Area II those facilities needed to accommodate the health, safety, and recreation needs of the visiting public, which do not interfere with or adversely affect NASA operations. Siting of any such construction shall be subject to approval by KSC in accordance with the public safety and the needs of the space and defense programs of the Nation. All such construction shall meet NASA building and fire standards for comparable buildings.

7. The appropriate Services within the Department may make and enforce such rules and regulations as are necessary, and within their respective legal authority, in exercising the privileges granted in this Agreement; Provided, however, that rules and regulations prescribed by NASA to govern the use of the Space Center shall be controlling in all matters pertaining to the Space Program of the United States, particularly with respect to such matters as security, safety, over-flights and radio/instrumentation interference. NASA and the Department shall coordinate the promulgation of regulations concerning public use of Area II.

8. NASA reserves the right to site any future Space Program facility at any location in Area II, but in such siting, as well as other Space Program operations, NASA

will take under consideration the Department's utilization and administration of said property in order to insure compatibility of NASA activities with those of the Department wherever practicable.

9. The Department shall, at its own expense and without cost or expense to NASA, preserve, maintain, and keep in good repair and condition the premises made a part of the Seashore; Provided, however, that NASA shall continue to maintain all existing cemeteries.

10. The Department, its employees, contractors, and the public are authorized to use State Road 3, State Road 402 and Camera Pad Road for access to the Seashore; Provided, however, that the public shall be excluded from use thereof when such roads are closed for space operations. NASA shall maintain State Road 3 and State Road 402 (including associated railroad crossings, traffic signals, bridges and drainage ditches), less and except that portion of State Highway 3 (Kennedy Parkway) abutting Area I, maintenance of which shall be the sole responsibility of the Department; Provided, that NASA may agree to provide maintenance of such portion to the Department on a reimbursable basis. Further, in the event a traffic increase attributable to the creation of the Seashore results in increased deterioration of other portions of State Road 3 (Kennedy Parkway) and/or State Road 402 (Beach Road) serving both NASA and the Department, the Department shall reimburse NASA for a proportionate share of the cost of maintenance thereof, subject to agreement between NASA and the Department concerning the proportionate share allocable to each of the parties. Further, NASA shall continue to maintain Camera Pad Road leading from State Road 402 to Camera Pads 9 and 10, to the extent necessary for space programs; Provided, that in the event the Department desires to open this road to use by the public for access to portions of the Seashore the Department shall reimburse NASA for all maintenance required on such road for that purpose, subject to agreement between NASA and the Department in such event.

11. The Department shall fund for and provide any and all facilities constructed, maintained or used by the Services in their programs.

12. The use of Area II by the Department shall be subject to all valid easements, rights-of-way, licenses, and present or future interests in, upon, across, or through

said property granted by NASA for purposes related to the Space Program; Provided, however, that prior to granting any future interests in the Seashore, NASA shall obtain and consider the views of the Department with respect to the design, nature and location thereof. Out-grants which are unrelated to the Space Program and the primary administration and management thereof shall be the responsibility of the Department; Provided, however, that the Department shall to the fullest extent feasible, follow the policy of out-leasing citrus groves in order that such groves may be continued in an operational status.

13. The right is hereby expressly reserved to NASA, its officers, agents, employees, grantees and contractors to enter upon Area II at any time and to make any use of said land which may be necessary in connection with the Space Program of the United States.

14. The Department shall cooperate to the fullest extent possible with the Brevard Mosquito Control District for the suppression and control of arthropod production in that portion of the Seashore covered by this Agreement, under terms and conditions, including funding arrangements, as may be agreed to in any agreement with the District.

15. Any agreement between the Department and any other government agency concerning the use or occupancy of Area II shall be subject to prior approval by KSC in accordance with the public safety and the needs of the space and defense programs of the Nation. Except as specifically otherwise authorized by law, NASA shall be the sole interface with the Department of Defense concerning use or occupancy of any portion of Area II by the Department of Defense.

16. Fixtures, equipment, facilities, or other property of the Department constructed or maintained on Area II shall be and remain property of the Department and may be removed at any time prior to the termination of this Agreement and at any time within three months after such termination. Any property of the Department not removed from the premises within three months after termination of the Agreement shall become property of NASA.

III. GENERAL PROVISIONS

1. In order to insure the greatest possible compatibility between the Space Program and the National

Seashore, the parties hereto shall meet at least once annually and communicate from time to time on matters of mutual concern and interest.

2. In making its review of the area within the Seashore as to the suitability of any portion thereof for preservation as wilderness, as required by Section 8 of the Act, the Department shall obtain and consider the views of NASA and, prior to giving any public notice with respect to a Departmental recommendation of suitability for preservation, shall notify NASA of its intention to make such a recommendation.

3. All notices by NASA to the Department concerning this Agreement will be addressed to the Refuge Manager, Merritt Island Wildlife Refuge, Florida 32780, and the Superintendent, Canaveral National Seashore, National Park Service, and all notices by the Department to NASA will be addressed to Director, John F. Kennedy Space Center, NASA, Kennedy Space Center, Florida 32899.

4. Notwithstanding any other provision of this Agreement, implementation of the Agreement and any obligation hereunder shall be subject to the availability of appropriated funds.

5. This Agreement may be amended at any time upon mutual consent of the parties.

6. This Agreement may be terminated as to Area II in whole or in part in the event the Administrator determines that use of Area II as a Seashore is inconsistent with public safety and the needs of the space and defense programs of the Nation; Provided, however, that the Administrator shall make no such determination without first obtaining and considering the views of the Department.

This Agreement shall become effective when executed on behalf of both parties and shall remain in effect until terminated or amended as provided herein. With respect to Area II, upon notification to NASA of implementation hereof by the Department, this Agreement will supersede the Agreement of June 2, 1972, between NASA and the Department for use of property at the John F. Kennedy Space Center, NASA, by the Bureau of Sport Fisheries and Wildlife to the extent that property included in the 1972 Agreement has been incorporated

into the Canaveral National Seashore and is covered by the terms and conditions of this Agreement. In the meantime, NASA and the Department agree to continue operation under said Agreement of June 2, 1972.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,

Associate Administrator for
Center Operations

Date: 4/1/75

DEPARTMENT OF THE INTERIOR

Assistant Secretary of the
Interior

Date: 4/2/75

NPS Agreement # IA-5180-9-9001

INTERAGENCY AGREEMENT
BETWEEN
NATIONAL PARK SERVICE
AND
U. S. FISH AND WILDLIFE SERVICE

This Interagency Agreement is made and entered into this 9th day of February, 1990, by and between the National Park Service (hereinafter NPS) and the U.S. Fish and Wildlife Service (hereinafter FWS), by and through Canaveral National Seashore and Merritt Island National Wildlife Refuge:

ARTICLE I. BACKGROUND AND OBJECTIVES:

Whereas, the National Park Service Organic Act of August 25, 1916, 39 Stat 535 provides authority for NPS to enter into this agreement; and

Whereas, an agreement between the National Aeronautics and Space Administration and the Bureau of Sport Fisheries and Wildlife (now the U.S. Fish and Wildlife Service), dated June 2, 1972, established Merritt Island National Wildlife Refuge and the conditions for administering the refuge; and

Whereas, the establishment of Canaveral National Seashore was provided for by the Act of January 3, 1975, PL 93-626, 88 Stat 2121; and

Whereas, an agreement between the National Aeronautics and Space Administration and the Department of the Interior was established for the use of property on NASA as part of the Canaveral National Seashore on April 2, 1975; and

Whereas, a Memorandum of Understanding between NPS and FWS, dated July 10, 1975, establishes cooperation on mutual programs between the two bureaus; and

Whereas, an Interagency Agreement between FWS and NPS, dated June 18, 1981, amended May 11, 1987 and approved by the National Aeronautics and Space Administration, establishes cooperation on mutual programs between the two agencies and

Whereas, the two parties desire to restate their individual and joint responsibilities in administering those lands and waters as described in Section 5(1) of PL 93-626 where joint management authority exists.

Now, therefore, in consideration of joint interest and concerns, NPS and FWS mutually agree as follows:

ARTICLE II. STATEMENTS OF WORK:

1. The FWS shall administer those lands and waters as described in Section 5(1) of Public Law 93-626, and both agencies agree that the line between the "marsh and the dunes" as specified in this section shall refer specifically to the western toe of the primary dunes or eastern edge of the original sand trail between the northern boundary of H. M. Gomez Grant Line Extending southerly to the south end of the "sand trail" near Camera Pad 10,

and continuing southerly along the west edge of the Beach Road and/or beach parking areas, including the Eddy Creek launch site, to the intersection with the railroad and continuing westerly on Max Hoeck Wildlife Drive along the north edge of the railroad to the junction with State Road 3, and continuing north along the east side of State Road 3 to Gomez Grant Line and then easterly along Gomez Grant Line and an extension of said Grant Line across Mosquito Lagoon to the beginning. FWS will continue to manage for refuge purposes all of the lands and waters south of the Gomez Grant Line and west of the primary dunes and Beach Road, north of the government railroad track and east of State Road 3, including mainland, Mosquito Lagoon and west side of the barrier island. For the purpose of this agreement, this area will be known as the "Joint Area."

Note: Upon completion of the Playalinda Beach Access Road (Project CANA 300(1), Article II.1. will read as follows: The FWS shall administer those lands and waters as described in Section 5(1) of Public Law 93-626, and both agencies agree that the line between the "marsh and the dunes" as specified in this section shall refer specifically to the western toe of the primary dunes or eastern edge of the original sand trail between the northern boundary of the H. M. Gomez Grant Line southerly to the north end of the beach road near Camera Pad 10, and continuing southerly along the west edge of the beach road and/or beach parking areas to the intersection with State Road 402 and continuing westerly on the north edge of SR 402 to the junction of Max Hoeck Road, continuing westerly on the south edge of Max Hoeck Road to the junction with State Road 3, continuing northerly on the east side of State Road 3 to H. M. Gomez Grant Line and continue easterly along Gomez Grant Line and an extension of said Grant Line across Mosquito Lagoon to the beginning. FWS will continue to manage for refuge purposes all of the lands and water south of the Gomez Grant Line and west of the primary dunes and Beach Road, north of State Road 3, including mainland, Mosquito Lagoon and west side of the barrier island. For the purposes of this agreement, this area will be known as the "Joint Area."

2. The area administered by the NPS between State Route 402 and the railroad will continue to be closed to hunting, and will be subject to closures related to the imposition of security zones related to operations at the Kennedy Space Center. Posting of this area will be the responsibility of NPS and sign type will be agreed upon between the Merritt Island Refuge Manager and the Canaveral National Seashore Superintendent.

3. The Fire Management Plan covering the Joint Area is the overall responsibility of FWS. Cooperative efforts will be undertaken by both agencies in areas such as sponsoring fire-related training courses and the development of an interagency unified strike team(s). Assistance for fire suppression in all areas of the Merritt Island Refuge and Canaveral National Seashore - manpower and equipment - will be provided by either agency to the other when requested on an "as available" basis.

Controlled burning operations will be coordinated, and each agency will advise the other (including NASA) when such action is being taken, and this will be spelled out in the Fire Management Plan of each agency.

4. Assistance for any search and rescue operation within all areas of the Refuge and Seashore will be provided by either agency upon request on an "as available" basis.

5. FWS will act as the lead agency in any studies in the Seashore/Refuge Joint Area involving wildlife species including species listed by Federal law as threatened or endangered. All studies will be conducted under FWS permit.

6. Information and/or interpretive signing or exhibitry including costs of purchase and maintenance within the Joint Area will be the responsibility of the NPS upon consultation with FWS. Any signing or exhibitry relating specifically to wildlife or the mission of the FWS will be the responsibility of FWS upon consultation with NPS. All signing will be included in the FWS sign plan for the refuge.

7. Maintenance of the "sand trail," dike road, or improved dike road adjacent to the line referred to in Section 1 of this Agreement shall be the responsibility of the FWS. The Beach Road and parking areas, the Eddy Creek boat ramp, dock and parking area, and informational and interpretive signing related to these areas, will be the maintenance responsibility of the NPS.

8. Administration of the citrus groves within the Refuge/Seashore shall be the responsibility of FWS.

9. Each agency shall keep the other informed of on-site programs such as public hunting, interpretive activities, environmental education activities, and other group activities involving use of the Seashore, and will coordinate these activities with NASA. General staff meetings of NPS and FWS personnel will be open to representatives of the other agency.

An agency liaison will be appointed by the NPS and the FWS to handle coordination of all activities and functions referred to in this Agreement. These representatives will maintain frequent contact with respect to activities within the Seashore/Refuge in an effort to increase the cooperative efforts between the NPS and the FWS.

10. Informational or interpretive publications dealing with the Seashore/Refuge will be coordinated and reviewed by both NPS and FWS. Following such review; these publications will be made available to each agency on request on an "as available" basis.

11. Research, interpretation, and protection of archeological and historical sites within the Seashore/Refuge Joint Area will be the primary responsibility of the NPS. Any site protection and/or development of these sites will be fully coordinated with the FWS.

12. Visitor control programs will be coordinated among NASA, FWS, and NPS with enforcement being the responsibility of the jointly agreed upon agency requiring the control. Each agency will take the lead in enforcement in their respective areas of administration, and will keep NASA informed of any changes or major issues regarding enforcement policy.

NPS and FWS have shared jurisdiction in the Joint Area. FWS will act as the lead agency in enforcement activities in the Joint Area, and any enforcement actions in the Joint Area by NPS will be fully coordinated with and approved by FWS. Routine law enforcement by NPS in Mosquito Lagoon can be approved informally. FWS and NPS personnel responding to a request for response or back-up assistance in an enforcement action within the total boundaries of the refuge or seashore would be performing within the cooperative spirit of this Agreement and within the scope of their employment by their respective agencies. Joint patrols and other law enforcement efforts within the total seashore/refuge boundary will fall within the scope of the employees employment.

13. Trail, boundary, and/or road development, improvement or maintenance within the Joint Area will be initiated only after adequate review and comment time by all agencies involved.

14. FWS, and NPS will be responsible for Tort Claims on lands and/or waters under their respective management.

15. Mosquito control coordination in Brevard County will be conducted by FWS, and that in Volusia County will be coordinated by NPS. All planned overflights by Mosquito Control will be coordinated with NASA and will comply with existing regulations. Any changes from the Mosquito Control Agreement desired by the FWS or NPS within the NASA boundary will be coordinated jointly with NASA and the Brevard Mosquito Control District.

16. FWS agrees to make a specified portion of its office complex/visitor information center available to the NPS for joint use in orientation/interpretation for the visitors to the Seashore/Refuge. Details of this use and occupancy such as staffing, funding, hours of operation, etc., will be arranged as needed.

17. FWS agrees to provide shop or building space for NPS to facilitate their field operations at the FWS maintenance compound. FWS further agrees to allow NPS employees access to this area for other official purposes.

18. FWS agrees to provide space at the FWS maintenance compound to park NPS government-owned motor vehicles and employee parking, including but not limited to patrol sedans, pickup trucks, dump trucks, tractor mowers and all-terrain vehicles. NPS will be allowed to use the fuel facilities and record the amounts used. Fuel will be replaced on a bulk basis.

19. NPS and FWS agree to allow trained, qualified employees to operate FWS or NPS equipment or tools on an "as available" basis.

ARTICLE III. TERM OF AGREEMENT:

This agreement will remain in force five (5) years from date of signing. It may be renewed after review and reassessment by the signatory parties.

ARTICLE IV. KEY OFFICIALS:

NATIONAL PARK SERVICE
Sibbald Smith
Superintendent
Canaveral National Seashore
2532 Garden Street
Titusville, FL 32796

U.S. FISH AND WILDLIFE SERVICE
Stephen R. Vehrs
Refuge Manager
Merritt Island National
Wildlife Refuge
P.O. Box 6504
Titusville, FL 32782

ARTICLE V. PAYMENT:

Any transfer of funds between the parties involved will be done through a sub-agreement to this agreement.

ARTICLE VI. TERMINATION:

This Agreement may be terminated by either party upon sixty (60) days written notice.



Regional Director
National Park Service
Atlanta, GA



Regional Director
Fish and Wildlife Service
Atlanta, Georgia

MAR 22 1990

Date

February 9, 1990

Date

Memorandum of Understanding
Between the
United States Department of Interior
(National Park Service, Southeast Region and the
U.S. Fish & Wildlife Service, Southeast Region)
and the
Florida Department of Agriculture and Consumer Services
(Division of Forestry)

ARTICLE I – BACKGROUND AND OBJECTIVES

This Memorandum of Understanding is hereby entered into this October 30, 2002 by and between the **Florida Division of Forestry**, a state agency (the STATE), and the **National Park Service and U.S. Fish and Wildlife Service**, agencies of the U.S. Department of the Interior (DOI), (the SERVICE), covering a reciprocal fire protection agreement.

The SERVICE is mandated to protect and perpetuate natural and cultural resources found within national parks and wildlife refuges, and is responsible for conducting fire management activities in federal parks and wildlife refuges in Florida which are adjacent to areas protected by the STATE; and

The STATE is responsible for conducting fire management activities on state owned and privately owned lands in Florida which are adjacent to and interspersed with National Park and National Wildlife Refuge lands; and

It is to the mutual advantage of both the STATE and the SERVICE to coordinate their efforts in the prevention, detection, suppression, and investigation of wildfires in and adjacent to their areas of responsibility.

Each agency shall render mutual assistance in law enforcement activities and the gathering of evidence and in actual court prosecutions to the fullest extent allowable by law and policy.

ARTICLE II –AUTHORITY

This agreement is entered into under the authority of 42 USC § 1856a (1994) and Florida Statue, Title XXXV, Chapter 589.04 and 590.02.

ARTICLE III –STATEMENT OF WORK

The SERVICE and the STATE agree to:

A. General Operations

1. Working in close consultation with one another, the corresponding field units may conduct fire management activities and preliminary fire-related investigations on the lands located within each other's jurisdictions, all in accordance with the provisions of this Memorandum of Understanding (MOU) and their respective annual operating plans. The plans will be drafted upon execution of this MOU and will be revised or modified as necessary on an annual basis. The prescribed content and format for the plans are set forth in the Attachment "A", the Annual Operating Plan.
2. Each corresponding field unit, upon the request of the other field unit, will dispatch fire fighting equipment and personnel to assist in the emergency suppression of fires in areas for which the requesting field unit is responsible, provided that in the judgement of the sending field unit, the fire danger and risk on lands for which it is responsible are such that the said equipment and personnel may safely be released.
3. Each corresponding field unit, to the best of its knowledge and ability, when suppressing fires for the receiving field unit will adhere to the suppression and mop-up standards of the receiving field unit insofar as resources are available. The fire management strategy to be used within the lands under the jurisdiction of the each field units will be addressed in the annual operating plans or specific Incident Action Plans. If adequate resources are not available to meet such standards, the field unit providing assistance shall notify the field unit requesting assistance at the earliest possible time.
4. Each corresponding field unit will aggressively investigate and report on wild fires under its jurisdiction. Coordination activities will be outlined in the annual operating plan.

5. Each corresponding field unit will keep the other field unit informed of major changes within its own unit with respect to facilities, personnel, equipment, services, and supplies that affect day to day operations.
6. Fire prevention and education programs will be coordinated to achieve the fire prevention objective outlined in the annual operating plans, without duplication of effort.
7. Field units will ensure that coordinated dispatching of resources will be initiated as rapidly as can be provided.
8. For purposes of making employment compensation claims, personnel dispatched by either corresponding field units for the benefit of the other field unit will be considered as employees of their own government agency. The STATE and the SERVICE will instruct their employees to act under the direction of the receiving field unit when so dispatched. When personnel of a sending unit is working for the benefit of a receiving unit, the receiving unit shall provide or arrange for immediate medical treatment of any injuries which may be incurred at the scene of the fire.
9. Each corresponding field unit will be responsible for the training of its respective fire management personnel and will invite representatives at all levels of the other field unit to attend and participate in training sessions and meetings.
10. Each agency shall provide authorization and identify radio frequencies for cooperative fire management use. Space and or facilities for electronic equipment, radios, and antennas shall be set forth in the annual operating plan. Applicable federal and state laws and regulations will govern use of radio communications.
11. Either corresponding field unit in accordance with its applicable rules and regulations may restrict activity or close areas to the public. However, before such action is taken, the corresponding field units will determine the severity of the situation. Every reasonable effort will be made to insure uniform and simultaneous action by both corresponding field units.
12. Fuel management and prescribed fire activities will be coordinated in order to provide training opportunities and to increase experience and qualifications. Either agency may provide personnel to assist the other on a non-reimbursable basis for fuel management and prescribe fire activities. Local managers may include language in the Annual Operating Plan to further clarify the roles and expectations of fuel management and prescribe fire cooperation. Assistance may also be provided on a

reimbursable basis when both parties agree to this beforehand. Actual cost for personnel and prevailing rates for equipment as described in the Annual Operating Plan may be used or the parties will mutually agree upon the reimbursement rate prior to the activities being conducted.

13. Wildfires resulting from escaped prescribed fires ignited by or at the direction or under the supervision of one of the parties to this agreement shall be the financial responsibility of that party. All suppression costs shall be borne by the responsible party. A party may take appropriate suppression action when lands under its protection jurisdiction are involved in or threatened by the fire. Such suppression action may be taken on its own initiative or at the request of the responsible party. A party may take appropriate suppression action, at the request of the responsible party, when lands under its protection jurisdiction are not involved in or threatened by the fire. The responsible party shall reimburse the other party for all suppression costs incurred in accordance with this claim.

B. Operations within Mutual Threat Zones

For those Service lands where a mutual threat zone is applicable, the SERVICE and STATE agree to define mutual threat zone as a geographical area between two or more jurisdictions onto which representatives from these jurisdictions would respond on initial attack. Due to complexities of boundary locations and maintaining detailed maps on these mutual threat zones, both agencies agree to define the mutual threat zones in the respective Annual Operating Plans.

1. Mutual aid, which is any form of free direct assistance from one fire agency in support of another during an emergency, based upon a pre-arrangement between the agencies involved is detailed in the Annual Operating Plan. Initial attack and extended attack responsibilities of each agency within and outside the mutual threat zone are included in the Annual Operating Plan.
2. SERVICE personnel acting as authorized agents of the STATE, or anyone acting at the direction of the STATE, shall have the same rights the STATE has, pursuant to Florida Statue 590.02 (3) at any or all times upon state or privately owned lands for the purpose of taking fire suppression actions.

C. The parties further agree as follows:

1. Each party to this agreement waives all claims against the other party for compensation for any loss, damage, personal injury, or death occurring in consequence of the performance of this agreement.

ARTICLE IV –TERM OF AGREEMENT

This MOU shall be effective on the date herein above first written and shall terminate five (5) years from that date. The term of this Memorandum of Understanding may be extended for an additional five (5) years if warranted and agreed to in writing by both parties.

ARTICLE V –KEY OFFICIALS

National Park Service

Ken Garvin
Southeast Regional Fire Management Officer
National Park Service
Atlanta Federal Center
1924 Bldg., 100 Alabama St., S.W.
Atlanta, GA 30303
404-562-3108 ext. 653

U.S. Fish and Wildlife Service

Roger Boykin
Southeast Regional Fire Coordinator
U.S. Fish and Wildlife Service
1875 Century Boulevard
Atlanta, GA 30345
404-679-7191

State of Florida

Jim Karels
Chief, Forest Protection Bureau
Florida Division of Forestry
3125 Conner Boulevard
Tallahassee, FL 32399-1650
850-488-6106

ARTICLE VI –PRIOR APPROVAL

Not applicable.

ARTICLE VII –REPORTS AND/OR OTHER DELIVERABLES

A. Reports

1. Each corresponding field unit will furnish to the other field unit, or make available upon request, any maps, documents, instructions, records and reports, including fire reports and law enforcement reports, which either field unit considers necessary in connection with this Agreement. Provision of such information shall be subject to the rules and regulations of the federal government, the State of Florida, and the DOI.
2. For statistical purposes each corresponding field unit will report fires in accordance with its current procedures. The field units will exchange fire report data as they deem appropriate.

B. General Payment Provisions

1. When assistance with fire management activities is requested and received by one corresponding field unit, said field unit may reimburse the field unit that rendered the assistance. If a reimbursement is to be made, payment will be made in accordance with this MOU and the annual operating plan. Payment will be based on the actual costs incurred by the field unit rendering assistance.
2. To the extent possible, rates to be charged or reimbursed for equipment used in firefighting shall be set forth in the annual operating plan. If one corresponding field unit agrees to reimburse the other field unit for equipment, (including aircraft), reimbursement will be made at the rates set forth in the annual operating plan. If rates for certain equipment used for fire management activities are not specified in the annual operating plan, the reimbursement rate will be mutually agreed upon by the parties upon conclusion of the fire.
3. One corresponding field unit also may reimburse the other field unit for the cost of the personnel services. Salary or wages will include the actual cost to the sending field unit for work performed during the time between departure from and return to the official station. Overtime may be

included, if and when overtime is earned under the laws or rules governing the employees of the sending field unit. It is not intended that salary, overtime, travel or subsistence costs will be reimbursed for the administrative personnel not directly associated with the fire management activities unless specifically agreed upon in the annual operating plan.

4. Payments for reimbursable services rendered under this MOU may be made only upon receipt of an itemized statement that conforms to the requirements set forth herein. Within 60 days of each reimbursable fire, the field unit rendering the assistance shall furnish the field unit receiving the assistance an itemized statement containing the following information:
 - a. The date and location of the fire.
 - b. Name(s) of person(s) who ordered equipment and name(s) of person(s) from whom the equipment was ordered.
 - c. Type of truck or transportation furnished, number of miles traveled, rental rate, and the total evaluated cost as set forth in the annual operating plan.
 - d. Type of tractor, plow, engine, aircraft, or other equipment furnished, hours actually operated, rental rate, and total evaluated cost as set forth in the annual operating plan.
 - e. Names and Social Security Numbers of personnel dispatched to the fire, time of dispatch and time of return to official station, total elapsed time, rate of pay, and total pay.
5. Equipment owned and used by one corresponding field unit to suppress fires on lands for which the other field unit is responsible will be operated, serviced, and repaired by the field unit that owns the equipment unless specified otherwise in the annual operating plan.

C. Reimbursements to the State

1. After a reimbursable fire occurs upon SERVICE lands, the STATE's Regional Forester or designee may prepare and send to the SERVICE's Park Superintendent or Refuge Manager at the receiving unit an itemized statement in accordance with the provisions set forth herein and in the annual operating plan for the field unit involved. The SERVICE, upon receipt of the itemized statement, shall ensure the proper processing of a funding document package.

2. Reimbursements to the STATE shall be made payable to the local field office of the Florida Department of Agriculture and Consumer Services, Division of Forestry.
3. The SERVICE shall not be bound to make any expenditure under the terms of this MOU or any annual operating plan except as funds are appropriated by the Congress of the United States, or otherwise are made available for such purpose.

D. Reimbursements to the Service

1. After a reimbursable fire occurs upon STATE lands, the Park Superintendent or Refuge Manager may prepare and send to the STATE's Regional Forester an itemized statement in accordance with the provisions set forth herein and in the annual operating plan for the field unit involved. The STATE, upon receipt of the itemized statement, shall ensure the proper processing of a funding document package.
2. Reimbursements to the SERVICE shall be made payable to the National Park Service or the U.S. Fish and Wildlife Service.
3. The STATE shall not be bound to make any expenditure under the terms of this MOU or any annual operating plan except as funds are appropriated by the State of Florida, or otherwise are made available for such purpose.

ARTICLE IX –MODIFICATION AND TERMINATION

- A. This agreement may be modified only by a written instrument executed by all the parties.
- B. Either party may terminate the MOU by providing sixty (60) days advance written notice. In the event that one party provides the other party with notice of its intention to terminate, the parties shall meet promptly to discuss the reasons for the notice and to try to resolve their differences amicably. The parties commit to using every reasonable means available, including the use of a neutral mediator if necessary, to try to avoid terminating this agreement.

ARTICLE X –STANDARD CLAUSES

A. Civil Rights

During the performance of this agreement, the participants agree to abide by the terms of USDI-Civil Rights Assurance Certification, non-discrimination, and will not discriminate against any person because of race, color, religion, sex, or national origin. The participants will take affirmative action to ensure that applicants are employed without regard to their race, color, sexual orientation, national origin, disabilities, religion, age or sex.

B. Promotions

The State of Florida shall not publicize or otherwise circulate promotional material (such as advertisements, sales brochures, press releases, speeches, still and motion pictures, articles, manuscripts, or other publications) which states or implies Governmental, Departmental, bureau, or Government employee endorsement of a product, service, or position which the State of Florida represents. No release of information relating to this agreement may state or imply that the Government approves of the State of Florida's work product or considers the State of Florida's work product to be superior to other products or services.

C. Public Information Release

Both the Service and the State will cooperate in seeking out and utilizing media opportunities associated with fire management activities in on state and federal lands. When both agencies are involved in a joint fire suppression effort, or when a news release by one agency is likely to have a direct impact on the other agency, a joint release will be developed and issued by the spokesperson of each agency. Specific information procedures and interface requirements with Incident Management Teams are addressed in the Annual Operating Plan.

D. Liability Provision

Each party to this agreement will indemnify, save and hold harmless, and defend each other against all fines, claims, damages, losses, judgments, and expenses arising out of, or from, any omission or activity of such person organization, its representatives, or employees.

ARTICLE XI - SIGNATURES

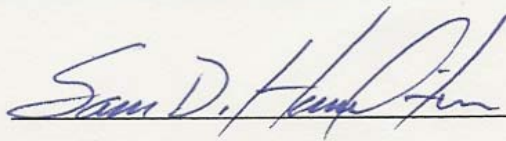
IN WITNESS HEREOF, the following authorized representatives of the parties have signed their names on the dates indicated, thereby executing this agreement.

For the National Park Service:



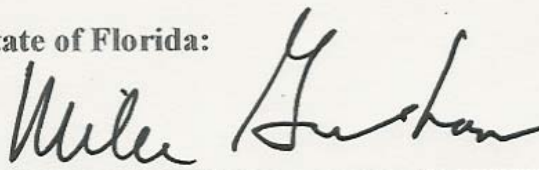
ACTING
Date 10/31/02
Southeast Regional Director
National Park Service

For the U.S. Fish and Wildlife Service



Date 11/25/02
Southeast Regional Director
U.S. Fish and Wildlife Service

For the State of Florida:



Date 2-3-03
Director of Administration
Florida Department of Agriculture and Consumer Services

COOPERATING AGENCIES

National Park Service

Superintendent
Big Cypress Natl. Preserve
HCR 61 Box 110
Ochopee, FL 33943
Telephone (941) 695-1101

Superintendent
Biscayne National Park
PO Box 1369
Homestead, FL 33090-1369
Telephone (305) 230-1144 x3002

Superintendent
Canaveral National Seashore
308 Julia Street
Titusville, FL 32799-3521
Telephone (321) 267-1110

Superintendent
Castillo De San Marcos Natl. Monument
Fort Matanzas National Monument
1 South Castillo Drive
St. Augustine, FL 32084
Telephone (904) 829-6506 x221

Superintendent
DeSoto National Monument
P.O. Box 15390
Bradenton, FL 34280-5390
Telephone (941) 792-0458 x14

State of Florida

District Manager
Caloosahatchee District, D-17
10941 Palm Beach Blvd.
Fort Myers, FL 33905
Telephone (239) 690-3500

District Manager
Everglades District, D-18
3315 SW College Avenue
Fort Lauderdale, FL 33314
Telephone (954) 475-4120

District Manager
Orlando District, D-12
8431 S. Orange Blossom Trail
Orlando, FL 32809
Telephone (407) 856-6512

District Manager
Bunnell District, D-10
5001 US 1 North
Bunnell, FL 32110
Telephone (386) 446-6785

District Manager
Myakka River, D-15
4723 53rd Avenue
Bradenton, FL 34203-4138
Telephone (941) 751-7629

National Park Service

Superintendent
Everglades National Park
40001 State Road 9336
Homestead, FL 33034
Telephone (305) 242-7710

Superintendent
**Fort Caroline National Monument
Timucuan Ecological & Historical
Preserve**
13165 Mount Pleasant Road
Jacksonville, FL 32225
Telephone (904) 221-7567 x10

Superintendent
Gulf Islands National Seashore
1801 Gulf Breeze Pkwy
Gulf Breeze, FL 32563

State of Florida

District Manager
Everglades Distirct, D-18
3315 SW College Avenue
Fort Lauderdale, FL 33314
Telephone (954) 475-4120

District Manager
Jacksonville District, D-7
7247 Big Oaks Road
Bryceville, FL 32009
Telephone (904) 266-5001

Center Manager
Blackwater Forestry Center, D-1
11650 Munson Highway
Milton, FL 32570
Telephone (850) 957-6140

U.S. Fish & Wildlife Service

Refuge Manager
Arthur R. Marshall Loxahatchee NWR
Hobe Sound NWR
19216 Lee Road
Boynton Beach, FL 33437-4796
Telephone (561) 732-3684

Refuge Manager
Chassohowitzka NWR
1502 SE Kings Bay Drive
Crystal River, FL 34429
Telephone (352) 563-2088

Refuge Manager
Florida Panther NWR
Ten Thousand Island NWR
1860 Tollgate Blvd.
Suite 300
Naples, FL 34114
Telephone (941) 353-8442

Refuge Manager
J.N. Darling NWR
1 Wildlife Drive
Sanibel, FL 33957
Telephone (941) 472-1100

Refuge Manager
Lake Woodruff NWR
P.O. Box 488
DeLeon Springs, FL 32130-0488
Telephone (904) 985-4673

Refuge Manager
Lower Suwanne NWR
Cedar Keys NWR
16450 NW 31ST Place
Chiefland, FL 32626
Telephone (352) 493-0238

State of Florida

District Manager
Everglades District, D-18
3315 SW College Avenue
Fort Lauderdale, FL 33314
Telephone (954) 475-4120

Center Manager
Withlacoochee Forestry Center, D-11
15019 Broad Street
Brooksville, FL 34601
Telephone (352) 754-6777

District Manager
Caloosahatchee District, D-17
10941 Palm Beach Blvd.
Fort Myers, FL 33905
Telephone (239) 690-3500

District Manager
Caloosahatchee District, D-17
10941 Palm Beach Blvd.
Fort Myers, FL 33905
Telephone (239) 690-3500

District Manager
Bunnell District, D-10
5001 US 1 North
Brunnell, FL 32110
Telephone (386) 446-6785

Center Manager
Waccasassa Forestry Center, D-8
1600 NE 23rd Avenue
Gainesville, FL
Telephone (353) 955-2005

U.S. Fish & Wildlife Service

Refuge Manager
Merritt Island NWR
Archie Carr NWR
Lake Wales Ridge NWR
Pelican Island NWR
St. Johns NWR
P.O. Box 6504
Titusville, FL 32782
Telephone (321) 861-0667

Refuge Manager
National Key Deer NWR
Crocodile Lake NWR
P.O. Box 430510
Big Pine Key, FL 33043-0510
Telephone (305) 872-2239

Refuge Manager
St. Marks NWR
P.O. Box 68
St. Marks, FL 32355
Telephone (850) 925-6121

Refuge Manager
St. Vincent NWR
P.O. Box 447
Apalachicola, FL 32329-0447
Telephone (850) 653-8808

State of Florida

District Manager
Orlando District, D-12
8431 S. Orange Blossom Trail
Orlando, FL 32809
Telephone (407) 856-6512

District Manager
Everglades District, D-18
3315 SW College Avenue
Fort Lauderdale, FL 33314
Telephone (954) 475-4120

District Manager
Tallahassee District, D-4
865 Geddie Road
Tallahassee, FL 32304
Telephone (904) 488-1871

District Manager
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GUIDELINES FOR THE ANNUAL OPERATING PLAN

(to be formulated between the units of the FL Division of Forestry and the NPS or FWS area)

PURPOSE:

Describe the purpose of this plan and how it is to function. Describe the operating procedures between the participating agencies within the framework of the Memorandum of Understanding. Cite the Memorandum of Understanding by title and effective date.

RESOURCE MANAGEMENT:

Discuss each agency's mandates; fire management policies; resource issues and concerns; consequent resource management objectives.

MUTUAL THREAT ZONES:

Discuss the initial attack suppression strategies that are acceptable where the boundary between the two agency's suppression responsibilities are not immediately distinguishable. Include a geographic description and map.

PRESCRIBED BURNING:

List any arrangements for the issuance of burning authorizations by agency. Detail arrangements. Discuss State and local notification procedures for conducting prescribed burns.

OPERATIONS:

Outline the fire organization in the mutual threat zone; list personnel in fire jobs. Discuss procedure for releasing resources and transitioning the fire to the responsible agency. Address acceptable fire suppression strategies. Detail who has first call, second call, support, ICS procedures, and unified command and how it is to function.

COMMUNICATIONS:

Include dispatch procedures and the procedures for keeping each other informed on fire potential and activity, and the status of fire equipment and personnel. Include under what condition radios will be made available including the type of equipment and where it is located.

PERSONNEL AND EQUIPMENT:

Detail resource listing of available equipment and personnel. Include a telephone directory. Discuss the types of equipment and under what conditions and where they may be used. List key personnel and any applicable qualifications. If applicable, list rates for equipment and personnel. Require full Personal Protective Equipment on fire activities, prescribed or wildland fire.

FIRE PREVENTION:

Detail interagency cooperation in fire prevention and fire education efforts.

INCIDENT REPORTS:

Detail arrangements to furnish incident reports to each agency.

TRAINING:

Discuss interagency training to be carried out at the local level. Include courses to be offered, qualified instructors, and location and facilities.

FACILITIES:

List facilities for meeting, training, and for emergency management functions.

FINANCIAL ARRANGEMENTS:

Include under what condition reimbursements will be made. Address the procedures for making reimbursements as outlined in the Memorandum of Understanding.

OTHER:

Detail any other applicable considerations.

PLAN APPROVAL:

District Forester and Park Superintendent approve the annual operating plan.

Appendix 13.09 - CANA Limited Delegation of Authority

Canaveral National Seashore

Limited Delegation of Authority

_____, Incident Commander
(Name)

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

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

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

My considerations are as follows:

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

Superintendent

Date

Appendix 13.10 - Prescribed Fire Monitoring Plan

A monitoring plan specific to CANA will be developed in the future. In the interim, the *NPS Fire Monitoring Handbook* (2001) will be utilized as a guide for monitoring at the seashore.

Appendix 13.11 - Five-Year Fuels Treatment Plan

Prescribed Fire

Five units will be prescribed burned at the seashore over the next five years, primarily to reduce hazard fuels accumulations and to promote ecosystem sustainability. See the following table and maps for the burn unit sizes and locations.

Five-Year Prescribed Fire Schedule

Unit Name	Acres	FMU	Year(s) of Treatment
Apollo Beach #1	57.5	#1	2007
Apollo Beach #2	105.7	#1	2008
Apollo Beach #3	139.7	#1	2009
Apollo Beach #4	192.7	#1	To be determined
Apollo Beach #5	253.4	#1	To be determined
Apollo Beach #6	325.4	#1	To be determined
Apollo Beach #7a	32.9	#1	To be determined
Apollo Beach #7b	33.9	#1	To be determined
Apollo Beach #8	32.3	#1	To be determined
Apollo Beach #9	21.9	#1	To be determined
Apollo Beach #10	27.3	#1	To be determined
Apollo Beach #11	46.5	#1	To be determined
Playalinda Beach #1	67.3	#2	To be determined
Playalinda Beach #2	56.2	#2	To be determined
Max Hoeck #1	396	#3	2007
Max Hoeck #2	670	#3	To be determined
Bill's Hill #1	114	#4	2007
Bill's Hill #2	126	#4	2007
Bill's Hill #3 and #4	500	#4	2009
Bill's Hill #5	256	#4	2006, 2010
Klondike Beach #1	50.7	#6	To be determined
Klondike Beach #2	136.3	#6	To be determined
Klondike Beach #3	100.2	#6	To be determined
Total acres	3,741.9		

Burn Unit Descriptions

Unit	Acreage	Perimeter
Mosquito Lagoon	11,280	20.3 miles
Apollo	1,471	15.7 miles
Klondike 1	160	5.3 miles
Klondike 2	105	4.2 miles
Klondike 3	96	3.1 miles
Klondike 4	100	4.5 miles
Klondike 5	78	3.2 miles
Klondike 6	72	3.1 miles
Total Klondike	611	
Playalinda	292	9.3 miles
Bill's Hill 1	119	1.9 miles
Bill's Hill 2	136	2.4 miles
Bill's Hill 3	344	3.7 miles
Bill's Hill 4	165	2.6 miles
Bill's Hill 5	324	4.3 miles
Total Bill's Hill	1088	
Max Hoeck 1	351	4.4 miles
Max Hoeck 2	640	5.1 miles
Total Max Hoeck	991	
Seminole Rest	25	0.9 miles

Mechanical Fuels Treatment

Mechanical fuels treatment at the seashore will include creating and maintaining a hazard fuels break along the Bills Hill section of the seashore perimeter to help prevent the spread of fire to and from adjacent non-agency land. Creation of the hazard fuels break will entail clearing a 20-foot wide corridor for 7,435 linear feet (1.4 miles) along the perimeter itself, and selectively thinning hazard fuels inside of that corridor (on the seashore side) for an additional 30 feet. Fuels considered to be “hazards” will primarily be dead and down timber, ladder fuels, and timber/brush of less than 4 inches dbh (diameter at breast height). Total area affected will be approximately 8.5 acres. See the last of the following maps for the hazard fuels break location.

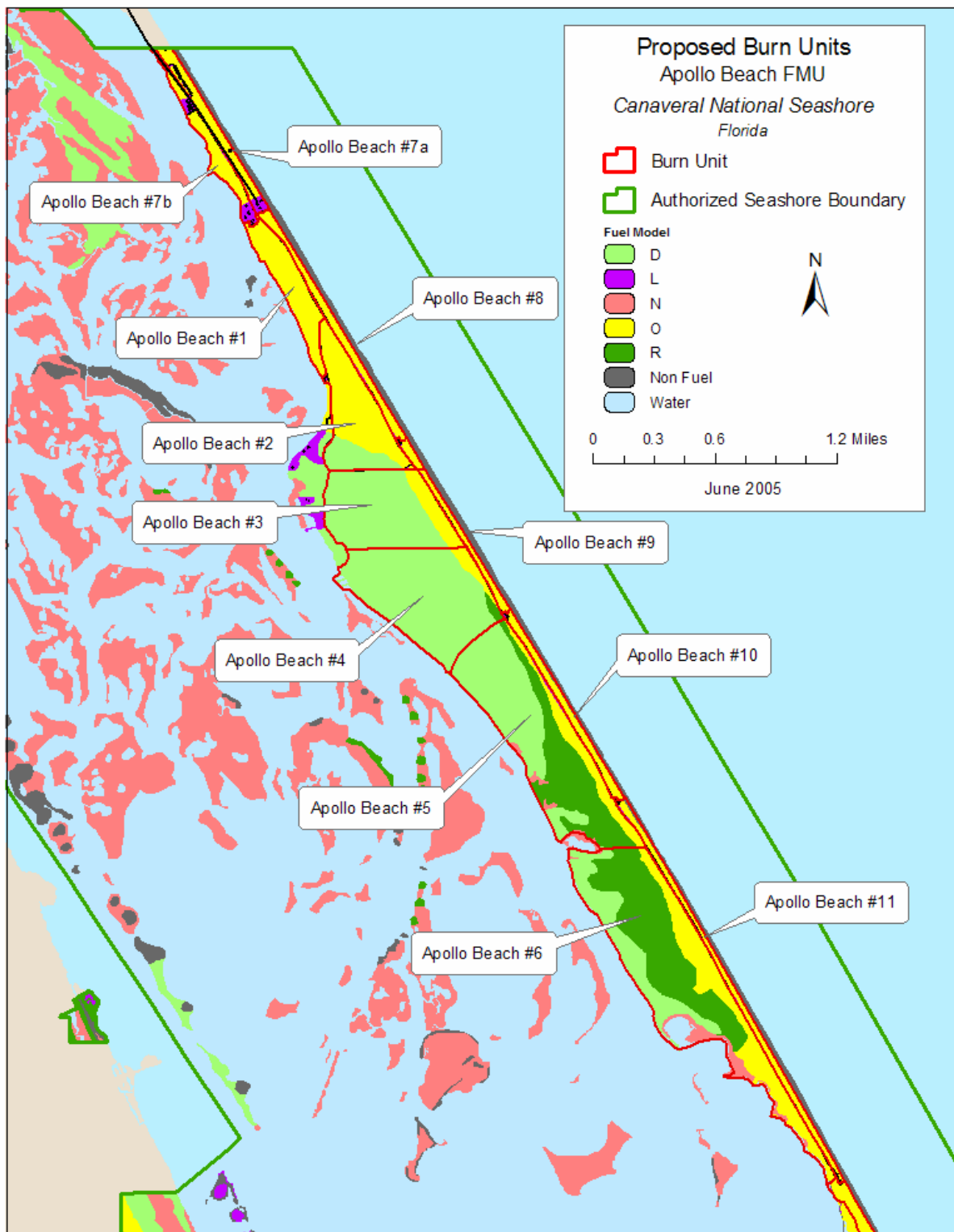


Figure 13.11.1 Apollo Beach Burn Units - #1

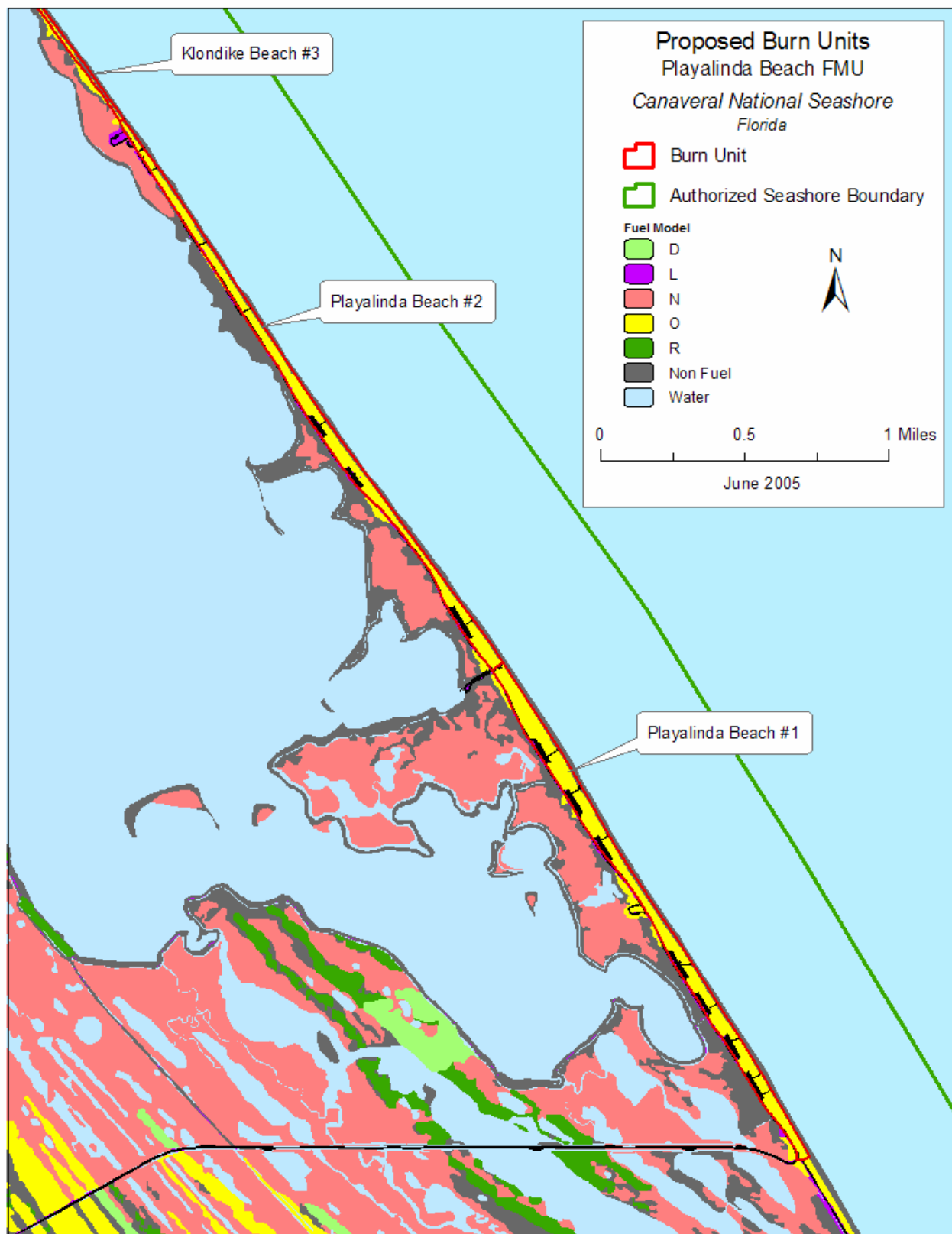


Figure 13.11.2 Playalinda Burn Units – FMU #2

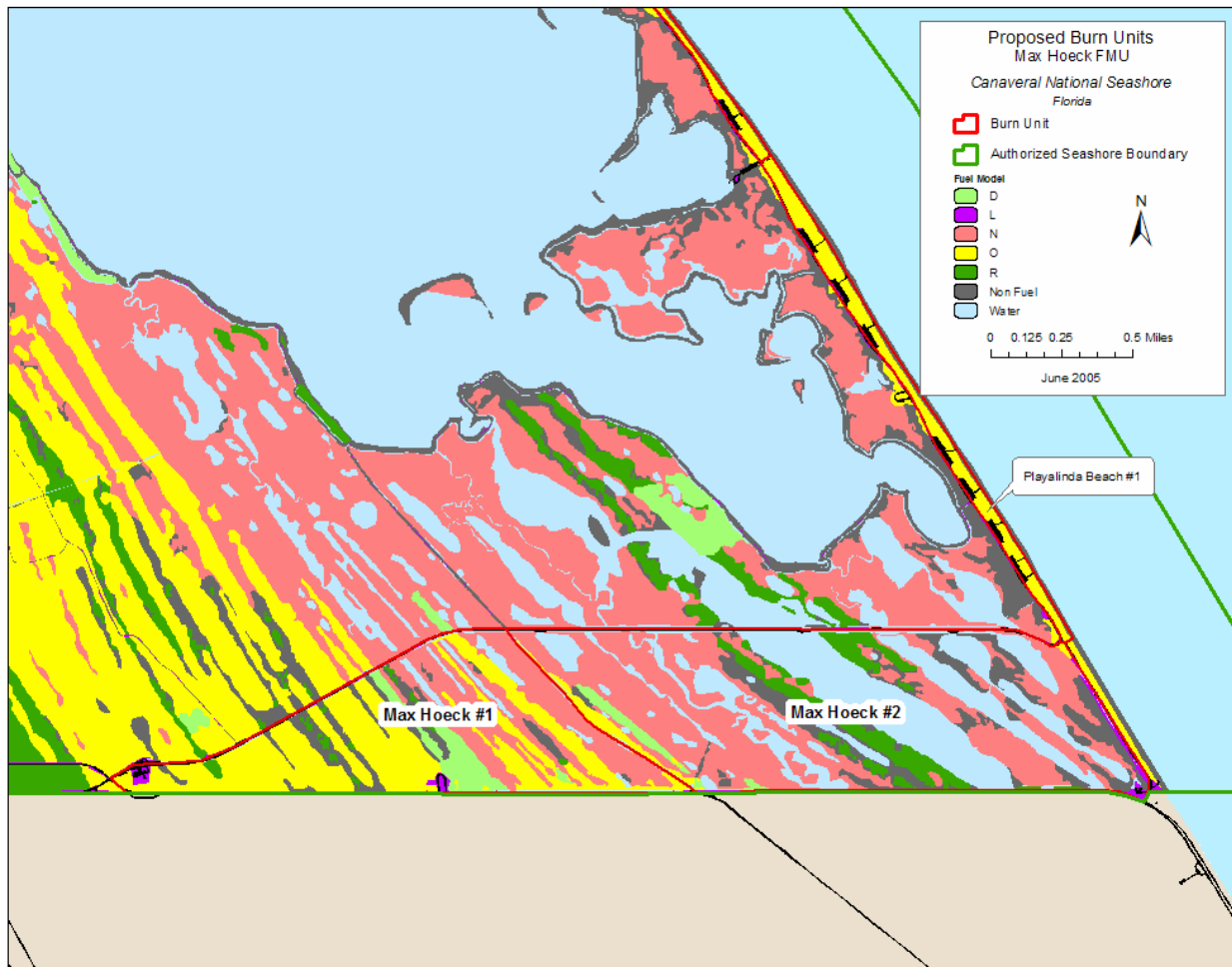


Figure 13.11.3 Max Hoeck Burn Units – FMU #3

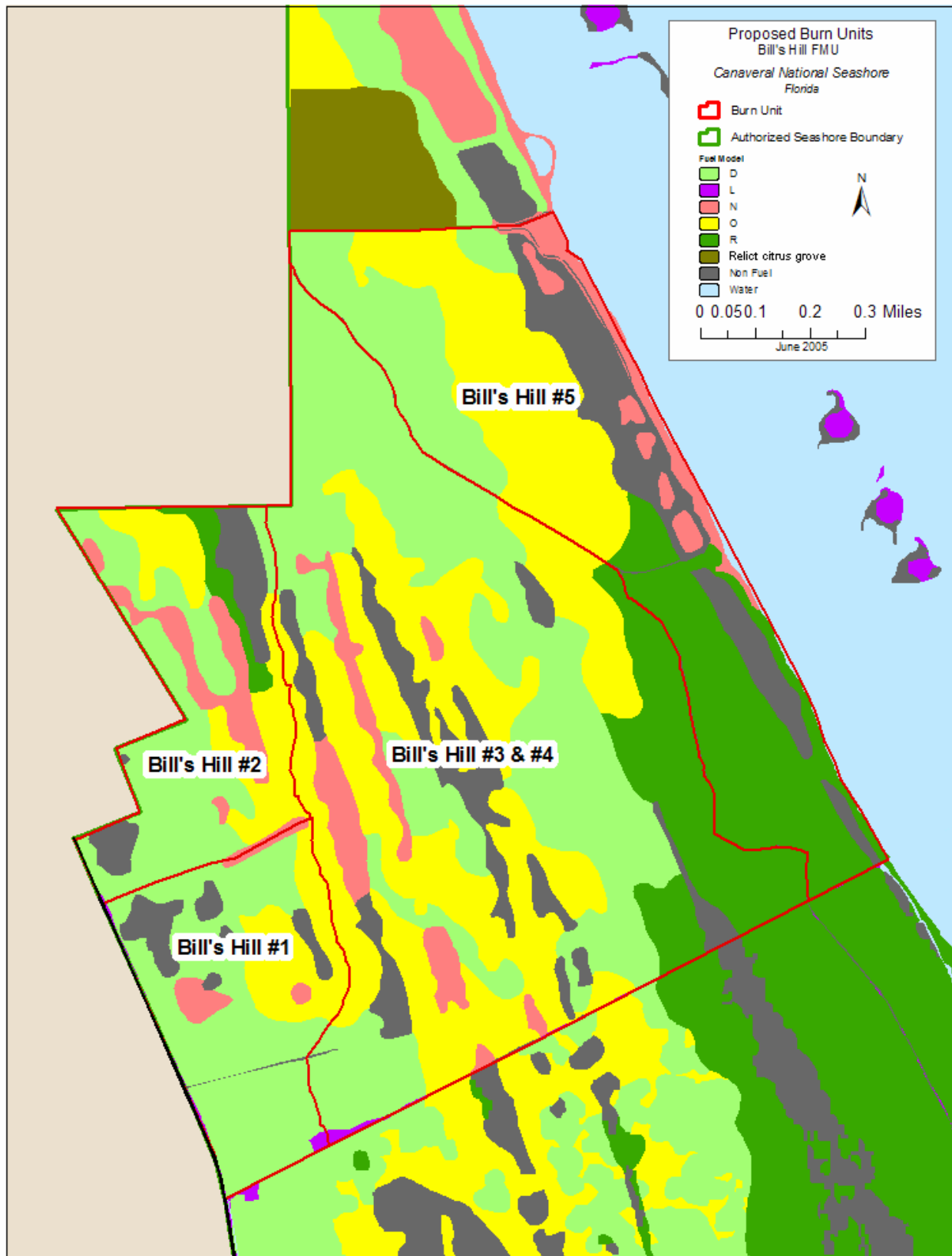


Figure 13.11.4 Bills Hill Burn Units – FMU #4

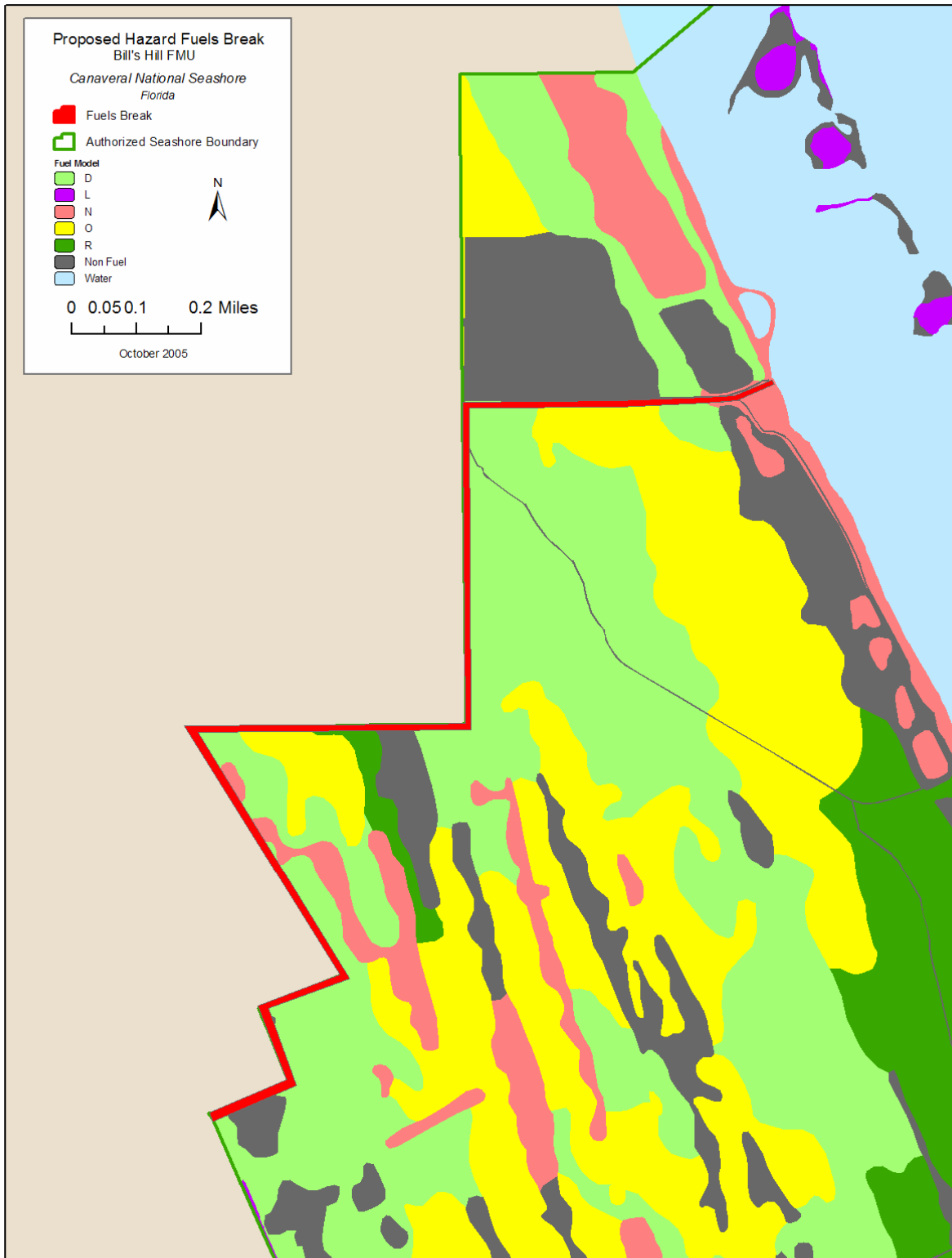


Figure 13.11.5 Perimeter Fuel Break for Bills Hill – FMU #5

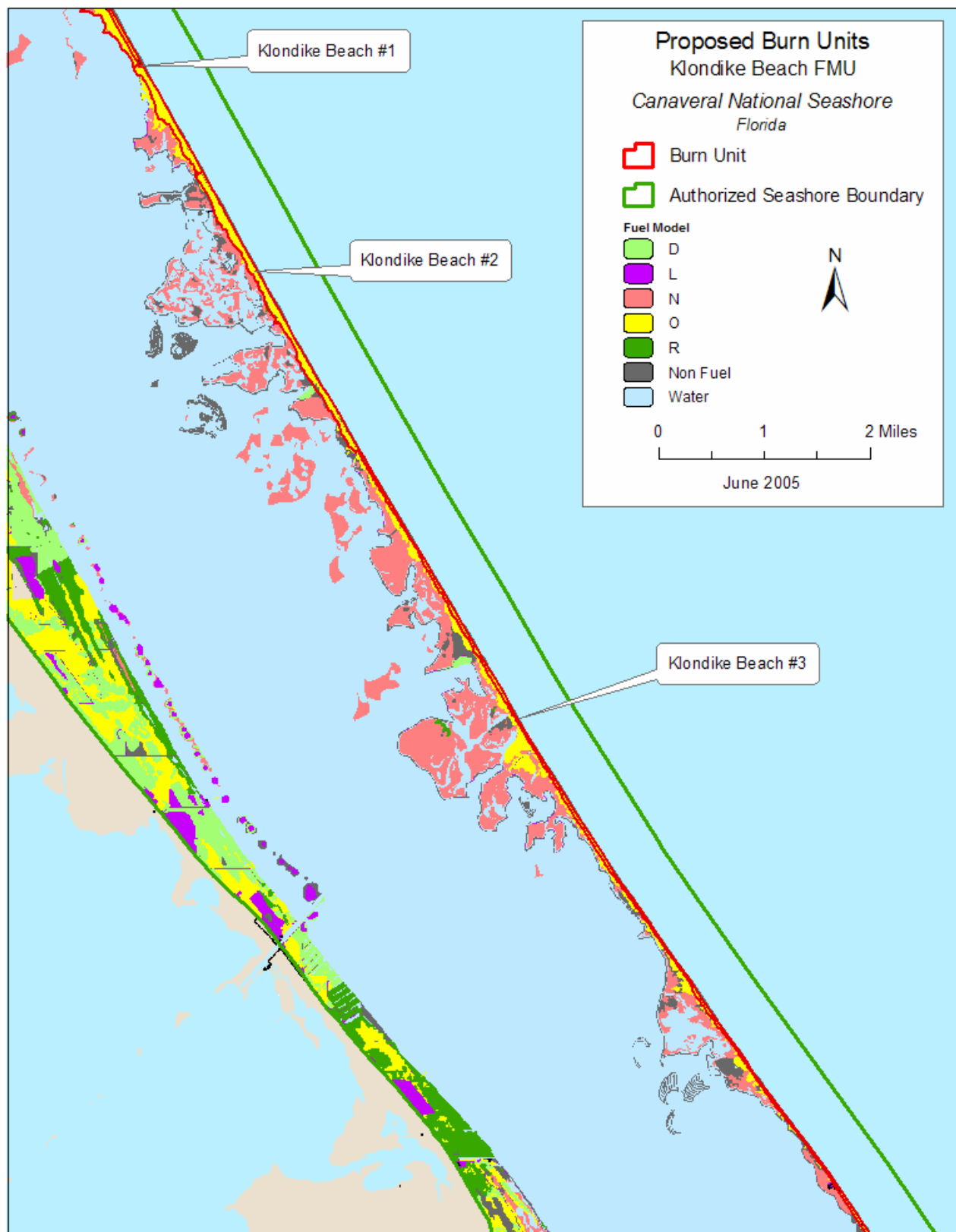


Figure 13.11.6 Klondike Beach Burn Units – FMU #6

Appendix 13.12 - Natural Fire Return Intervals and Fire Effects within Specific Vegetation Communities at CANA; Fire Effects on the Exotics Australian Pine and Brazilian Pepper

- ❖ **Coastal strand:** Adrian (1996, personal communication with CANA resource management specialist) states that the natural fire interval is probably seven to eight years within this vegetation community. The dominant shrubs sprout after fire and re-establish themselves quickly (Schmalzer 2003). While a variety of shrub species occurs here, the most dominant plant is saw palmetto. It often forms dense monotypic stands, and its extreme flammability and widespread occurrence makes it one of the most important factors influencing fire behavior at CANA. Simon (1986) states that fire movement at the seashore is directly affected by the amount of saw palmetto present. Davison (1984) noted that wherever fire carried into hardwood forest at Cumberland Island, an extensive palmetto understory was present.

Saw palmetto's primary method of reproduction is through above ground fire-stimulated rhizomes, and it is one the first shrubs to recover after fire (Hilmon 1968, Schmalzer and Hinkle 1992a, 1992b, Schmalzer 2003). One year after fire, Abrahamson (1984b), Schmalzer and Hinkle (1992a, 1992b) and Schmalzer (2003) recorded a return to pre-burn coverage, while Burton and Hughes (1961) and Hough (1965) noted a return to near pre-burn levels, and Hilmon (1968) observed that palmettos regained 80 percent of their crowns.

A short fire return interval favors saw palmetto over some other species, such as oaks (Schmalzer and Hinkle 1992a). It sprouts from a large above ground protected rhizome, while hardwoods are normally replaced by rootstock sprouting. A fire rotation of less than five years can prevent hardwoods from replenishing their stores of carbohydrate, and once the stores are depleted the plants will die (Davison and Bratton 1986). Saw palmetto can completely replace hardwoods if an area is burned on a one to three year cycle for more than nine years (Wade et al. 1980).

Fewer studies have been conducted on fire effects in coastal strand than several of CANA's other vegetation communities. Simon (1986) conducted a research burn in CANA's coastal strand in September, 1983. Dominant species greater than 0.5 meters in height were saw palmetto, maritime live oak and nakedwood. Those species, plus rapanea (*Rapanea guianensis*), were dominant in the less than 0.5 meter class. The burn was intense enough to destroy all vegetation in the less than 0.5 meter category. By 12 months post-burn, saw palmetto had recovered to exceed pre-burn coverage in both height classes. Live oak was completely killed back in both categories. By 12 months post-burn, live oak greatly exceeded pre-burn coverage in the less than 0.5 meter height class due to root, stump and acorn sprouting. In the greater than 0.5 meter class, live oak demonstrated no recovery until nine months post-burn, and at 12 months still remained considerably below the pre-burn level. After 12 months, nakedwood had returned to slightly below pre-burn levels; however, in the taller category it had barely begun to recover. Rapanea had almost recovered to pre-burn levels 12 months post-fire.

Simon (1986) noted that several other species increased after fire. Wax myrtle and coralbean (*Erythrina herbacea*) exceeded pre-burn levels in the greater than 0.5 meter height class. Both are nitrogen-fixers and often increase in areas that have recently burned. Two species were able to invade after the fire; climbing hempweed (*Mikania scandens*) was observed two months post-burn and Spanish larkspur (*Ipomopsis rubra*) became established by four months post-fire.

The fruits of saw palmetto and gopher apple (*Licania michauxii*) are an important food source for many wildlife species (Martin et al. 1951; Harlow and Tyson 1959; Harlow and Jones 1965). Gopher apple did not increase in coverage like saw palmetto at CANA; however, it did recover to its pre-burn level by 12 months post-fire (Simon 1986). Simon found no significant difference in fruit production for saw palmetto and gopher apple in burned and unburned areas. Saw palmetto flowered out of season two months (November) after the fire but set no fruit. The next summer both species produced flowers and fruits at about the same time as the previous year.

While burning can stimulate fruiting, if done too frequently or in the wrong season, it will retard fruit production. Hough (1965) observed that on sites previously burned on a one to two year rotation, full saw palmetto fruit production was not restored for at least eight to 10 years after the last fire. Hilmon (1986) reported that flowering increased significantly after a five year absence of fire, with substantial fruiting occurring six to nine years post-fire. Hilmon (1968) also noted a decline in the incidence of flowering and fruiting the first year after a winter fire. However, since palmetto reproduces primarily by sprouting, frequent winter burning would favor it over species that rely on fruiting for reproduction (Davison and Bratton 1986).

Simon (1986) measured fuel loading in the coastal strand at CANA before and after fire. A dry weight biomass load of 47,694 kg/ha (21.3 tons/acre) was obtained before burning. This consisted of 44.6 percent saw palmetto and 55.4 percent woody vegetation biomass. Fire reduced the total biomass by 77 percent; saw palmetto biomass declined by 98 percent, while woody biomass declined by 61 percent. Litter biomass was reduced by 97 percent for saw palmetto and by 29 percent for woody vegetation.

At one year post-burn, total biomass was measured at 25,682 kg/ha (11.5 tons/acre), or 53.8 percent of the pre-burn load. Of that total, 57.6 percent was saw palmetto and 42.4 percent was woody vegetation. Saw palmetto had recovered to 69.6 percent of its pre-burn level and woody vegetation to 41.2 percent of its former level. (Woody fuel reduction was comparable to other studies with similar plant associations; however, dry conditions may have resulted in a higher than normal fire intensity resulting in greater fuel reduction. Hough [1968] noted 56 percent fuel consumption compared to Simon's 77 percent.)

- ❖ **Oak scrub:** Fire plays a critical role in maintaining the oak scrub community (Schmalzer and Hinkle 1987, Schmalzer et al. 2003). Oaks, saw palmetto and other shrubs recover primarily by sprouting with little change in species present or richness (Schmalzer and Hinkle 1992a, 1992b). The same species that were present before fire

become re-established afterwards (Abrahamson 1984a, 1984b; Schmalzer and Hinkle 1987). New species have little opportunity to invade; herbaceous species are not a major component of oak scrub at Kennedy Space Center and any that do invade after fire are generally eliminated within two years (Schmalzer and Hinkle 1987)..

Recovery of the oak scrub vegetation after fire is rapid with the vegetation showing considerable resilience within 5 -10 years (Schmalzer 2003). Initially saw palmetto recovers faster than other shrub species, regaining pre-burn cover levels in the >0.5m layer within a year (Schmalzer and Hinkle 1992a, Schmalzer 2003). Oaks take longer to recover, attaining pre-burn levels in about five years (Schmalzer 2003). While dominance shifts temporarily to more rapidly growing species (Schmalzer and Hinkle 1992b), cover of major species returns to pre-burn levels four to six years after fire and changes little between years five and ten (Schmalzer 2003). In the absence of fire changes in total height will continue for many years. Schmalzer and Hinkle (1992b) measured mean height of the vegetation at one meter four to six years post-fire while Schmalzer (2003) recorded mean height at 84 and 125.9 cm five and 10 years post-fire, respectively. No species were lost and there was little invasion of other species as a result of fire (Schmalzer and Hinkle 1992a).

Bare ground created by fuel and litter consumption declines to less than two percent three years after fire (Schmalzer and Hinkle 1987, Schmalzer 2003). This is a concern since openings are important to a number of protected animal and plant species, such as the scrub jay, gopher tortoise, indigo snake and *Lechea divaricata*.

Litter biomass increases for at least eight years following fire (Schmalzer and Hinkle 1987, 1996). The nutrient concentration in live above ground biomass does not appear to change with time since fire, similar to other shrublands (Schmalzer and Hinkle 1996). Standing dead biomass and saw palmetto rhizomes are important biomass components, buffering against nutrient loss. Levels of major nutrients in plants equal or exceed that in the soil, except on wetter sites, illustrating the low nutrient quality of the well drained soils and importance of retaining nutrients in scrub areas (Schmalzer and Hinkle 1996).

In scrub areas unburned for decades, oaks can grow to a size where they are resistant to all but the most intense fires. In such cases prescribed fire alone is not sufficient to restore the vegetation to a natural state and mechanical reduction must be employed (Schmalzer and Boyle 1998; Breininger et al. 2003, Schmalzer 2003, Schmalzer et al. 2003). Schmalzer and Boyle (1998) and Schmalzer et al. (2003) compared oak-saw palmetto scrub areas treated with prescribed fire (burn-only) and prescribed fire/mechanical reduction (cut/burn). While oaks responded in a similar fashion to both treatments, equaling or exceeding pre-burn height 4.5 years after fire; saw palmetto did not. It recovered to pre-burn coverage within a year in the burn-only area but had only reached 50% of the former level in the cut/burn portion 4.5 years after fire.

Damaging or removing roots and rhizomes in oak-saw palmetto scrub can produce long-lasting changes in composition and structure (Breininger and Schmalzer 1990, Schmalzer et al. 2002). Care must be taken in the employment of mechanical reduction to avoid

excessive damage to saw palmetto, which is vital to carry fire through oak scrub vegetation. While oaks and other shrubs sprout from below ground roots and rhizomes, palmettos re-sprout from an above ground apical meristem, which is much more vulnerable to damage from mechanical treatments (Schmalzer et al. 2003). Attention must also be given to avoid presenting opportunities for exotic plants such as Brazilian pepper to become established on recently disturbed ground. There does not appear to be a systematic difference in the types of equipment used (rotary cutters, roller chopper, K-G and V blades or tree topper) (Schmalzer et al. 2003).

Schmalzer and Boyle (1998) noted that bare ground was initially greater in cut/burn than burn-only treatment areas, but by four years post-fire the treatment areas were equal. Height growth of the vegetation in cut/burn often exceeded burn-only, due to the release of nutrients from the cut material consumed by the fire (Schmalzer et al. 2003).

Schmalzer and Boyle (1998) and Schmalzer et al. (2003) recommend a one-time application of mechanical treatment in badly-overgrown scrub with subsequent use of periodic prescribed fires to maintain natural structure and composition. Fire is most effective if applied within six months of cutting and some areas may need to be burned more frequently until the system is restored (Schmalzer et al. 2003).

Historically scrub fires were caused by lightning associated with summer thunderstorms. However, managers sometimes must utilize prescribed fire at other times of the year due to funding, availability of personnel and equipment and to avoid excessively hot fires in overgrown areas. Foster and Schmalzer (2003) compared winter and summer burns in Florida scrub. They found that five years after fire: 1) there was no difference in mean vegetation height (about 85 cm), 2) initially there was more bare ground after a summer burn, but within a year the areas were similar and in five years there was little to no bare ground in either, 3) oaks and the majority of other shrubs exhibited a similar response in both seasons, 4) saw palmetto coverage was lower until 18 months post-fire; however, the slow response of saw palmetto was attributed to feral hog grazing in summer. They conclude that winter burning does not have a significant biological impact on scrub restoration.

Austin et al. (1977) postulates that fires historically occurred every four to five years along Florida's coastal habitats, preventing hammock vegetation from replacing scrub. Data collected by Schmalzer and Hinkle (1987) indicate that the burn cycle is somewhat longer. Optimal scrub jay habitat includes patches of oak scrub 120-170 cm tall scattered among short scrub with many sandy openings (Breininger and Oddy 2001). Oaks between 120-170 cm tall generally have been unburned for 10 years but not as long as 20 (Duncan et al. 1995). This would imply a burn cycle of 10-20 years. Davison and Bratton (1986) observed a drought cycle of 23 +/- 5 years for CANA and suggested that oak scrub fires coincided with dry periods. More research needs to be done before the natural fire frequency for scrub can be determined.

Simon (1986) conducted a research burn of oak scrub at CANA in September, 1983. In the less than 0.5 meter height class the dominant species were myrtle oak, fetterbush,

scrub blueberry, saw palmetto and sand live oak. All recovered completely by 12 months post-burn with the exception of scrub blueberry. In the greater than 0.5 meter height class, no oaks recovered to pre-burn levels by 12 months post-burn, whereas saw palmetto and fetterbush exceeded pre-burn coverage. Areas with higher saw palmetto cover burned more completely than other areas. The majority of sprouting in the oaks was due to root and stump sprouts; little trunk sprouting was observed. Simon noted a substantial acorn crop before burning and at nine and 12 months post-burn.

- ❖ **Slash pine flatwoods:** The slash pine flatwoods community is a fire climax (Wade et al. 1980) and probably the most fire-prone, fire-adapted and fire-dependent plant community at CANA (Simon 1986). Natural fires maintain the flatwoods as a stable and nonsuccessional plant community (Myers and Ewel 1990). Myers and Ewel (1990) cite several sources that suggest flatwoods species possess flammable qualities which ensure occasional fires that will prohibit invasion by less fire-tolerant hardwood species. The highly flammable pine litter and saw palmetto, combined with the stratified structure (pine litter, palmetto understory, hanging dead pine needles, pine canopy), serve to make the flatwoods extremely volatile.

Fire exclusion can lead to replacement of open-canopy pine flatwoods and associated marshes with hardwood forest within 20 years (Duncan et al. 1999). Duncan et al. (1999) also noted that anthropogenic disturbance and fire suppression allowed dense pine forests to establish in pine flatwoods at CANA (Duncan et al. 1999). Maliakal et al. (2000) observed that fire suppression over 10 years can cause significant changes in community structure in Lake Wales Ridge wiregrass flatwoods. In the Miami Rock Ridge, slash pine forests rapidly changed into dense diverse hardwood forest when fire was suppressed (Alexander 1967). Crocker (1968) and Christensen (1978) noted that shrubs such as wax myrtle, hollies, oaks, cabbage palmetto, and saw palmetto became more numerous on dry sites that were unburned for at least five to eight years. Hilmon (1968) found that saw palmetto increased when fire was suppressed for only six to eight years.

The elimination of fire poses another danger. It allows litter and other dead fuels to accumulate, increasing the risk of catastrophic fire. In south Florida, it takes about 10 years for the amount being produced to equal the amount being decomposed (Heyward and Barnett 1936). However, the greatest fire danger is not ground litter, but the live understory (especially saw palmetto) and dead needles that hang in the lower branches of the pine trees and the shrubs. These act as a ladder, carrying fire into the canopy and increasing the chance of crowning (Wade et al. 1980).

CANA lies in the intermediate zone of the two varieties of slash pine: south Florida slash pine (*Pinus elliottii* var *densa*) and the more northern *Pinus elliottii* var *elliottii*, with both varieties occurring at the seashore (Schmalzer 1991b, personal communication). South Florida slash pine is much more fire tolerant than the northern variety (Wade et al. 1980). The only species that rival it in fire tolerance are longleaf pine (*Pinus palustris*) and cabbage palmetto. Wade et al. (1980) noted that one-third of the southern variety survived fires that killed all of the northern type. In previously

burned areas at CANA, Simon (1986) observed re-sprouting from scorched slash pine crowns. Wade et al. (1980) also noted the ability of slash pine to recover from fire, sometimes recovering from complete defoliation.

The estimated fire return interval for scrubby flatwoods is 5-20 years (Menges and Hawkes 1998) and mesic flatwoods one to eight years (Florida Natural Areas Inventory 1990, Stout and Marion 1993, Main and Menges 1997). Scrubby flatwoods contain some oak scrub plants while mesic flatwoods are dominated by saw palmetto (*Serenoa repens*) fetterbush (*Lyonia lucida*), gallberry (*Ilex glabra*) and grassess (*Aristida beyrichiana*) (Breininger et al. 2003).

Simon (1986) conducted a research burn in a slash pine flatwoods at CANA in January, 1984. The fire was very low in intensity, consumed only a small amount of the litter, and exposed little soil for seeding or root sprouting. Fuel loading actually increased, due to the amount of pine litter and downed branches caused by crown scorch, although mature trees suffered a minimal amount of crown damage. Slash pine seedlings less than five meters in height were completely eliminated. The pines immediately began sprouting new growth, and within seven months had attained the pre-burn level of coverage. Simon (1986) also observed an increase in bracken fern (*Pteridium aquilinum*) in pine flatwoods at CANA following a burn. Bracken fern has a competitive advantage over many other species because of the vegetative reserves that the fire-stimulated rhizomes can provide (Keeley 1978).

As with oak scrub, most open sandy areas do not persist in scrubby flatwoods for more than a few years after fire (Schmalzer and Hinkle 1992, Hawkes and Menges 1996).

Fire frequency and intensity are critical factors in burning pine flatwoods. At CANA, where fuel loading has reached dangerous levels in areas, wildland fire can destroy an entire stand (Simon 1986). Davison (1984) noted this occurrence at Cumberland Island and several areas of Florida. Very short burning rotations (one to three years) eliminate pine seedlings and encourage the growth of saw palmetto. As mature pines die, the acreage is converted to palmetto prairie. Once a dense palmetto cover exists, fire frequency and intensity become too great for young pines to survive (Wade et al. 1980). Excessive fires can also provide disturbance that allows exotic species such as Brazilian pepper and Australian pine to invade.

If prescribed fire is employed to reduce hazard fuels, Wade et al. (1980) recommend that it take place during the dry season (November-April) to avoid damaging the growing tips of the pines. Simon (1986) also advises winter burning of pine areas in winter to lessen the amount of overstory mortality, although this is outside of the April through August period of most lightning-caused ignitions. Wade et al. (1980) add the provision that if pine restoration is the objective, burning should take place in early fall before south Florida slash pine releases its seed. Later fire will destroy seeds and young seedlings.

Pine flatwoods areas at CANA contain patches of other vegetation types, including oak

scrub, swale marsh and hardwood forest. These burn at different intervals and intensities. It is important to understand spatial variations in fire frequency among these patches in order to maintain habitat for specialized species (Breininger et al. 2002). Since marshes contain species that burn readily and accumulate fuels faster than surrounding vegetation, they play an important role in carrying fire into less flammable areas such as oak scrub and scrubby flatwoods (Breininger et al. 2002). Extensive fires occurring about every 20 years would be useful because they tend to burn all areas, including those resilient to fire (Breininger et al. 2002).

- ❖ **Hardwood hammock:** While hardwood hammock areas do not burn readily, occasional fire scars on hammock trees at CANA attest to the ability of fire to carry into the hammocks under certain drought and wind conditions. However, the three recorded hammock fires within the NPS-managed portion of CANA between 1981 and 2003 were confined to surface litter or structures, and easily extinguished.
- ❖ **Mangrove:** Very low intensity fires will kill mangroves; however, the mangrove is such an effective firebreak that fire never spreads far beyond the area of ignition (Wade et al. 1980). Fires in adjacent salt marshes will kill the outer fringe of mangroves, which are intruding on the marsh, creating a temporary extension of the marsh into mangrove stands.
- ❖ **Marsh:** Although little is known of the natural fire frequency in *Juncus* and *Spartina* marshes in Florida, fire is an important component of the marsh ecosystem (Loveless 1959; Wade et al. 1980; Davison and Bratton 1988). Fire inhibits the encroachment of woody species into the marsh (Myers and Ewel 1990). Fire exclusion will allow hardwood forests to invade and replace marsh vegetation (Duncan et al. 1999). In the Everglades, fire kills encroaching mangroves and maintains graminoid dominance (Klukas 1973). At MINWR, prolonged absence of fire will allow red maple and Carolina willow to invade impounded marshes (USFWS 1995).

Since marshes contain species that burn readily and accumulate fuels faster than surrounding vegetation, they play an important role in carrying fire into less flammable areas such as oak scrub (Breininger et al. 2002).

Schmalzer et al. (1991) studied changes in species composition and biomass in *Spartina* and *Juncus* marshes at Kennedy Space Center one year after fire. In mixed stands, Schmalzer et al. observed that *Spartina bakeri* recovered more rapidly than *Juncus roemerianus*, indicating that frequent fire may favor a shift in mixed stands to greater *Spartina* dominance. Schmalzer et al. conclude that periodic burning is unlikely to have negative effects on vegetation of marshes if adequate time is allowed for recovery between episodes and standing water or wet soil is present. During periods of severe drought, marsh soils could dry to the extent that roots are killed by fire (USFWS 1995).

- ❖ **Australian pine:** While Australian pine is fire resistant, Wade et al. (1980) noted that it is concurrently very susceptible to fire. Periodic fires will keep the species from expanding, and when used with herbicide treatment, can kill existing trees. Simon

(1986) conducted a research burn at CANA in oak scrub containing a half-acre stand of immature Australian pine. Four years earlier the trees had been cut and removed. The untreated stumps started to re-sprout within two weeks, and by a year later had established a thick stand of trees about two meters in height. The research burn completely consumed all plants under 0.5 meters in height. The cover of Australian pines above 0.5 meters in height was reduced from 95 to 12 percent. By two months post-burn, stump sprouts were evident. Three and one-half months after the burn, a freeze killed many mature Australian pines at CANA and delayed recovery. At nine months post-burn, mature stands that had been killed back completely by the cold exhibited root, stump and trunk sprouts up to 1.0 meter in height. By 12 months post-burn, vegetation under 0.5 meters in height had returned to 16 percent cover and plants above 0.5 in height measured at 9.6 percent cover. Average height was 0.9 meters. Simon concluded that burning can serve as a control for Australian pine but is not an effective eradication technique by itself, even on young stands.

- ❖ **Brazilian pepper:** Fire will kill Brazilian pepper seedlings; however, once thickets have formed, even intense fires have difficulty penetrating them. It is so effective at stopping fire that it has been planted in hedgerows to serve as a firebreak (Wade et al. 1980). Everglades National Park is currently using prescribed fire with a short return interval to manage Brazilian pepper. CANA will collaborate with MINWR on the use of prescribed fire in conjunction with herbicide to control this species.

Appendix 13.13 Canaveral National Seashore – Archaeological Site Management Information System (ASMIS), July 14, 2006

List of Archaeological Sites

	ASMIS#	State ID #	Site Name
1	CANA00001	8 VO 0146	No Official Name
2	CANA00002	8 VO 0147	No Official Name
3	CANA00003	8 VO 0119	Cedar Creek Midden
4	CANA00004	8 VO 0152	No Official Name
5	CANA00005	8 VO 0165	No Official Name
6	CANA00006	8 VO 0109	Turtle Mound
7	CANA00006.01	8 VO 0111	Turtle Mound Burial
8	CANA00008	8 VO 0120	Brick House Cove Mound
9	CANA00009	8 VO 0168	No Official Name
10	CANA00010	8 VO 0170	Shipyard Island Midden
11	CANA00011	8 VO 0171	No Official Name
12	CANA00012	8 VO 0172	Orange Island
13	CANA00013	8 VO 0173	No Official Name
14	CANA00014	8 VO 0110	Pumpkin Point Midden
15	CANA00015	8 VO 0174	No Official Name
16	CANA00016	8 VO 0175	No Official Name
17	CANA00017	8 VO 0177	No Official Name
18	CANA00018	8 VO 0176	Slippery Creek
19	CANA00019	8 VO 0178	Gaines Island
20	CANA00020	8 VO 0112	Castle Windy
21	CANA00021	8 VO 0187	No Official Name
22	CANA00022	8 VO 0153	Hog Island
23	CANA00023	8 VO 0155	Garvers Island
24	CANA00024	8 VO 0149	No Official Name
25	CANA00026	8 VO 0207	No Official Name
26	CANA00028	8 VO 0206	Middle Island
27	CANA00029	8 VO 0154	Georges Island
28	CANA00030	8 VO 0150	Lagoon
29	CANA00031	8 VO 0143	McCarty Place
30	CANA00032	8 VO 0156	No Official Name
31	CANA00033	8 VO 0157	Shelton Kurt Island
32	CANA00034	8 VO 2569	Confederate Salt Works
33	CANA00035	8 VO 2569	Ross Hammock Midden and Mounds
34	CANA00036	8 VO 0151	Cat Hammock
35	CANA00037	8 VO 0159	Vann's Island
36	CANA00038	8 VO 0158	No Official Name
37	CANA00040	8 BR 0152	No Official Name
38	CANA00042	8 BR 0153	Beach Road Hammock
39	CANA00043	8 BR 0183	Pardon Island
40	CANA00044	8 BR 0184	Widgeon Bay
41	CANA00045	8 BR 0185	No Official Name
42	CANA00046	8 BR 0188	Old Haulover Canal
43	CANA00047	8 BR 0143	Ragin Midden

44	CANA00048	8 BR 0144	No Official Name
45	CANA00049	8 BR 0145	Clark Slough
46	CANA00050	8 BR 0167	Paynes' Midden
47	CANA00051	8 BR 0154	Eddy Creek
48	CANA00052	8 BR 0146	Bull Camp
49	CANA00053	8 BR 0147	No Official Name
50	CANA00054	8 BR 0151	No Official Name
52	CANA00055	8 BR 0148	No Official Name
53	CANA00056	8 BR 0149	No Official Name
54	CANA00057	8 BR 0205	Max Hoeck Midden
55	CANA00058	8 BR 0142	Butler Campbell's Mound
56	CANA00059	8 BR 0076	New Haulover Canal site
57	CANA00060	8 BR 0186	Campbell-Jackson cemetery
58	CANA00061	8 BR 0191	Emma Watton cemetery
59	CANA00062	8 VO 0129	Bills Hill
60	CANA00063	8 VO 0124	Seminole Rest
61	CANA00064	8 VO 2599	Mosquito Lagoon House of Refuge
62	CANA00065	8 VO 1700	Visitor Center Midden
63	CANA00066	8 VO 1701	A1A Midden
64	CANA00067	8 VO 1702	Eldora Loop Midden
65	CANA00068	Unassigned	Eldora North Road Midden
66	CANA00069	Unassigned	Eldora Lagoon Midden
67	CANA00070	8 BR 0200	Canaveral Shipwreck
68	CANA00071	8 VO 2376	Midden 1
69	CANA00072	8 VO 2377	Midden 2
70	CANA00073	8 VO 3128	Oyster Bay
71	CANA00074	8 VO 3129	Pistol Point
72	CANA00075	8 BR 0555	Eddy Creek Boat Launch Area
73	CANA00076	8 BR 0556	Playalinda Beach Parking Area No.8
74	CANA00077	8 VO 0150b	Apollo Midden
75	CANA00078	8 BR 0909	East Max Hoeck Creek Midden
76	CANA00080	Unassigned	Lone Sherd (995.1)
77	CANA00081	Unassigned	Dog's Cross (995.2)
78	CANA00082	Unassigned	Dead Mangrove Island (995.3)
79	CANA00083	Unassigned	Scorpion Dike (995.4)
80	CANA00084	Unassigned	No Official Name (995.5)
81	CANA00085	Unassigned	Bay Head Midden (995.6)
82	CANA00086	Unassigned	No Official Name (995.7)
83	CANA00087	Unassigned	Long Shore Midden (995.8)
84	CANA00088	Unassigned	No Official Name (995.9)
85	CANA00089	Unassigned	North Mangrove Midden (995.10)
86	CANA00090	Unassigned	No Official Name (995.11)
87	CANA00091	Unassigned	Shell Dipper (995.12)
88	CANA00092	Unassigned	No Official Name (995.13)
89	CANA00093	Unassigned	No Official Name (995.14)
90	CANA00094	Unassigned	Cut Corner Midden (995.15)
91	CANA00095	Unassigned	Ephemeral Midden (995.16)
92	CANA00096	Unassigned	West Mangrove Midden (995.17)

93	CANA00097	Unassigned	No Official Name (995.18)
94	CANA00098	Unassigned	Canoer's Corner (995.19)
95	CANA00099	Unassigned	Silver Palm
96	CANA00100	Unassigned	Hummingbird Mound
97	CANA00101	8 BR 0139	Dummit Grove NE
98	CANA00102	8 BR 1632	Edgar/Campbell Midden
99	CANA00103	8 BR 1633	Apiary #53
100	CANA00104	8 BR 1664	Archaic Surface Scatter
101	CANA00105	8 BR 1665	Old Canal Midden
102	CANA00106	8 BR 1666	Marsh Crossing Site
103	CANA00107	8 BR 1667	Thin Sand Ridge Site
104	CANA00108	8 BR 1668	Ceramic Surface Cluster
105	CANA00109	8 BR 1669	Spoon Bill Site
106	CANA00110	8 BR 1670	Haulover Canal Midden
107	CANA00111	8 BR 1671	Haulover Artifact Scatter
108	CANA00112	8 BR 1672	Haulover Pond Midden Site
109	CANA00113	8 BR 1673	Haulover Sand Mound and Midden (A, B)
110	CANA00114	8 BR 1674	76th Street NW Midden
111	CANA00115	8 BR 1675	Little Shell Point
112	CANA00116	8 BR 1677	Campbell / Jackson Sheet Midden
113	CANA00117	8 BR 1678	Friable Sherds Site
114	CANA00118	8 BR 1679	Diffuse Ceramic Scatter
115	CANA00119	8 BR 1680	Relic Grove Site
116	CANA00120	8 VO 6785	Spike Point Site
117	CANA00121	8 VO 6786	Kuhl Midden
118	CANA00122	8 VO 7492	Spider Web Midden
119	CANA00123		Target Rock
120	CANA00124		Clifton School
121	CANA00125		Ghost Wreck
122	CANA00126		V-1 Impoundment site

List of Classified Structures (LCS)

	Structure Name	Structure Number	LCS ID
1	Hoeck, Max, Burial Mound	BR-151	11636
2	Old Haulover Canal	BR-188	11637
3	Allenhurst Cemetery Headstones	BR-191	11638
4	Ross Hammock Burial Mound 1	VO-130	11639
5	Confederate Salt Works	VO-213	11640
6	Ross Hammock Burial Mound 2	CANA01	91888
7	Castle Windy	CANA02	91889
8	Turtle Mound	CANA03	91890
9	Bill's Hill Burial Mound	CANA04	91891
10	Bartram, William, Marker 1	CANA05	91892
11	Bartram, William, Marker 2	CANA06	91893
12	Seminole Rest Main House	CANA07	91894
13	Cistern at Seminole Rest	CANA07A	101117
14	Seminole Rest Caretaker's House	CANA08	91895
15	Eldora State House	CANA09	91896
16	South Cistern, Eldora Statehouse	CANA10	274855
17	North Cistern, Eldora Statehouse	CANA11	274857
18	Concrete Pier, Eldora Statehouse	CANA12	274858
19	Cistern Shed, Eldora Statehouse	CANA13	274861
20	Eldora Hotel Cistern	Unavailable	278908
21	Northeast Cistern, Eldora Statehouse	Unavailable	275087

Appendix 13.14 – Fire Program Analysis Charter for Central Florida FPU (SA_FL_003)

See next pages.

Central Florida Prototype

SA_FL_003

Fire Planning Unit (FPU)

Fire Program Analysis (FPA) System

FPU Charter

Developed 01/19/2005

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1. Fire Planning Unit Overview

1.1 Identification

This project is to be known as the SA-FL_003 Fire Planning Unit (FPU), and is also referred as the Central Florida FPU. The FPA System Preparedness Module is an interagency project consisting of the following wildland fire management agencies:

Unit Name	Size of Unit (Acres)
• Ocala NF	348,933
• Lake Woodruff NWR	21,522
• Merritt Island NWR	140,000
• Saint Johns NWR	6,194
• Lake Wales Ridge NWR	19,630
• Canaveral NS	57,648

1.2 Purpose / Business Need / Scope/ Benefits

The purpose of creating FPA Fire Planning Units is to support and contribute to the development of landscape scale interagency fire planning and budgeting to meet the intent of the National Fire Plan, Federal Wildland Fire Policy, 10-Year Implementation Plan, and other related documents, as well as direction provided by Congress and OMB in the FY2003 appropriations language.

This is accomplished through:

- Providing subject matter expertise to be incorporated into FPU design and function
- Developing data sets that address all participating agency needs
- Conducting test analyses to ensure reasonable results
- Ensure consistent application of FPA business rules that affect analysis outcomes
- Provide defined roles and responsibilities for all levels of participating personnel from line officers to personnel in supporting disciplines
- Ensure timely completion of analysis to meet required planning and budget submission deadlines
- Ensure consistent implementation is coordinated by all participating agencies

The participating agencies in the FPU will benefit by interagency participation in fire management planning. This agreement will support processes and standards for interagency collaborative wildland fire planning as required in recent and future policy documents.

Enhancements within the FPU are greater than what could be achieved as individual units.

1.3 FPU Objectives

The goal of the FPU is to provide an acceptable planning and budget analysis that will be used by the participating agencies to develop and implement associated budgets within the context of the Fire Program Analysis System, and to guide effective implementation of Fire Management Plans.

The overall objective of an FPU is to define the geographic scope of the landscape, or boundaries, for the local fire suppression planning analysis. The analysis will develop objectives. The Steering Committee will define the process and who will act on these objectives.

Specific objectives are:

- Develop interagency planning partnerships to find ways to give assistance.
- Develop or refine resource management objectives relative to fire, and the full suite of fire management objectives, constraints and restrictions.
- Develop and refine the required data inputs for the models in the FPA system.
- Evaluate both interim and final analysis results for reasonableness.
- Identify efficiencies through landscape integrated planning and budgeting.
- Provide comment on guidance and reference documents to improve quality of the information and operations
- Ensure consistency with objectives and standards developed in Land Management Plans, or enabling legislation by Congressional designation for unit creation, and respective Fire and Aviation Management Plans.

1.4 Partnerships

The following partnership team will provide executive level oversight. The members of this team are the Charter Management Committee or designee from the following agencies:

- USDA Forest Service
- DOI National Park Service
- DOI Fish & Wildlife Service

1.5 Key References

References may be found at <http://fpa.nifc.gov>. Following are significant documents guiding the FPA process:

- 1995 Federal Wildland Fire Policy
- 2001 Update to the Federal Wildland Fire Policy
- National Fire Plan
- **A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Comprehensive Strategy: Implementation Plan (a.k.a. 10-Year Comprehensive Strategy)**
- Developing an Interagency, Landscape-scale Fire Planning Analysis and Budget Tool (a.k.a. "The Hubbard Report")
- Unit Land Management Plans

1.6 Terminology

To improve communications the team will use terms consistent with those defined in the Glossary of Wildland Fire Terminology, published by the National Wildfire Coordinating Group (NWCG) or terms defined in the Appendix of the FPA Reference Guide.

2. Project Approach Section

The Fire Planning Unit (see attached map) will include all the Ocala National Forest (FL-FNF), Canaveral National Seashore (FL-CAP), Merritt Island National Wildlife Refuge (FL-MIR), Lake Woodruff National Wildlife Refuge (FL-LWR), Saint Johns National Wildlife Refuge (FL-SJR) and Lake Wales Ridge NWR (FL-LRR).

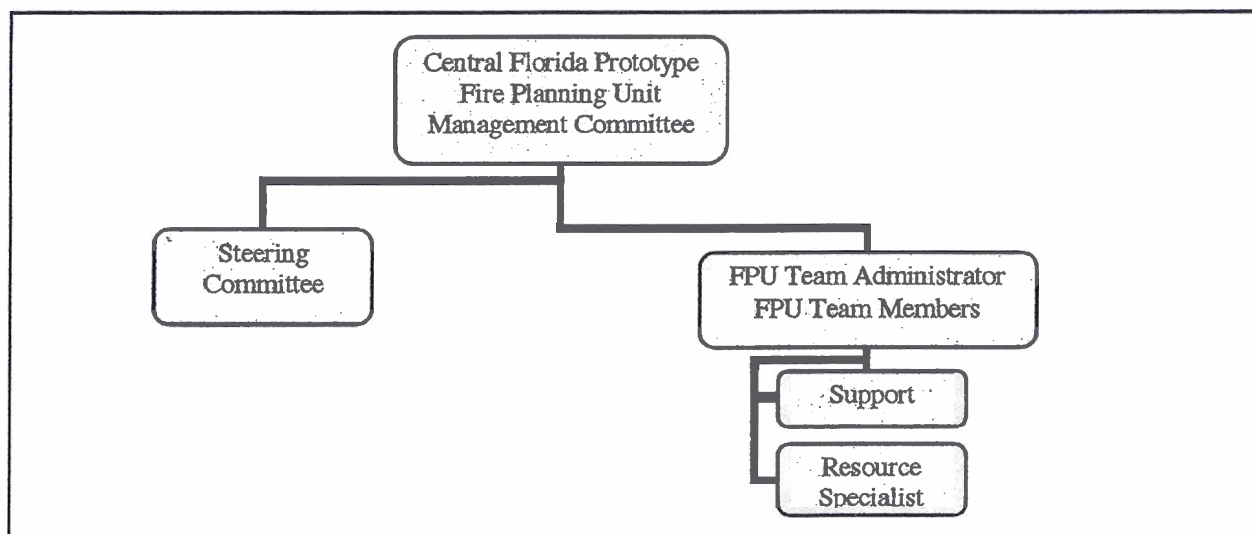
These three agencies will be the partner agencies for fire program analysis. Other cooperators may become involved as the process matures.

2.1 FPU Deliverables and Quality Objectives

Primary deliverables from this undertaking will include:

- Annual analysis meeting tests of reasonableness
- Provision of proposed budget to appropriate line officer(s) for approval and submission
- Proposed interagency roles and responsibilities and operational procedures

2.2 FPU Organization and Responsibilities



Management Committee

The Management Committee consists of line officers or their designees from the respective administrative units. They are responsible for overall management of the planning and budgeting process including conflict resolution, but not limited to the following: negotiation of differences in location and ownership of fire resources, distribution of FPU funding among the administrative units, and decisions on implementation timeframes.

- Ensure current agency policy and laws are followed.
- Recommend alignment of fire and aviation resources and facilities.
- Establish a Management Committee Chairperson (bi-annually rotation)

This group's membership is identified in Table 1 in Appendix B.

Steering Committee

Steering committee is made up of the fire business specialists (FMOs or others with similar duties). This group is responsible for the following:

- Provide direction regarding fire management business strategy.
- Provide guidance on FPU business requirements
- Review project plans and deliverables especially business requirements.
- Help the FPU Team make decisions regarding scope, time, quality and cost tradeoffs.
- Ensure that the deliverables of the project will meet the business needs of the sponsoring agencies.
- Establish dispute or conflict protocols and provide the primary forum for resolving issues.
- Draft the FPU Transition Plan for Management Committee approval.

The FPU Steering Committee membership is listed in Appendix B, Table 2.

FPU Technical Team

Members include representatives from participating agencies. This team has responsibility to:

- Draft the FPA Charter for the FPU, obtain approval, and review and update the document annually
- Establish fire management planning and budgeting business process and procedures for all participating wildland fire management agencies;
- Coordinate with technical support groups, and Resource Specialist;
- Obtain, enter and edit data, run the analysis and verify results from the analysis;
- Provide feedback on FPA system user interfaces, data structures and models to support preparedness planning;
- Present analysis information to peers, associates and managers.

FPU Technical Team Members are listed in Appendix B, Table 3

Resource Specialist and Support Services

Resource Specialist serves the FPU Team providing periodic input on specialty subjects.

Members may include:

- Liaisons from other fire business areas, e.g. Fire Operations, Fire Planning, Fuels, Prevention, Education, providing input for consideration of interfaces, shared data/resources and to coordinate planning.
- Resource management specialists (botanist, wildlife biologist, range manager, forester, ecologist) Resource Specialist and participants in the identification of attributes in the FPA weighting process
- Liaison from States, Tribes and Federal Agencies.

Support service can include many disciplines depending on the needs of the individual FPU. Examples include: GIS program support, Fire Ecology expertise, fire planning from a higher level, and other resource professionals.

A list of functions/personnel contributed by each participant is included in Appendix B, Table 4.

2.3 Reporting, Oversight, & Review

Reporting, oversight and review will ensure that the FPU stays within scope and on time. Oversight is provided by line officers/steering committee.

Core Process Workflows

The FPU Team will be responsible for assembling data as needed for the FPA process. One individual (an FPU Team Administrator) will be assigned the role of gathering of data from all the agencies and input it into the FPA Modules. That individual is responsible for tasking agency planners with data needs and due dates for timely implementation of the analysis. The administrator will document processes used in developing the inputs for the Fire planning Analysis.

The team administrator has the responsibility of informing the Steering Committee of unresolved issues such as discrepancies of data among agencies.

The Steering Committee has the responsibility of providing oversight and support to the team administrator in developing assumptions that best represents "real world" fire operations for their individual agencies and as a collective unit.

2.4 Communications

FPU Team

The following mailing list of the Central Florida FPU participants has been sent out to participants in the FPU. Communication is encouraged within the FPU team to identify issues in a timely manner and to provide information when needed.

Name	Agency	Phone Number	Email Address
Mark Clere	USFS	352-895-9675	mclere@fs.fed.us
Glen Stratton	USFWS	321-861-6695	glen_stratton@fws.gov
John Stiner	NPS	321-267-1110	john_stiner@nps.gov

2.5 FPU Schedule

Timelines for FPU activities will be developed annually based on requests from the agencies' national offices, that timeline will then be assembled and appended to this charter.

2.6 Project Effort/Cost Estimate (*Will NOT be utilized at this time*)

This section may be needed if shared positions are anticipated. For example, one full time FPA team administrator (fire planner) position is required for the Central Florida Fire Planning Unit to function as the coordinator/lead planner and primary contact. The participating agencies will fund the planner's salary according to the annual table in the Appendix to guarantee it is a dedicated position. Travel and miscellaneous costs related to FPU activities will be incurred by the participating agencies for their employees.

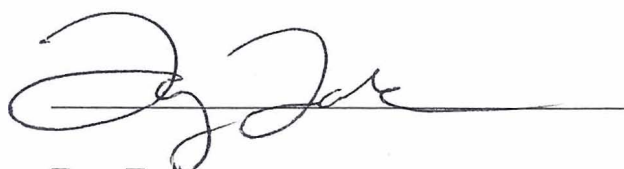
2.7 Mechanism for Transferring Funds (*Will NOT be utilized at this time*)

This section, if needed, could include the mechanics for transfer of funds among agencies. (To reduce the workload associated with changes in dollar amounts percentages should be established then the annual adjustments for step increases, base funding increases etc. will be covered automatically.) These items should be developed later as FPA process progresses.

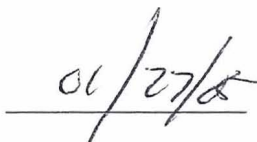
3. Approval Section

This charter is effective as of the last date of signature. By signing, the signatories indicate their ~~agreement and support of the project charter and their commitment to the project. Appendices~~ updates do not require line officers signatures.

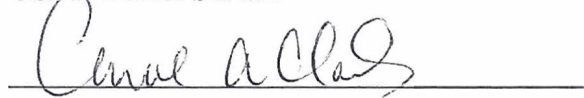
Charter will be reviewed by the FPU Management Team annually or as necessary and changes made as needed.



Tony Tooke
Acting Forest Supervisor
National Forests in Florida
USDA Forest Service



Date



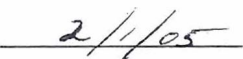
Carol Clark
Park Superintendent
Canaveral National Seashore
DOI National Park Service



Date



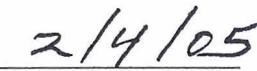
Harold Morrow
Refuge Manager
Lake Woodruff NWR
DOI U.S. Fish and Wildlife Service



Date



Ron Hight
Refuge Manager
Merritt Island/St. Johns/Lake Wales NWR
DOI U.S. Fish and Wildlife Service



Date

3.1 Delegation of Authority

Upon approval of this Charter by the National Forests in Florida Forest Supervisor a letter of Delegation of Authority will be issued to Jerri Marr, District Ranger, Lake George RD and Rick Lint, District Ranger, Seminole RD, Ocala NF. The delegation letter will delegate responsibility ~~for communications with participating line officers, overall management of the planning and~~ budgeting process including conflict resolution, but not limited to the following: negotiation of differences in location and ownership of fire resources, distribution of FPU funding among the administrative units.

The US Fish and Wildlife Service and National Park Service will reserve the option to delegate responsibility for communications with participating line officers, overall management of the planning and budgeting process including conflict resolution, but not limited to the following: negotiation of differences in location and ownership of fire resources, distribution of FPU funding among the administrative units, decisions on implementation timeframes.

Appendices

Appendix A – Example - Shared Funding for FPU Planner/Team Administrator

Shared funding will not be considered at this time. Each agency is responsible for providing funding of their respective personnel.

Appendix B – Tables of Organizations

The following tables will be reviewed and updated as necessary.

Table 1 – Management Committee			
Agency	Title	Individual	Contact Information
Lake George RD Ocala National Forest	District Ranger	Jerri Marr	352-625-2520
Seminole RD	District Ranger	Rick Lint	352-669-3153
Lake Woodruff NWR	Project Leader	Harold Morrow	386-985-4673
Merritt Island/St. Johns/Lake Wales +	Project Leader	Ron Hight	321-861-2278
Canaveral National Seashore	Park Superintendent	Carol Clark	321-267-1110

+ Denotes Chairperson

Table 2 – Steering Committee			
Agency	Title	Individual	Contact Information
USFS	Forest FMO	George Custer	352-669-3153
NPS	Regional GIS Fire Specialist	Dean Gettinger	404-562-3108 X512
USFWS	District FMO	Glen Stratton	321-861-6695

Table 3 – FPU Technical Team		
Agency	Individual	Contact Information
USFS	• Mark Clere	352-895-9675
USFS	Mary Humphries	256-761-7600
USFWS	Jennifer Adams **	404-679-4126
USNPS	Dean Gettinger	404-562-3108 X512
USFWS	Glen Stratton	321-861-6695

• indicates FPU Team Administrator

** indicates backup FPU Team Administrator

Table 4 – FPU Resource Specialist			
Agency	Specialty	Individual	Contact Information
USFS	FMO	James Hart	850-523-8606
USFS	Wildlife Biologist	Laura Lowery	352-625-2520 x2528
USFS	Hydrology	Will Ebaugh	850-523-8557
USFS	Prescribe Fire Specialist	Bruce Harvey	850-523-8607
USFS	Botanist	Will Cammero	352-625-2520
USFS	Archeologist	Ray Willis	352-669-3153 x5526
USFS	GIS-Specialist	Kathy Bronson	352-669-3153 x5528
USFS	Recreation	Bret Bush	352-625-2520 x2509
USFWS	Forester	Fred Adrian	321-861-6694
USFWS	Biologist	Marc Epstein	321-861-2369
USFWS	Biologist	Kristina Sorensen	386-985-4673
USFWS	CCP Planner	Cheri Ehrhardt	321-861-2368
USFWS	Prescribe Fire Specialist	Mike Ward	386-985-4673
USNPS	Resource Specialist	John Stiner	321-267-1110
USFWS	Fire Ecologist	Dave Brownlie	850-893-4153
USFS	Fire Ecologist	Bruce Davenport	850-893-4153 x270
USFS	Special Uses	Harold Shenk	352-625-2520 x2523
USFS	Business Manager	Terri McDonald	352-669-3153 x5511

Central Florida FPU Map:

