NPS OUTER BANKS GROUP

FIRE MANAGEMENT PLAN

Including:
Cape Hatteras National Seashore
Fort Raleigh National Historic Site
Wright Brothers National Memorial

APRIL 2001

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19.0 INTRODUCTION

The management policies (Directors Order – 18, November 1998 and Reference Manual – RM – 18, February 1999) for the National Park Service (NPS) require that all Park Service areas with vegetation capable of supporting fire develop a Fire Management Plan[1]. The use of fire to achieve resource management objectives is addressed in the Resource Management Plans for Cape Hatteras National Seashore (1984), Wright Brothers National Memorial (1996), and Fort Raleigh National Historic Site (1998). This plan implements the selected management actions from the appropriate Resource Management Plan, with over-all guidance provided by the General Management Plan for each area. The purpose of this plan is to outline in as detailed a manner as possible, actions that will be taken by the Outer Banks Group (Group) in meeting the fire management goals established for the area. The Group is composed of Cape Hatteras National Seashore, Wright Brothers National Memorial, and Fort Raleigh National Historic Site.

Authority for carrying out a fire management program at the Group originates with the Organic Act of the National Park System, August 25, 1916. The Organic Act states the primary goal of the National Park Service is to preserve and protect the natural and cultural resources found on lands under its management in such manner as will leave them unimpaired for future generations.

The Organic Act was amended by the General Authorities Act of 1970 and further clarified by the Redwoods National Park Act, as amended in 1978, which required that within all Service-administered areas the…

> "authorization of activities shall be construed and the protection, management, and administration (of these 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…"

The statutes cited below authorize and provide the means for prevention, presuppression, control, and suppression of wildland fire on lands under the jurisdiction of the Department of the Interior, or lands adjacent thereto.

- Protection Act of September 20, 1922 (42 Stat.857; 16 U.S.C. 594).
- Economy Act of June 30, 1932
- Federal Property and Administrative Services Act of 1949 (40U.S.C. 471 *et seg*.).
- Reciprocal Fire Protection Act of May 27, 1955 (69 Stat. 66, 67; 42 U.S.C. 1856, 1856a) authorizes reciprocal fire protection agreements with any fire organization for

[1] Servicewide fire management policy is expressed in the current revisions of the Directors Order – 18 and the Reference Manual – 18 and "The Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide", and is incorporated into this document by reference.

mutual aid with or without reimbursement and allows for emergency assistance in the vicinity of agency facilities in extinguishing fires when no agreement exists.

- Disaster Relief Act of May 22, 1974 (88 Stat. 143; 42 U.S.C.5121).

- Federal Fire Prevention and Control Act of October 29, 1974 (88 Stat. 1535; 15 U.S.C. 2201).

- Federal Grants and Cooperative Act of 1977 (Pub. L. 95-244, as amended by Pub. L. 97-258, September 13, 1982. 96 Stat. 1003 31 U.S.C. 6301-6308).

- Wildfire Assistance Act of 1989, (Pub. L. 100-428, as amended by Pub. L. 101-11, April 1989).

- Departmental Manual, Part 621, Wildfire Suppression and Management (December 25,1998).

An Environmental Assessment that meets the requirements established by the National Environmental Policy Act (NEPA) has been completed for this plan (Appendix C). Compliance with the National Historical Preservation Act (NHPA) is documented in Appendix D.

20.0 COMPLIANCE WITH POLICY & RELATIONSHIP TO OTHER PLANS

Wildland fire may contribute to or hinder the achievement of park management objectives. Therefore, park fire management programs are to be designed to meet resource management objectives identified in various planning documents and to ensure that firefighter and public safety are not compromised. Each park with vegetation capable of burning will prepare a fire management plan to guide a fire management program responsive to the park's natural and cultural resource objectives and to safety considerations for park visitors, employees, and developed facilities (DO-18, 1998). The Wildland and Prescribed Fire Management Policy (1998) directs federal agencies to achieve a balance between suppression to protect life, property, and resources, and fire use to regulate fuel and maintain healthy ecosystems. This plan describes actions necessary to carry out fire management policies and objectives.

Cape Hatteras was authorized by the Act of August 17, 1937 (50 Stat.669). On January 12, 1953, the Secretary of the Interior issued an order establishing Cape Hatteras National Seashore. The authorizing legislation states the purpose of the national seashore "shall be, and is hereby, established, dedicated and set apart as a national seashore for the benefit and enjoyment of the people." The act went on to say, " Except for certain portions of the area, deemed to be especially adaptable for recreational uses…, the said area shall be permanently reserved as a primitive wilderness and no development of the project or plan for the convenience of visitors shall be undertaken which would be incompatible with the preservation of the unique flora and fauna or the physiographic conditions now prevailing in this area."

Fort Raleigh National Historic Site was established by Secretarial Order (April 5, 1941,

9 CFR 2441) to preserve a nationally important historic site for the inspiration and benefit of the people of the United States. A collateral purpose was to honor an agreement with the Roanoke Island Historical Association by continuing to provide a site for the annual presentation of the pageant-drama, *The Lost Colony*. Congress further defined the purpose of the site in the Act of August 17, 1961 (75 Stat. 384) when it said that the purpose of the site was to preserve lands historically associated with the attempt to establish an English colony on Roanoke Island. On November 16, 1990, President George Bush signed P. L. 101-603, an Act to authorize the Secretary of the Interior to acquire approximately 335 acres on the north end of Roanoke Island as additions to Fort Raleigh National Historic Site. The Act also redefined the purpose of the site to include preservation and interpretation of the first English colony in the New World and the history of Native Americans, European Americans, and African Americans who lived on Roanoke Island.

The Kill Devil Hill Monument was established by the Act of March 2, 1927. The Executive Order of March 3, 1933, transferred administrative responsibility to the National Park Service. The site was established to commemorate the first successful human attempt at heavier-than-air, controlled, powered flight. The existing 431-acre land base stabilizes the remaining dunes existing during the Wright brothers' flight experiments at the turn of the century. The Secretarial Order of December 1, 1953, re-designated the area monument as Wright Brothers National Memorial (National Park Service 1996).

Pea Island National Wildlife Refuge, which is within the boundaries of the national seashore, is administered by the United States Fish and Wildlife Service.

21.0 DESCRIPTION OF UNIT

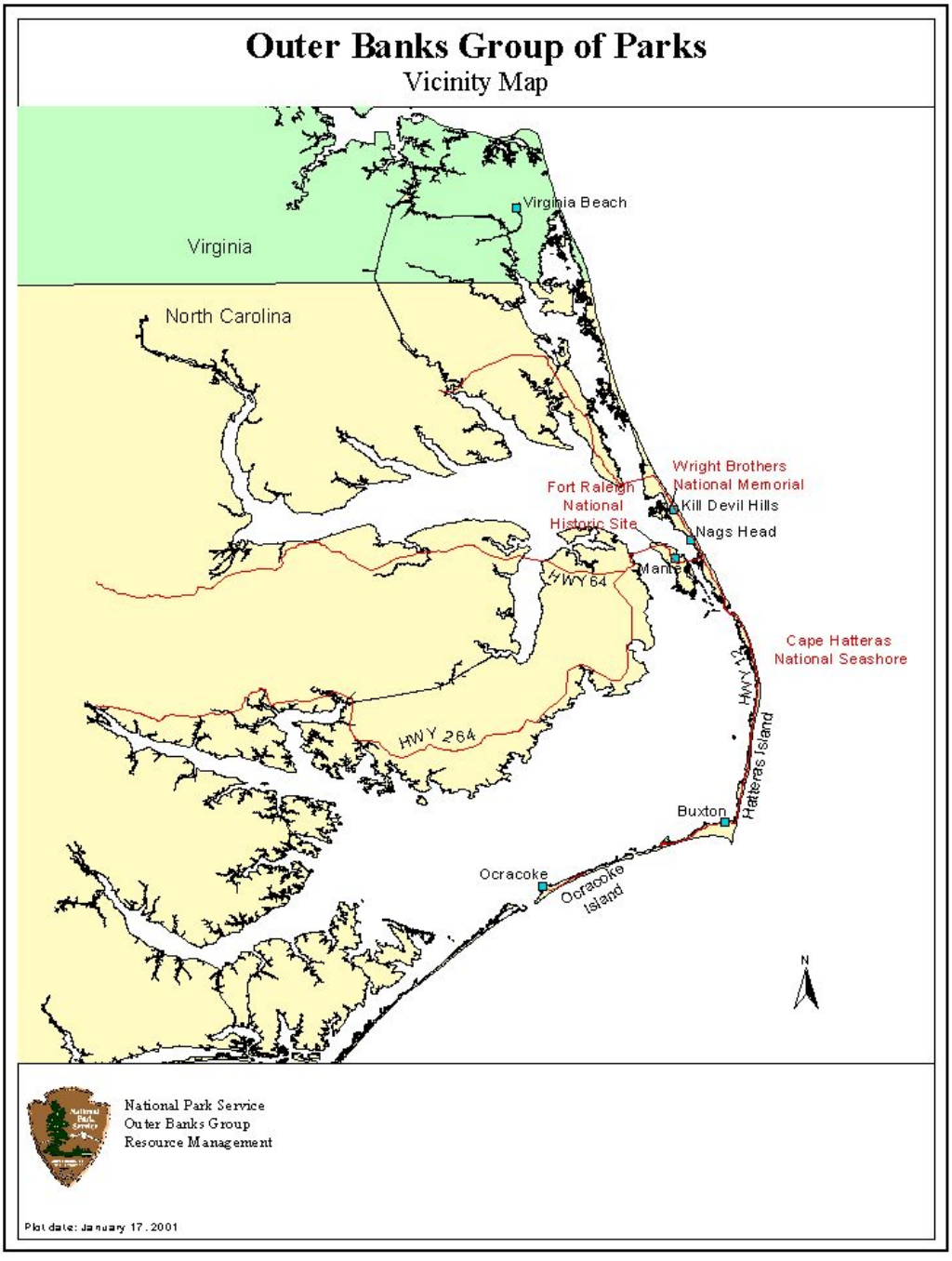
3.1 Location

The Outer Banks Group is located in Dare and Hyde Counties, along the Outer Banks of North Carolina and extends for over 90 miles on Roanoke, Bodie, Hatteras and Ocracoke Islands (Figure 1). Part of the barrier island chain that fringes the East and Gulf coasts of the United States, the islands are narrow, typically less than one-mile wide, and are bordered on the west by the Pamlico Sound, which forms the largest estuarine system on the East Coast.

Cape Hatteras National Seashore (Seashore) contains about 30,318 acres of dry and submerged land (Devine et al. 1995). The national seashore is recognized for its natural, historical, and recreational values, including its beaches, excellent fishing, diverse bird life, and historic landmarks.

Wright Brothers National Memorial contains approximately 421 acres and is located on Bodie Island north of the Seashore within the corporate boundaries of Kill Devil Hills, North Carolina (Devine et al. 1995). The 372-acre Ft. Raleigh unit is located on the northern tip of Roanoke Island (Devine et al. 1995).

Figure 1: Outer Banks Group



3.2 Topography

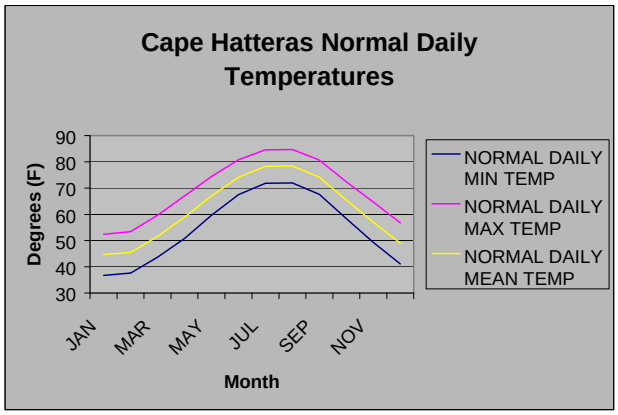
The Group is located on a series of the barrier islands separated, up to 25 miles, from the mainland by marshes and open waters of Pamlico Sound. By the very nature of barrier islands, the environment is dynamic. Waves, currents, and winds have reshaped the barrier islands. These long, narrow islands of unconsolidated and shifting sand absorb the full forces of ocean waves and storm surges.

Topographically, areas such as Nags Head and Buxton Woods range from forested dunes reaching height of 60 feet, down to lows of freshwater ponds between the dunes (NPS 1981). From the ocean side to the sound side, the typical cross section of the islands consists of beach, berm, dunes, grassland flat, shrub thicket, and maritime forests where the island is wide and has a series of dune ridges (National Park Service 1981). The highest elevations within the group are found in dune formations within and adjacent to Buxton Woods. The islands are more typically low and flat, ranging from 0 to 15 feet in elevation, with slightly higher elevations along the dune ridge. Large areas of inlet flats and marsh are lower in elevation and frequently over-washed by high tides. Portions of Buxton Woods are the only areas outside the 100-year flood plane.

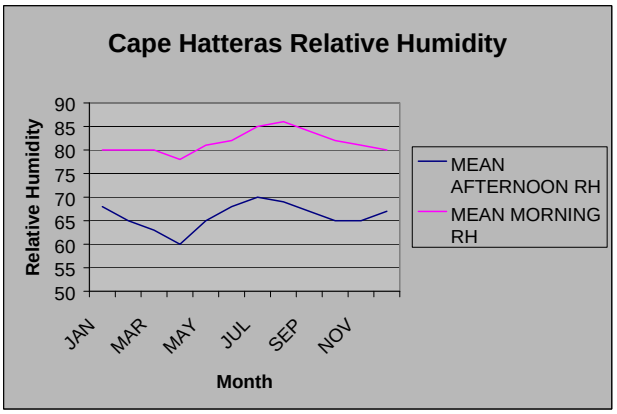
3.3 Climate

The Outer Banks climate is governed and moderated by the ocean. Winters are generally mild, and summers are hot and humid (Figure 2). Extremes of heat and cold are not severe; the average annual maximum air temperature is 69 degrees Fahrenheit, and the minimum is 56 degrees Fahrenheit. Due to offshore storms, the average annual rainfall is high, 55 inches, and rainfall can be intense. It is frequently windy day and night with a mean wind speed of 11 miles per hour. The prevailing summer wind is from the southwest and from the northeast in the winter, and rapid changes in both wind direction and speed are common (Hardy and Carney 1969). The highest wind velocities generally occur in winter, during frontal passages.

Figure 2: Weather Trends – Cape Hatteras National Seashore



Source: John Segar as taken from National Weather Service statistics. 1957-1998.



Source: John Segar as taken from National Weather Service statistics. 1957-1998.

The barrier islands are vulnerable to frequent storms. Northeasters occur during late fall, winter, and spring. Hurricanes, which can spawn tornadoes and other weather phenomena, can occur from August to October with the greatest threat in September, although the hurricane season extends from June to November.

3.4 Geology and Soils

No other landscape in the eastern United States is as mobile as that of the barrier islands. The scale of disturbances ranges from millennia in Nags Head Woods where vegetation may have been protected by tall dunes for 1,000 to 3,000 years to daily in cases of plants entombed by small fans of sand deposited in the lee of dunes with any sea breeze (Frost 1999 in prep). The islands, comprised of Holocene sediments, are migrating westward as a continuing response to a rising sea level. The main mechanisms for migration are inlet formation and overwash. Buxton Woods and Nags Head areas appear to be a remnant of an earlier geologic process (Frost 1999 in prep).

The soils of the island have been mapped and described by the USDA Soil Conservation Service (1977). The loamy sand and organic peat and muck found in marshes are significant in life cycle of some marine life and provide significant wildlife habitat (NPS 1981). The USDA Soil Conservation Service report is on file at Group headquarters.

3.5 Hydrology

Groundwater provides the freshwater resources for the national seashore. Its source was described and mapped by the U.S. Department of the Interior Geological Survey and consists of a water-table aquifer and confined and semi-confined aquifers (Winner 1975). Small ponds occur in depressions where the water table is above the surface. Rainwater enters directly into the water-table aquifer because of little or no surface runoff. The fresh groundwater is like a lens-shaped mass floating on top of denser salty water. The lens continually changes due to the rates of recharge and discharge. Where the island is high, there is sufficient head pressure for freshwater to circulate downward into a deeper confined aquifers. Elsewhere, the fresh groundwater moves away from the central part of the island toward the ocean and sound (Winner 1975). Given this hydrologic regime, there is a potential for contamination of fresh ground water. Wastewater effluent and other contaminants can enter the aquifer as easily as rainwater (NPS 1981).

3.6 Vegetation

Communities of specialized plant and animal species have adapted to the often harsh and unstable barrier island environment found on Cape Hatteras. The distance from the ocean, direction of prevailing winds, soil salinity, moisture and periodic overwash are among the factors that determines the distribution of vegetation. The sensitivity indicated for each zone suggests the vulnerability of its plants and animals to disturbance (National Park Service 1981).

Pre-settlement descriptions of the Outer Banks are few. Bratton and Davison (1985) recounted a report by Thomas Hariot (1588) of a predominance of pine on Roanoke Island, but also mentions cedars, sweet gums, and oak that were "faire, straight, tall and as good timber as any can be…" Also included was an account by Jonathan Price (1795) describing the woods on Hatteras as "covered with large evergreen trees, such as live oak, pine and cedar... "and they included a report that Ocracoke Island, which now supports almost no native forest, as covered with woods of small live oak and cedar.

Today, sandy beaches give way to dunes where sea oats (*Uniola paniculata*) stabilize the dunes and hold the sand. Rhizomatous grasses such as sea oats adapt to overwash, but shrub and tree communities are vulnerable to salt spray and inundation (Doland et al. 1973). Shrub thickets will form, however, where there is protection from salt spray and overwash.

On barrier islands such as Cape Lookout that have not been altered by man, vegetation succession to shrub thicket and maritime forest occurs only in locations which are protected from damage from ocean and sound with access to fresh groundwater (Firth 1987). Due to the construction of artificial dunes within the national seashore, shrubs have invaded some of the grasslands behind the dunes and have caused a decline in the grass species adapted to overwash (National Park Service 1981).

On sites of higher elevation, maritime forest, such as Buxton Woods, may occur (National Park Service 1981). Swamp forest occurred in the low-lying swales behind the ancient dunes. Tree species such as red maple (*Acer rubrum*), willow (*Salix caroliniana*), swamp dogwood *(Cornus stricta*), and persimmon (*Diospyros virginiana*) are common (Bratton and Davison 1987). Eastern red-cedar (*Juniperus virginiana*), Loblolly pine (*Pinus taeda*), American holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), bayberry (*Myrica cerifera*), and yaupon (*Ilex vomitoria*) are also present.

On the soundside of the island, the marsh grasses contribute an important link to the estuarine ecosystem. The high marsh, flooded by spring and storm tides, is dominated by salt meadow cordgrass (*Spartina patens*), whereas the low marsh, flooded at mean high tide, is shared in dominance by salt meadow cord grass and needle rush (*Juncus roemerianus*) (National Park Service 1981).

Table 1: Habitat Types – Fort Raleigh

Habitat Type	Acres	Percent
Deciduous Forest	01.5	00.4
Coniferous Forest	205.1	55.0
Low Marsh	53.4	14.3
Mixed Forest	61.7	16.6
Open Land	19.5	05.2
Pine Plantation	12.6	03.4
Residential Coniferous	00.3	00.1
Residential Open	00.0	00.0
Riparian	15.0	04.0
Shrub Savanna	02.7	00.7
Water	00.9	00.2
Total	372.6	99.9

Source:[2] Devine, Hugh A., Beau McCaffrey, and Kent Turner. Vegetation Mapping & GIS for the Cape Hatteras National Seashore, Feb.1995.

Table 2: Habitat Types – Wright Brothers

Habitat Type	Acres	Percent
Live Oak Scrub	141.6	33.6
Open Dunes, Grasslands, Disturbed grounds	146.1	34.6
Pine; pine-mixed hardwood	124.6	29.5
Wetlands: Ditches	06.3	01.5
Wetlands: Forested	02.7	00.6
Wetlands: Marsh	00.6	00.1
Total	421.9	99.9

Source: Devine, Hugh A., Beau McCaffrey, and Kent Turner. Vegetation Mapping & GIS for the Cape Hatteras National Seashore, Feb.1995.

[2] The percentages of habitat types may not equal 100% due to rounding.

Table 3: Habitat Types – Cape Hatteras

Habitat Type	Acres			Total	Percent
	Bodie Island	Hatteras Island	Ocracoke Island		
Barren Sand	689.3	1139.2	1086.1	2914.6	09.6
Br. Evgreen Maritime	810.7	170.5	07.9	989.1	03.3
Broad leaf/Needle leaf	00.0	730.1	00.0	730.1	02.4
Developed land	595.9	1023.2	36.4	1655.5	05.5
Dune Grassland	00.0	2480.3	800.4	3280.7	10.8
Fresh Marsh	1533.2	109.5	20.0	1662.7	05.5
Juncus R. High Marsh	407.8	1129.1	434.7	1971.6	06.5
Low Marsh	974.2	575.8	616.8	2166.8	07.1
Needle leaf/Broad leaf	00.0	2624.5	00.0	2624.5	08.7
Pinus Maritime Forest	65.4	286.7	46.4	398.5	01.3
Reeds	66.4	52.4	02.4	121.2	00.4
S. Patens High Marsh	00.0	80.3	685.7	766.0	02.5
Shrub Savanna <1/3	265.8	2182.6	644.5	3092.9	10.2
Shrub Savanna >1/3	457.7	940.3	463.9	1861.9	06.1
Shrub Thicket	49.0	814.4	422.3	1285.7	04.2
Water	288.2	199.0	13.3	500.5	01.7
No Data	700.0	2911.1	684.2	4295.3	14.2
Total	6903.6	17449.0	5965.6	30317.6	100.0

Source: Devine, Hugh A., Beau McCaffrey, and Kent Turner. Vegetation Mapping & GIS for the Cape Hatteras National Seashore, Feb.1995.

3.7 Wildlife

One of the guiding principles contained in the Wildland and Prescribed Fire Management Policy: Implementation and Reference Guide requires that "fire management plans must be based on the best available science"(NWCG 1998). The role wildland fire plays in the distribution and composition of wildlife species is not well known. Lyon, et al. (1978) in their state of knowledge report, noted that managers lack descriptions of both short-term and long-term ecosystem responses to wildland fire, including site-specific responses of food, cover, and animals, and differential response to season of burn and repeated burning. They also stated researchers lack knowledge of specific habitat requirements, life histories, and inter-species relationships of key faunal species or groups. However, Lyon concluded there is enough general knowledge available to resource managers to state that fire is beneficial to many wildlife species and the detrimental effects of fire on many animals are short lived (Lyon, et al. 1978). Although the observations made by Lyon and his fellow researchers remains true today, several studies, including those by Bratton (1991), Davison (1983), Doland and Lins (1986), Doland et al. (1973), Firth (1987), Frost (1999), and others over the past two decades of specific species and their habitats unique to the Group have been undertaken. These studies are expanding the knowledge available to resource managers. In keeping with the guiding principle referenced at the beginning of this paragraph, as even more knowledge becomes

available, the knowledge generated will be used to improve the fire management program.

The most conspicuous animals present are birds, which can be seen and heard in all habitats during all seasons of the year. Because the majority is migratory, the rich and varied bird life changes throughout the year (National Park Service 1981). The marshes on the sound side of Bodie Island, together with those on Pea Island and Ocracoke Island, provide a wintering home for over half of North America's Greater Snow Geese *(Chen caerulescens*) on the Atlantic flyway, as well as significant numbers of other waterfowl (Firth 1987). Inlet areas, recently overwashed beaches, and estuarine islands are important nesting sites for terns (*Sterna* spp.) and skimmers (*Rhynchops* spp.).

Vegetative adaptations have resulted in vegetation zones including interdune meadows, shrub thickets, maritime forests, fresh water marshes, and salt marshes. This variety of vegetative communities provides habitat for many faunal species, some dependent on specific vegetative types and other benefiting from an ability to utilize multiple communities. About one-half of the mammal species found in North Carolina's lower coastal plain are found on the national seashore (National Park Service 1981). Periodic fire tends to favor understory species that require more open habitat (Lyon et al. 1978, Wade and Lunsford1989). For example, a reduction of bushes and shrubs would provide increased food sources for migratory waterfowl. Opossums (*Didelphis virginiana*), northern short-tailed shrews (*Blarina brevicauda*), rabbits (*Oryctolagus* spp.), rats (*Rattus* spp.), mice (*Peromyscus* spp.), voles (*Microtus* spp.), raccoon (*Procyon lotor*), and white-tailed deer (*Odocoileus virginianus*) are common residents. Aquatic mammals such as muskrat (*Ondatra zibethica*), mink (*Mustela* spp.), nutria (*Myocastor coypus*), and otter (*Lutra* spp.) are observed around the ponds and marshes. The maintenance of all successional stages through positive management should insure at least minimal levels of all potential species in an area (Lyon et al. 1978).

Research on the influence of fires on reptiles and amphibians is poorly documented. Data indicate because they generally inhabit moist or protected sites, very few individuals are killed during fires (Means 1981). Reptiles such as turtles and snakes are found in the national seashore. Turtles are confined primarily to the ocean and beaches and are not to expected to be impacted by fire. Two species of poisonous snakes, canebrake rattlesnake (*Crotalus horridus atricaudatus*) and cottonmouth water moccasin (*Agkistrodon piscivorus*), have been observed in Buxton Woods. Amphibians include Fowler's toad (*Bufo woodhousei*), squirrel tree frog (*Hyla squirella*), green tree frog (*Hyla cinerea*), and southern leopard frog (*Rana sphenocephala*) are most common.

Many species of commercially important invertebrates and fish are supported by the food chain of the seashore's salt marshes. The marshes and tidal creeks serve as nursery grounds for fish, clams and scallops, and crab and shrimp (National Park Service 1981).

A listing of wildlife species common to the Group is on file at Group Headquarters.

3.8 Threatened and Endangered Species

There is a wide range of federally and state listed threatened and endangered species that live year around or visit Group lands part of the year. Many species such as the loggerhead sea turtle (*Caretta caretta*), Leatherback sea turtle (*Dermochelys coriacea*), Green sea turtle (*Chelonia mydas*) and Piping Plover (*Charadrius melodus*) are limited to beach sites. Others such as dune blue curls (*Trichostema* spp.) and seabeach amaranth (*Amaranthus pumilus*) are federal listed species that inhabit dune and disturbed areas. The state listed Brown Pelican (*Pelicanus occidentalis*) is known to nest on land in the vicinity of the national seashore. State listed species such as the Little Blue Heron (*Egretta caerulea*), Snowy Egret (*Egretta thula*), and the Carolina salt marsh snake (*Nerodia sipedon williamengelsi*) can be found in the marshy areas on The Sound. Species such as the Peregrine Falcon *(Falco peregrinus*) and Bald Eagle (*Haliaeetus leucocephalus*) are occasional winter visitors. A complete listing of Threatened and Endangered Species that are listed in Dare and Hyde Counties is included in Appendix E.

3.9 Air Quality

Air quality in the Group receives protection under several provisions of the Clean Air Act (CAA), including the National Ambient Air Quality Standards (NAAQS) and the Prevention of Significant Deterioration (PSD) Program. The area is considered to be in attainment of the NAAQS, the minimum standards for air quality throughout the country. The PSD Program provides additional protection from air pollution. One of the goals of the PSD Program is to preserve, protect, and enhance the air quality in areas of special natural, recreational, scenic, or historic, including the Group's values (Ross 1990). Under this program, Cape Hatteras National Seashore is designated Class II (USDI National Park Service, 1979). Only a limited amount of additional air pollution, due to moderate growth, can be allowed in the area over time (certain national parks and wilderness areas are classified as Class I and receive the highest protection under the CAA).

Over all, the air quality on the Outer Banks is considered to be good. Wind and atmospheric instability generally result in rapid dispersion of most air pollutants during the day, but nighttime conditions are often conducive to the formation of fog.

3.10 Cultural and Historic Resource

There are forty-four historic structures within the parks' boundaries, some of which may be vulnerable to wildland fire related damage. There are no known archeological sites that will be affected by fire management activities. A listing of these resources is on file at Group headquarters.

3.11 Improvements

Improvements made by the NPS are located throughout the Group. They include the development at Fort Raleigh that consists of the Group Headquarters Building, Visitor Center, Lost Colony Activities Building, Maintenance Area, employee residences, and facilities

associated with the Elizabethan Gardens and the Waterside Theater. Improvements at Wright Brothers Memorial include the First Flight Monument on Big Kill Devil Hill, Visitor Center, reconstructed 1903 camp buildings, Maintenance Area and Park Headquarters, and an airstrip. Improvements at the Seashore include The Bodie Island Visitor Center and Lighthouse consisting of a visitor center, historic structures, the Bodie Island Lighthouse, a maintenance building and other associated buildings; Little Kinnakeet U.S. Life Saving Service Station; Hatteras Island Visitor Center and Lighthouse consisting of a visitor center, picnic facilities, historic structures, nature trail, employee housing, and other associated buildings and structures; and other visitor use facilities including campgrounds, bathhouses, picnic areas, bridges and boardwalks, trails, horse barns, marina, airstrips, and interpretive facilities. A complete listing of NPS improvements is available at Group Headquarters.

3.12 Socio-Economic Considerations

3.12.1 Local Area Economy

There has been extensive growth in tourism along this portion of the Outer Banks with consequent resort and vacation home development, and the area has become a major visitor destination within close range of the densely populated eastern seaboard. Resorts, motels and hotels, and vacation homes occupy much of the land that is available for development. In addition, due to the mild climate, many more retired and semi-retired people have discovered the Outer Banks as well. A secondary economy has developed and grown to meet the needs of the ever-increasing numbers of visitors and new residents. Several strip malls, restaurants and fast-food outlets, and other commercial development stretch from Southern Shores on the northern end of Bodie Island to Whalebone Junction. A new 18-bed hospital is being built in Nags Head. Roanoke Island is home to the Dare County seat and is also heavily dependent on tourism.

There is a high demand for permanent and seasonal housing on the Outer Banks. Most private lands outside the park units have already been developed or are currently under development. Houses are generally constructed with wood siding, wooden shakes, and built on pilings with an open ground floor. There have been few, if any attempts to manage fuel on lands outside the parks. As a result, hazard fuel levels continue to increase due to shrub invasion and normal accumulation of fuel created by insect outbreaks and storms. Visitors come to the Outer Banks to enjoy the surf and beach, and to generally get away from it all. Often they come from areas where wildfire only appears on the nightly news. In all likelihood, the new comers and visitors do not want to deal with the smoke and other inconveniences that come with any type of wildland fire activity.

3.12.2 Group Visitor Use

Over the past decade, visitation has steadily increased. There were 2.1 million visitors to the Seashore in 1991 as compared to 2.78 million in calendar year 2000 (Cape Hatteras National Seashore 2001). The majority of the visitation to the area occurs from March through October. However, due to favorable weather conditions, more and more visitors

are coming on a year around basis. The primary interest is beach and water related activities, such as swimming and beachcombing. Sea kayaking, surfing, boating, fishing, hiking, bird watching and visiting historic sites are other important activities. The vast majority of visitation occurs at the beach, inlet flats or developed areas.

3.13 Values to be Protected

Buxton Woods is one of the largest surviving stands of maritime forest on the Outer Banks, and is therefore an important botanical resource (Bratton and Davison 1985), and the Coastal Fringe Evergreen Forest on Roanoke Island has been listed as an unique ecosystem in the park.

Other values to be protected are many and varied, and include but are not limited to:

- Air and water quality
- Threatened and endangered federally and state listed species
- Cultural resources, including the cultural landscapes associated with lighthouses and lifesaving stations, and other historic and prehistoric archeological sites
- Developments within and adjacent to Group lands, including private homes, marinas, businesses, and other commercial developments
- The Elizabethan Gardens and Waterside Theater
- Utility lines, bridges, and other similar improvements outside the developed zones
- Recreational opportunities

22.0 HISTORICAL ROLE OF FIRE

Davison (1983) reported that the need for information regarding the effects of fire on vegetation is especially urgent in the Southeastern National Seashores located on sandy barrier islands where the annual rainfall is sufficient for growth of dense vegetation, but the summer is usually dry, punctuated by violent thunderstorms. The abundance of dry fuel and high lightening frequency in many areas has made fire a significant part of the evolution and ecology of the coastal vegetation (Davison 1983).

Research conducted at the national seashore has shown vegetation changes on the islands of the Outer Banks have resulted from both natural and anthropogenic disturbances (Firth 1987). There is no evidence that wildland fire played any significant part in maintaining the open character of the dune grasslands which is more a matter of other disturbance (Frost 1999 in prep). However, wildland fire and the absence of wildland fire have definitely played a role in the overall occurrence and distribution of other vegetation (Bratton and Davison 1985, Bratton and Davison 1987, Bratton 1991, Davison 1983, Firth 1987, Frost 1995, Frost 1999 in prep.).

Cape Hatteras had a long history of human-initiated burning to clear brush and open marshes for wildlife (Bratton and Davison 1985). Lightning, however, was and still is a rare source of fire north of Cape Fear, probably because the thunderstorms on the Outer

Banks of North Carolina are typically associated with frontal passages that almost always bring rain (Bratton 1991, Bratton and Davison 1985).

It is possible, however, that lightning ignited wildland fires and wildland fires ignited by Native Americans on the mainland may have spread to the islands (Frost 1999 in prep.). Marshes carry fire quite well and the marshes and canebrakes of mainland Dare County in pre-settlement times were huge areas that frequently burned (Frost 1999 in prep). On Roanoke Island there is a small stand of longleaf pine (*Pinus palustris*), a fire dependent species, on the Fort Raleigh Historic Site that is not near any current mainland remnant of pine savanna (Frost 1999 in prep). This and other evidence supports the theory that Roanoke Island and possibly even Nags Head Woods were part of this continuous fire compartment, connected to the mainland by marshlands sometime before closure of the various Currituck Inlets by 1828 (Frost 1999 in prep). Frost (1995) also speculated that the barrier islands not connected to the mainland by marshes might have been burned, first by native Americans and later by European man.

The earliest descriptions of Dare County and surrounding areas come from diaries and journals from explorers on the Roanoke Voyages circa 1580-1585. These first English explorers visited Roanoke Island and attempted the settlement of the first English Colony in North America. The landscape that greeted the first settlers was swept and sculpted by wildland fire (Frost 1995). Many written accounts of these explorations were sent back to England and remain today the best authoritative information on the land and its early inhabitants during the time of contact with the first Europeans. One of the earliest accounts of wildland fire on the Outer Banks was recorded in The Roanoke Voyages 1584-1590 when three wildland fires were reported between the 15th and 17th of August, 1590 (Quinn 1955). Since there were no European settlers living in the area at the time, the fires were presumably ignited by either lightning or by native Americans (Frost 1999 in prep.). Sir Francis Drake in one of his journals was amazed at the numbers of fires that could be seen burning along the islands and mainland (Pyne 1982).

The use of fire by early European settlers was thought to be fairly common, and the practice carried into the 20th century. In the first half of the 20th century, marsh burning associated with hunting and grazing was common (Firth 1987). Residents around Currituck purposefully burned in the spring to improve the grass for muskrats, and increase populations for commercial trapping (John Wood Foreman, as reported by Bratton and Davison 1985). Long-time residents of Hatteras Island interviewed by Bratton and Davison (1985) mentioned fire in association with hunting and with removal of snakes and brush.

Bratton (1991) and Bratton and Davison (1985, 1987) have completed several research projects in Buxton Woods. A search by Bratton and Davison (1985) for surface charcoal and charred trunks produced evidence of past wildland fires throughout the woods. South of Jeanette Sedge, there was frequent charcoal and numerous scarred trees, with some showing evidence of at least two fires. They found no evidence of scarring of small trees, which would have indicated recent hot fires. They determined wildland fire regimes have changed throughout the area's history. During the past century, there has been a shift

from frequent low intensity fires, probably of small size, to larger high intensity fires (late 1930s to early 1950s), to mainly fires that are quickly suppressed under NPS management (Bratton and Davison 1985).

As part of their research, Bratton and Davison (1985) recorded interviews of older residents that support their findings that up until that time fire had always been common in Buxton Woods. They found that in the early part of the 20th century wildland fires were not serious and attracted little attentions. One person interviewed said that a couple of wildland fires a week were not unusual. Several interviewed recalled large fires in the 1940s. One wildfire started in October 1946, driven by high winds swept south over Jeanette Sedge and Open Pond and burned out onto grassy areas at the beach. The fire reportedly burned for two days. Park records indicate a second wildfire burning across Jeanette Sedge in 1954 (Bratton 1985).

A probable reduction in anthropogenic ignitions and improved suppression, rather than a reduction in fuel loading, have resulted in a decline in wildland fires in Buxton Woods and elsewhere (Bratton and Davison 1985). Similarly, the burning of coastal marshes associated with hunting and grazing was an old practice that ceased with the removal of the livestock in the late 1930's and a period of fire suppression began (Firth 1987).

23.0 GOALS AND OBJECTIVES

5.1 Resource Management Goals and Objectives

The Vision Statement and resource management goals are addressed generally in the individual General Management Plans and/or Statements for Management each of the units, and then expanded upon in the individual Resource Management Plans. The vision statements and goals are summarized below:

Cape Hatteras National Seashore

- "To identify and preserve cultural resources of the Outer Banks, particularly those relating to man adapting to life at the ocean's edge."

- "To manage the Seashore in ways that will enhance the natural processes of barrier island dynamics and of succession of native vegetation and wildlife and will mitigate the impacts of human interference with these processes."

Fort Raleigh National Historic Site

- "To identify, protect, and preserve the historical and archeological resources associated with the first attempted English colonization of the New World and the history of Native Americans, European Americans, and African Americans who lived on Roanoke Island."

- "To protect and manage the natural resources in a manner which provides an appropriate setting for the historic resources and park developments."

Wright Brothers National Monument

- "To provide a setting that helps the visitor to experience a sense of time and place which existed on December 17, 1903…"

- “To preserve, protect, and manage the cultural resources including artifacts and monuments associated with the achievements of the Wright brothers to inspire this and future generations.

The Resource Management Plan for each area recognizes the need for developing and implementing a hazard fuel reduction plan, as well as the need for improving the park's ability to inform the public of wildland fire management activities. These issues are addressed in the following Resource Management Plan Project Statements:

Cape Hatteras National Seashore

- CAHA-N-005.000 - Monitor Vegetation
- CAHA-N-006.000 - Revise Fire Management Plan and Inform Public
- CAHA-N-006.100 - Implement Fire Management Plan

Fort Raleigh National Historic Site

- FORA-N-006.000 - Develop Fire Management Plan
- FORA-N-006.100 - Implement Fire Management Plan

Wright Brothers National Monument

- WRBR-N-004.000 - Develop and Implement Hazard Fuel Reduction Plan
- WRBR-N-004.100 - Inform Public of Fire Management Activities

These projects identify the role of wildland fire management in achieving the following resource management goals:

- Determine the role of wildland fire in waterfowl management and ecological restoration and biodiversity through an active monitoring program.
- Reintroduce fire into the ecosystem.
- Reduce significant buildup of fuel through the use of prescribed burns.
- Protect sensitive resources.
- Implement the fire management program in a manner that fosters an informed interested public.

5.2 Fire Management Goals and Objectives

The goals and associated objectives of the fire management program for the Outer Banks Group are outlined below:

Goal 1: Firefighter and public safety will receive the highest priority during every fire management activity.

Objectives:

- No fire management operations will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES)[3], current fire season conditions and current and predicted fire weather and behavior.
- Fire management operations will be carried out only by fully qualified individuals that promote the safe and skillful application of fire management strategies and techniques, and who are familiar with the fuel and expected fire behavior.
- Neighbors, visitors and the local residents will be notified of all planned and unplanned fire management activities that have the potential to impact them.
- Park closures will be imposed at the discretion of the Superintendent to ensure public safety.
- Conduct post-fire critiques to evaluate firefighter safety

Goal 2: **Suppress all unwanted and undesirable wildland fires regardless of ignition source to protect the public, check fire spread onto private property and protect the natural and cultural resources of the Group.**

Objectives:

- Suppress fires at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
- Employ minimum impact suppression tactics (MIST).
- Avoid adverse impacts to the natural and cultural resources.
- Limit off road vehicle use in closed areas unless there is imminent threat to human life or private or public property.
- Limit heavy equipment use unless there is imminent threat to human life or private or public property.
- Avoid adverse impact to water resources.
- Limit foam or retardant use unless approved by the Superintendent.

[3] LCES: **L**ookouts, **C**ommunications, **E**scape Routes, and **S**afety Zones. A system is used wildland firefighters to evaluate their safety.

Goal 3: Facilitate reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with local fire management agencies.

Objectives:

- Develop and maintain fire agreements with the following agencies:
  - US Fish and Wildlife Service – Eastern North Carolina Refuges
  - North Carolina Forest Service
  - Local Fire Departments/Districts
  - Buxton Woods Coastal Reserve
- Conduct training on an interagency basis to the fullest extent possible.
- Assist local fire departments improve their wildland fire suppression capabilities.

Goal 4: Use prescribed fire where and when appropriate as a tool to manage vegetation within park boundaries, and where acceptable, across park boundaries to attain resource management objectives.

Objectives:

- Conduct all fire management operations in accordance with approved plans.
- Achieve resource management goals such as reducing shrub invasion and promoting desired species.
- Restore native plant and animal communities and reduce exotic species.
- Employ hazard fuel reduction burns around wildland-urban interface zones to reduce wildland fire intensity and severity.
- Allow fire to assume its natural ecological role.
- Use wildland fire to restore and/or maintain unique ecosystems.
- Monitor and evaluate the effects of fire management on the ecosystem in order to determine if objectives are met.
- Prescriptions and other operational aspects will be improved based on monitoring data and observed fire behavior and fire effects.
- Fire use will be based on ecological and economic factors and social values.
- Cooperatively manage prescribed and wildland fires across park boundaries when and where appropriate.

Goal 5: Modify fuel complexes around developed areas, along wildland-urban interface boundary areas and in proximity of cultural sites to reduce fire behavior and intensity to a manageable level in order to protect critical sites.

Objectives:

- Use mechanical means to reduce hazard fuel accumulations around boundaries and structures to reduce fire intensity and severity and to allow improved access by fire engines.
- Use mechanical means to reduce accumulations of hazard fuel around vulnerable cultural and historic sites for protection from fire damage.

Goal 6: Promote public understanding of wildland fire management programs and objectives.

Objectives:

- Develop a series of formal and informal interpretive programs that explain the role of wildland fire in a positive light and will convey to the public the various aspects of the fire program.
- Assist and educate local landowners about the identification of wildfire hazards and implementation of mitigation precautions.
- Develop a public information program in a way that the environmental message is not confused with the prevention message.
- Cooperate with other agencies to create a consistent fire management message and theme.

Goal 7: Manage prescribed and wildland fires in concert with federal, state, and local air quality regulations to protect the air quality of the local and adjacent airsheds.

Objectives:

- Address air quality as a part of the go-no-go decision process for all fire management actions.
- Address air quality as a part of the alternative development and selection decision process when developing the Wildland Fire Situation Analysis.
- Incorporate air quality objectives in each prescribed burn plan.
- Develop and implement smoke impact mitigation measures in prescribed burn plans and all wildland fire management actions.
- Evaluate the use of alternative methods (e.g., mechanical, chemical, biological, etc.) to the use of fire prior to selecting fire use treatments.

Goal 7: Reduce the frequency of unplanned human-caused ignitions by implementing an aggressive fire prevention program.

Objectives:

- Work with other agencies to reduce the frequency of human-caused ignitions.
- Balance prevention patrols and public education during period of high fire danger.

24.0 WILDLAND FIRE MANAGEMENT SITUATION

6.1 Prescribed Fire Use

Management ignited prescribed fires have been conducted within Cape Hatteras National Seashore in the past. The seashore conducted 15 research and prescribed burns between 1987 and 1994 that totaled 933 acres (SACS 2000). In addition, Pea Island National Wildlife Refuge, which is within the boundaries of the seashore but managed by the

United States Fish and Wildlife Service (USFWS), has been conducting prescribed burns since the 1950s. Vegetation on the refuge has been maintained in early successional stages by prescribed burning, with the goal of maintaining or improving the grassy vegetation and reducing or preventing the establishment of shrub thickets. There have been very few instances of wildfires on Pea Island, largely due to modifications to the fuel from a periodic cycle of prescribed burning. The USFWS manages Pea Island National Wildlife Refuge based upon it's own Fire Management Plan.

6.2 Historical Weather Analysis

The park does not have an adequate fire weather database to analyze. The closest cooperator fire weather station is on Alligator River National Wildlife Refuge located on the mainland approximately 10 miles west of Bodie Island. The refuge's weather station has not been in use long enough to provide a valid statistical representation of weather for the Outer Banks area. Generally a minimum of ten years of weather data is required to provide meaningful statistics. The Group has requested funding for a Remote Automated Weather Station (RAWS) to provide this information in the future.

6.3 Drought Indices

Of the two frequently used drought indices, the Keetch-Byram Drought Index (KBDI) is the most appropriate drought index for the Group because it was developed initially for the Southeastern United Stated (Keetch and Byram 1968). The KBDI is a mathematically calculated drought indicator relating to the amount of moisture in the top seven inches of soil or duff/soil, and is an output of the National Fire Danger Rating System (NFDRS) when calculated by WIMS. The KBDI is based on the ambient air temperature and recent precipitation in relation to the mean annual rainfall for a specific weather station. The range of the KBDI is 0-800, with 0 being saturated and 800 being maximum drought. A KBDI reading above 400 generally indicates wildfire management problems, but this threshold varies based on location. For example a KBDI of 400 is the 90% threshold at the Croatan National Forest, North Carolina. Until the weather station is fully operational at the Park, the KBDI is available from the U.S. Fish and Wildlife Service – Alligator River National Wildlife Refuge.

6.4 Fuel Characteristics and Fire Behavior

Fire behavior is basically a function of fuel type, fuel load, fuel moisture content, topography, and local weather conditions. The differences in fire behavior are related to the fuel load and its distribution of fuel particle size classes. Fuel load and depth are significant fuel properties for predicting whether a fire will be ignited, its rate of spread, and its intensity (Anderson 1982).

There is good fuel continuity at Fort Raleigh. The continuity of the fuel in the remainder of the group is fragmented due to expanses of sandy soils, drainage ditches and other water features. Fuel such as compressed hardwood litter which will only burn under very dry conditions will under most circumstances inhibit fire spread (Bratton and Davison 1987).

For fire prediction purposes, National Fire Danger Rating System (NFDRS) Fuel Model O (High Pocosin) is used by the Group. NFDRS fuel models can be used to predict a fire's resistance to control and fire danger. Northern Forest Fire Lab (NFFL) models can be used to predict fire behavior. In general, both fuel models were developed for communities dissimilar in some aspects to those found at Buxton Woods, and in most cases over estimate fire danger there (Bratton and Davison 1987).

- NFFL Fire Behavior Fuel Model 4 (NFDRS Fuel Model O - High Pocosin) is used to describe the dense, brush-like communities of swamp, pine swamp, pine thicket, shrub thickets, and live oak scrub[4]. The shrub layer is typically continuous, and ranges from 2 to 6 feet high. Shrubs with high volatile content such as wax myrtle and yaupon may be present. Where pine forms the canopy, a deep litter layer may also be present. Generally, the fuel are live and vertically arranged to create a fuel ladder from ground to canopy. As a result, the potential of crown fire in this fuel model is high. In general, this vegetation type requires more wind and drier conditions to burn than marshes but will burn intensely even with relatively high live fuel moistures. Once a wildland fire starts in pocosin it is strongly resistant to control due to extreme fire behavior and heavy fuel loading. This model will usually overestimate fuel loading for Cape Hatteras (Bratton and Davison 1987).

Other fuel models are present and are described below. Only the NFFL fuel models will be indicated because the NFDRS model used by the Group to predict fire danger is listed above.

- NFFL Fire Behavior Fuel Model 7 (Southern Rough) describes forests where pine species are dominant or co-dominant. On the Outer Banks loblolly pine (*Pinus taeda*) is the primary overstory species, although it is often mixed with hardwoods. This model includes remnant longleaf pine and pond pine (*Pinus serotina*) found on Roanoke Island. A dense low shrub/herb layer with spatially distinct canopy and a thick layer of needles on the surface are generally present in this fuel type. Thousand-hour fuels are significantly more abundant in immature pine. Southern rough naturally burned as often as every two years in northern sections of the park. Fire exclusion has resulted in a reduction of longleaf pine and herbaceous species, and increased the stocking levels of hardwood species in the understory and overstory. Stand stocking (stems/acre) is probably much greater than would be expected under a natural fire regime. Crown fires are uncommon, but can occur. Greater intensities should be expected in areas where overstory mortality due to salt spray, flooding, or insects is present.

- NFFL Fire Behavior Fuel Model 8 (Mixed hardwood litter) can be used to predict fire behavior for a deciduous broadleaf forest and the evergreen border with an overstory in full leaf over a compact surface litter layer. The litter layer is primarily compressed leaves and twigs. Little undergrowth is present in the stand. This fuel

[4] Fire behavior for pocosin may also be computed using NFFL Fuel Models 3, 5, and 9 depending on vegetation type and crown closure.

model best describes fuel conditions found in the summer. On the Outer Banks, maritime forests of this type exhibit lower than average amounts of dead fuel and are more resistant to wildland fire. The tightly closed evergreen border canopy impedes air movement within the interior, which also enhanced the relative humidity, further impacting fire behavior (Bratton and Davison 1987). However, this fuel type can exhibit extreme fire behavior under adverse conditions. Under those conditions, the fuel can best be modeled using NFFL Fuel Model 4.

- NFFL Fire Behavior Fuel Model 3 (Saw grass) best describes the freshwater graminoid marshes. Bratton and Davison (1987) reported this model often over predicts rates of spread. A correction factor roughly equal to the percentage of area with dense vegetation should be used. Fires in this fuel type can burn intensely and spread extremely rapidly under a wide range of moisture conditions and commonly burns over standing water, especially when it is windy. Direct attack during the daytime is generally not safe or effective in these fuels unless supported by equipment or aircraft. Peat fires can be a potential problem in this fuel type during periods of severe drought when the water table is one-foot below the surface of the ground or greater (Frost 1995).

- NFFL Fire Behavior Fuel Model 1 (Annual Grasses) best describes the dry dune grassland, and the dominant vegetation is course perennial grasses, with shrubs covering less than two-thirds of the area. This grassland forms an almost continuous band along the margin of the inner berm, and is dominated by sea oats (*Uniola paniculata*) and saltmeadow hay (*Spartina patens*)[5]. When exposed to wind and direct sunlight, these fuels dry out rapidly. The natural fire return interval for this vegetation type is unknown, although fire exclusion has resulted in invasion by woody species. Because of the continuous stretches of dry, fine fuel, and the ever-present winds, ignitions catch readily and spread quickly (Bratton and Davison 1987). In general, the dune grasslands will burn less intensely than marsh vegetation because the fuel loading is not as heavy or the fuel as continuous.

As indicated above, wildland fires can burn with a variety of intensities depending on fuel loading and arrangement and weather conditions. Periods of drought can affect fire behavior in all fuel types and wildland fires can burn actively in all fuel models when the KDBI exceeds a range of 300-400. When the KBDI exceeds 500, wildland fires can exhibit extreme fire behavior and control and suppression problems are common (Crews personal com.). Dead and down fuel can also contribute to an increase in expected fire behavior and intensity, which can lead to torching and spotting.

6.5 Fire Season

The fire season for the Outer Banks as determined by seashore fire records begins in March and continues through October (SACS 2000). As would be expected, the fire

[5] Doland and Lins (1986) described this vegetation type in more detail. Their paper, The Outer Banks of North Carolina, is on file at Group Headquarters.

season corresponds with the period of highest temperatures and the greatest frequency of lightning storms. Visitation is also highest during this period.

A summary of the number of reported fire starts at the National Seashore and their causes can be found in Appendix F.

6.6 Fuel Characteristics and Historical Observations

Fire once played a variety of natural roles in the ecosystem. Far from being a negative and destructive force, naturally occurring fires have helped to shape the landscape over time. In many cases, the natural landscapes we see today, and find so beautiful, are the legacies of past fires. Many plant and wildlife species have adapted over time to the presence of fire and, in some cases, depend on fire for their continued existence. To remove all fires from an ecosystem deprives that system of a powerful and dynamic natural force.

On a barrier island, fire may not be the only factor that shapes vegetation. A review of past studies conducted on the Outer Banks concerning the process of barrier island migration – and the temporary halt in that process imposed by the artificial barrier dunes – lead Frost (1999 in prep) to conclude that much of the modern vegetation on the various islands is anthropogenic succession resulting from temporary interruption of normal island migration. Evidence from aerial photographs, historical photographs, written records, and observations of island migration dynamics suggests that this may be true for half or more of all existing vegetation[6]. Much of the "natural" vegetation has been affected to some degree by human activities like logging, grazing, agriculture and firewood cutting, in addition to the suppression of island migration (Frost 1999 in prep., Firth 1987). However, Bratton and Davison (1985), Firth (1987), and Frost (1995) believe that wildland fire and the absence of wildland fire have definitely played a role in the overall occurrence and distribution of vegetation on the Outer Banks.

Evidence collected by Frost (1999 in prep.) from plots in the highest dunes in Nags Head Woods gives the following picture of vegetation developed under a natural regime of cyclic fire and storm.

> The ridge tops were lined with open longleaf pine forest having a grassy savanna layer beneath. The only woody understory was a bluejack oak (*Quercus incana)* here and there, and a few patches of low pineland shrubs like dangleberry (*Gaylussacia frondosa*). This xeric savanna community extended about halfway down the steep, south-facing slopes, where an occasional old longleaf pine, a fire dependent species, can still be found. The midslope community was mixed longleaf-loblolly-hickory pyrophytic woodland with understory shrubs and saplings periodically cleared by fire and with the canopy hickories (*Carya* spp.)

[6] Photographs taken by the Wright Brothers and reviewed by Frost (1999 in prep) revealed there was nothing but sand and grass at Kitty Hawk. The only woody vegetation was found behind dunes along the sound and in old stabilized dune fields like Nags Head Woods, Colington Island and Kitty Hawk Woods.

> chronically affected by storms, but with little cumulative impact on community composition. There was probably a moderately well-developed, grassy herb layer, at least on the sunny mid-slope, since the grass and herb species found seem more likely to be remnants from a more open situation rather than species naturally occurring in habitats with the degree of shade and litter now present. The presence of longleaf pine indicates that the herb layer was not too thick and the area received enough sun for these trees to become established 150 years ago.

Frost (1999) further speculates that lower slopes were likely dominated by loblolly pine and southern red oak (*Quercus falcata*), grading into swamp black gum (*Nyssa biflora*), red maple (*Acer rubrum*) and other wetland vegetation in the lowest places. Steep north-facing slopes were dominated by pignut hickory (*Carya glabra*) whose shade-tolerant seedlings could exploit the occasional canopy gaps created by hurricanes and by beech where topography and inter-dune pools provided protection from fire.

The very sparse herb layer in Nags Head Woods observed by Frost (1999 in prep) along with the lack of longleaf pine reproduction suggests that the savanna flora is fading out as loblolly pine fills in the canopy and mesophytic hardwoods are forming the understory. Remnant tufts of grasses (*Chasmanthium laxum*), common in many kinds of coastal plain woods and becomes a dominant ground cover after fire in low maritime live oak woods and estuarine fringe loblolly pine flats, are being smother by pine litter (Frost 1999 in prep). Even with infrequent fire, Frost (1999 in prep) theorized the understory might remain open enough that occasional live oaks could grow large enough to resist fire and replace old canopy trees, maintaining something like an oak savanna or woodland. Frost (1999 in prep) also observed there was considerable evidence of past fires in his plots including old healed fire scars on many of the larger understory trees. Many of the smaller stems appear to be stump sprouts dating from a fire around 1943. Pieces of fine and coarse charcoal were found in the soil when Frost collected samples.

There is evidence to suggest that the remaining longleaf pine communities on Roanoke Island and in Nags Head Woods could be remnants of a much larger fire dependent longleaf community that ranged from the mainland to portions of the Outer Banks (Frost, 1999 in prep.). These communities could have been maintained by frequent fires that were carried from the mainland by way of the marshes that once were continuous between Collington Island and Nags Head. This would suggest that fire return intervals were frequent and of low intensity on Roanoke Island and Bodie Island, and more infrequent on Hatteras and Ocracoke Islands that were not connected to the mainland by marshes.

In the vegetation history of the remainder of Bodie Island since 1849, the 1930's were a turning point (Firth 1987). Before that time woody species failed to reach a significant size and went largely unnoticed in the windswept expanses of sand and marsh. Since then shrubs have spread to form dense thickets, and above the thickets, stands of trees have become established (Firth 1987). Firth (1987) also noted the rate of woody invasion had generally slowed since 1974 and in some places stopped.

Live oak scrub formed the naturally regenerating successional forest established on former dunes. This forest had a low profile, commonly 30 feet (9 meters) or less in height. The "canopy" trees were clumped and wind-formed, interspersed through areas of grass and bare sand. The interior of the domes were heavily shaded, and undergrowth was predominantly oak and other hardwood species, and has the highest overall species diversity of the communities studied (Bratton and Davison 1987). Live *oak (Quercus virginiana*), laurel oak (*Q. laurifolia*), Red cedar (*Juniperus virginiana*), and bayberry (*Myrica cerifera*) were the predominant wood species.

There is considerable historical and current evidence to indicate that primary succession on new dunes culminates in live oak followed by laurel oak (Frost 1999 in prep). While primary live oak succession depends on new dune formation, the fate of live oak in secondary succession may depend on whether or not there is fire. In naturally fire-protected sites or sites with intentional fire suppression, natural secondary succession is dominated by water oak (*Quercus nigra*) and beech with a dense woody understory. Where such stands border open wetlands that admit sunlight, or where a light fire has cleared out the understory, cane may be abundant. In historical times probably all maritime forest were burned and grazed (Frost 1999 in prep). Before that, the larger wooded areas were probably burned occasionally by lightning fires or by Native Americans while smaller isolated stands may have never burned. With twentieth century fire suppression, essentially all maritime forest remnants have grown up in dense understory of sub-canopy trees, shrubs and vines (Frost 1999 in prep).

Bratton (1991) reported that at Cumberland Island, the intensity of the fire and the response of the vegetation was more variable in oak scrub and depended partially upon the amount and size of the live oak in the canopy. In general, the larger the live oaks, the less intense the burn. As scrub live oak grades into a well-developed hardwood forest, the fire tends to burn through the understory, rather than the canopy, and may be suppressed by the relatively dense leaf litter and high humidity (Bratton 1991). The results of the study conducted at Cumberland Island led to the conclusion that the scrub and marsh communities were actually fire adapted, and very able to withstand the intensity of burns ignited during drought (Bratton 1991).

6.7 Control Problems

While Outer Banks fire suppression agencies have been effective at keeping fires small in the past, most vegetation types have the potential to strongly resist control. The primary control problems include:

- **Fuels and Fire Behavior** - Fire exclusion and declining forest health have combined to produce dense accumulations of fuel throughout much of the Outer Banks. These fuels have the potential to exhibit extreme fire behavior that could potentially overwhelm local fire suppression resources even under normal conditions. A wildfire occurring during a period of extreme drought and/or windy conditions have the potential to be catastrophic.

- **Wildland - Urban Interface** - The recent development on the islands adjacent to Group lands has resulted in a large number of structures with limited defensible space because they have been constructed in very close proximity to wildland fuel. These structures are generally constructed on raised pilings with wooden siding and shake roofs. In all likelihood, few would survive a wildfire under normal conditions without extensive protection from fire equipment. Poor access, narrow roads, limited turnaround areas for fire equipment would make protection of many structures very difficult. Evacuation would also be problematic due to narrow roads of loose sand.

- **Initial Attack Limitations** - Wildland fire suppression forces throughout the Outer Banks are widely spread out, and are generally unprepared to handle wildland fires exceeding 10 acres in size. The volunteer fire departments have brush trucks that can be used to initial attack wildfires if there is road or trail access. The North Carolina Forest Service's is better prepared to suppress larger wildland fires, but their closest off-road suppression equipment is located in Stumpy Point, with a 1/2 to 2 hour response time to the area. The state also maintains fire suppression aircraft with a response time of an hour or more.

The following scenarios have been included to illustrate how these two factors could combine to overwhelm local fire suppression forces:

- **Urban Interface Fire** - A wildfire starting near structures in the vicinity of the park boundary under normal fuel and weather conditions but with an adverse wind direction would force fire suppression resources to aggressively protect structures rather than checking the spread of the fire. This would allow the fire to spread quickly and threaten more structures. The spreading wildfire would quickly force limited fire suppression forces to triage structures, protecting those most easy to defend while the wildfire would continue to spread, threatening even more structures. The Buxton, Wright Brothers, and Roanoke Island areas are good examples of wildland-urban interface areas subject to this situation.

- **Wildfire** - A lightning strike or other ignition source ignites a wildland fire within the park and away from roads. Suppression forces would be unable to reach the fire due to equipment limitations, allowing the fire to grow in size and intensity. It is possible the fire may be contained by breaks in the fuel, but it is also possible that the wildfire would threaten structures on the boundary where there were no fuel breaks to allow suppression forces to initiate burn out operations. South Nags Head, Buxton, and Roanoke Island are good examples of areas subject to this situation.

25.0 SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

7.1 Wildland Fire Management Strategies to be Applied

7.1.1 Wildland Fire Suppression

All wildland fires regardless of the source of ignition will be suppressed using the appropriate management response. The appropriate management response will vary from fire to fire and even in some cases along the perimeter of a fire.

Appropriate management response options range from monitoring with minimal on-the-ground disturbance to aggressive suppression action. The appropriate management response is developed from analysis of local situations. Factors such as values to be protected, management objectives, external concerns and land use need to be assessed. An overview of possible situations and responses can be found in Table 4.

Table 4: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire which does not threaten life, natural or cultural resources, or property.	Restrict the fire within defined boundaries established either prior to the fire or during the fire.	1. Holding at natural or man-made barriers. 2. Burn out 3. Observe and patrol
1. Wildland fires on NPS property with low values to be protected 2. Wildland fires burning onto NPS lands 3. Escaped prescribed fire entering another unit to be burned	Take suppression action, as needed, which can reasonably be expected to check the spread of the fire under prevailing conditions.	1. Direct and indirect line construction 2. Use of natural and man-made barriers 3. Burn out 4. Patrol and mop-up of fire perimeter
1. Wildland fire that threatens life, property or sensitive resources 2. Wildland fire on NPS property with high values to be protected. 3. Observed and/or forecasted extreme fire behavior	Aggressively suppress the fire using direct or indirect attack methods, holding the fire to the fewest acres burned as possible	1. Direct line construction 2. Engine and water use 3. Aerial retardant 4. Burn out and back fires 5. Mop-up of all or part of the fire area

Additional guidelines and a more complete listing of minimum impact suppression techniques can be found in NPS Reference Manual 18 (RM-18).

7.1.2 Wildland Fire Use

Wildland Fire Use is a strategy for allowing naturally ignited wildland fires, under prescriptive management, to burn so long as the fire meets pre-stated resource management objectives in predefined geographic areas. A naturally ignited wildland fire allowed to burn under this strategy not meeting predetermined prescriptive elements or failing to meet resource management objectives would be suppressed using the appropriate management response.

Wildland fire will not be utilized for this purpose within the Outer Banks Group at the present time due to hazard fuel levels, staffing limitations, and a wide variety of safety and property concerns. Wildland Fire Use may be reconsidered in the future, but will not be utilized until a revision of the Fire Management Plan has been completed.

7.1.3 Prescribed Fire

Hazard fuel reduction will take place primarily in areas adjacent to developed areas, the urban-wildland interface and along roads and trails that can be expected to serve as control lines. The intent of the program is to reduce wildland fire hazards to levels that enable local wildland fire suppression forces to control fires with minimum risk to firefighters and minimal loss of natural and cultural resources, improvements, and other public and private property (values to be protected). The use of prescribed fire will be guided by park planning documents and in consultation with park staff, and will be used in combination with mechanical and other means to accomplish the objectives established for the projects.

Prescribed fire will also be used in support of ecosystem management objectives to maintain and/or restore plant communities, cycle nutrients and reduce or remove exotic plants and to protect and enhance cultural landscapes. Prescribed fire will be used in combination with mechanical and chemical treatments to accomplish these and other management goals.

7.2 Fire Management Units

Fire Management Units (FMU) for Cape Hatteras National Seashore were first delineated in the 1986 Fire Management Plan. This version of the Fire Management Plan has been expanded to include all units in the Outer Banks Group. FMUs for Fort Raleigh NHS and Wright Brothers NM have been added, and some of the 1986 FMUs have been combined into larger units based upon location, resources, concerns, fuels, defensible boundaries, and fire management objectives. The current FMUs for the Outer Banks Group are outlined in Table 5.

Table 5: Fire Management Units

Unit	Acres
Fort Raleigh	372
Wright Brothers	421
Bodie Island	6,903
Hatteras Island	17,449
Ocracoke Island	5,965

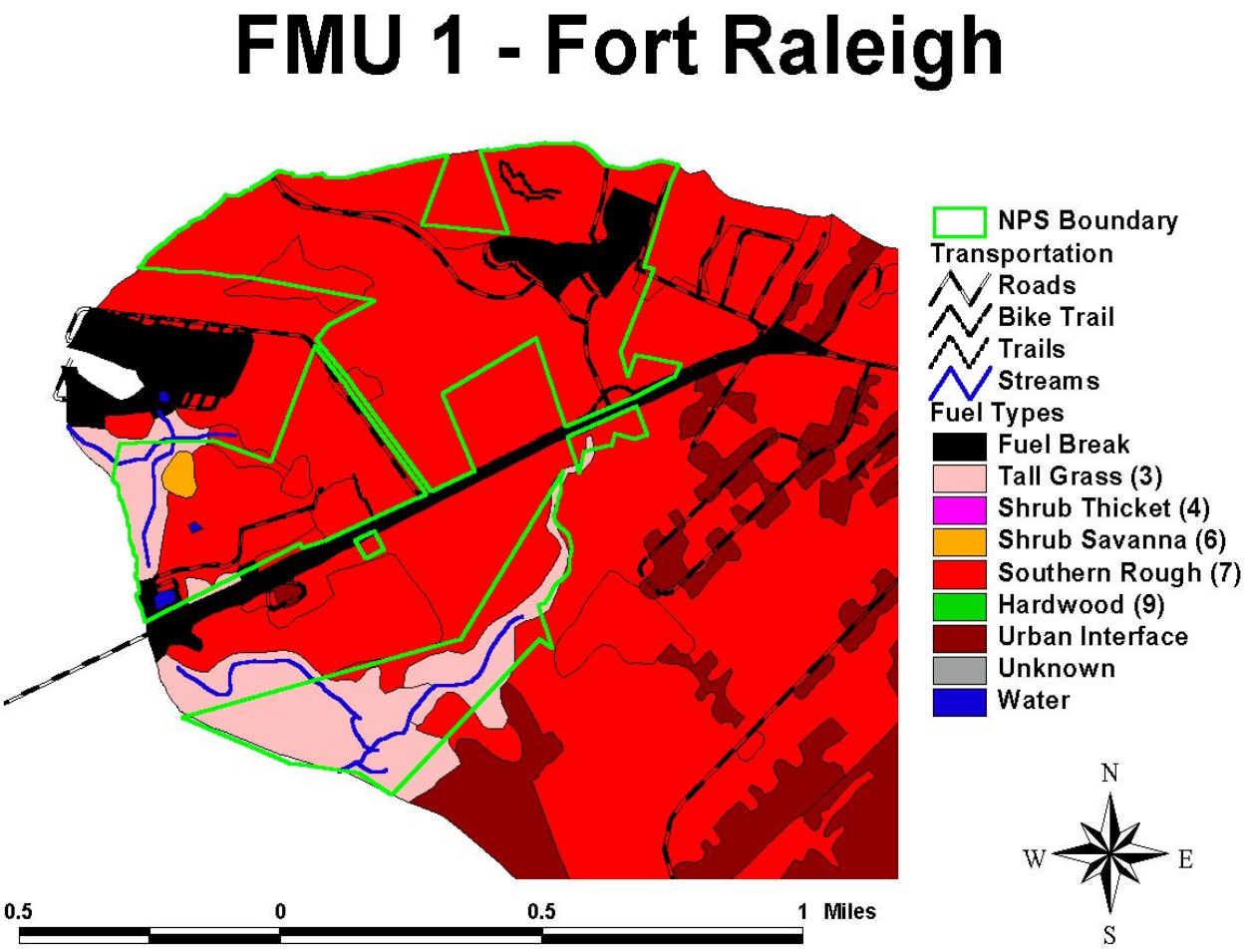
7.2.1 Fire Management Unit 1 – Fort Raleigh

7.2.1.1 Description of the Unit

This unit includes approximately 372 acres of NPS lands within the boundary of Fort Raleigh NHS located on the northern tip of Roanoke Island. Accessible from a series of paved roads off of US 64/264, the Unit is bounded on the north and west by Albemarle Sound and two large private in-holdings, and by private lands on the east and south (Figure 3). The Fort Raleigh Unit includes Group Headquarters and support facilities, reconstructed earthworks, facilities associated with the production of the *Lost Colony* and the Elizabethan Gardens. The Unit is heavily forested with some marshy areas on the southern boundaries. The wildland-urban interface is immediately adjacent to the southern, eastern and western boundaries of the Unit. A special concern for this FMU is the heavy levels of fuel loading, particularly along boundaries and adjacent to structures within or adjacent to the boundaries.

All wildland fires in this unit regardless of origin will be suppressed, using the appropriate management response, which in many cases may be direct attack utilizing engines or hand crews. Prescribed fire will be used primarily to manage hazard fuel.

Figure 3: Fire Management Unit 1 – Fort Raleigh



7.2.1.2 Specific FMU Management Objectives

- Ensure firefighter and public safety receives the highest priority during all fire management activities.
- Reduce heavy concentrations of hazard fuel.
- Utilize the appropriate management response during wildland fires suppression operations to protect the public, limit fire spread onto private property, and protect the natural, cultural, and historic resources of the Unit.
- Place emphasis on facilitating reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.
- Use natural or existing man-made barriers to the greatest extent possible for control lines. (Minimum Impact Suppression Tactics [MIST] concept).
- Place emphasis on educating adjacent landowners regarding the risk of fire to property and effective strategies for reducing risks.
- Monitor and document results of fire management activities.

7.2.1.3 Relationship of FMU Management to FMP Objectives

Fire management activities initiated in the Fort Raleigh Unit are designed to meet the following Fire Management Plan objectives.

- Firefighter and public safety will be the highest priority on all fire management activities.
- Use wildland fire when appropriate as a tool to manage and enhance natural resources and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.1.4 Management Objectives that are Tactical in Nature

- No fire management operation will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions, and current and predicted fire weather and behavior.
- Park neighbors, visitors and local residents will be notified of all fire management activities that may affect them.
- Response time will be appropriate to the values to be protected.
- Minimum impact suppression tactics will be used, as appropriate.
- Fire behavior and fire effects will be monitored and documented in accordance with NPS guidelines.

- Interested publics will be informed of fire management activities and the role of fire in the natural process.
- Temporary area closures resulting from fire management operations will be implemented at the discretion of the Superintendent.

7.2.1.5 Management Constraints

- Smoke management reporting procedures for burning in North Carolina will be followed for all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- The safety of highway users will be a primary consideration in the development of prescribed burning plans, and will be addressed in the smoke management section.
- Protective measures for known historic and cultural resource must be assured and mitigated, if necessary before a prescribed burn project is initiated.
- No off road heavy equipment or vehicle use in closed areas unless there is imminent threat to human life or private or public property.

7.2.1.6 Physical Description of Fire Management Unit

The Unit has little topographical relief. The predominant vegetation is coniferous forest, with mixed-aged pine plantations, and mixed forest. There are some areas of marsh on the southern and western boundaries. Sections of the pine forest have been attacked in the past by pine beetles, which have created open areas in early successional stages.

The Park Service and others maintain about 20 acres of the site as managed horticultural areas, open savanna or mowed lawn. The vegetation is encroaching on many of the residential structures and the maintenance facilities.

7.2.1.7 FMU Fire History, Effects, and Behavior Characteristics

No recorded wildland fires have been reported within the Unit (SACS 2000). The fuels are fairly typical to those found in other Fire Management Units within the Group. An overview of the fire history, fire effects, and expected fire behavior for the Outer Banks Group can be found in Section 7.2.3.6.

7.2.1.8 Values to be Protected and Special Concerns

A general listing of significant property, developments, improvements, and resources that must be protected from wildland fire include:

- Cultural and historic sites.
- Private property and other development adjacent to the Unit.
- Outer Banks Group Headquarters developed area.
- Threatened and endangered species
- Unique Coastal Fringe Evergreen Forest ecosystem.

7.2.1.9 Annual Fire Weather Cycles

Annual fire weather cycles are similar throughout the Group and are described in Section 3.3 Climate. Of importance, is the long-term cyclic nature of the weather that can bring periods of prolonged drought. In the century just concluded, periods of drought lasting several years have been recorded that increased fire frequency and intensity, and contributed many additional acres to the national fire statistics. During periods of drought, wildland fires exhibiting extreme fire behavior can occur during the summer. Under normal conditions, the fire season for the Outer Banks extends from March through October.

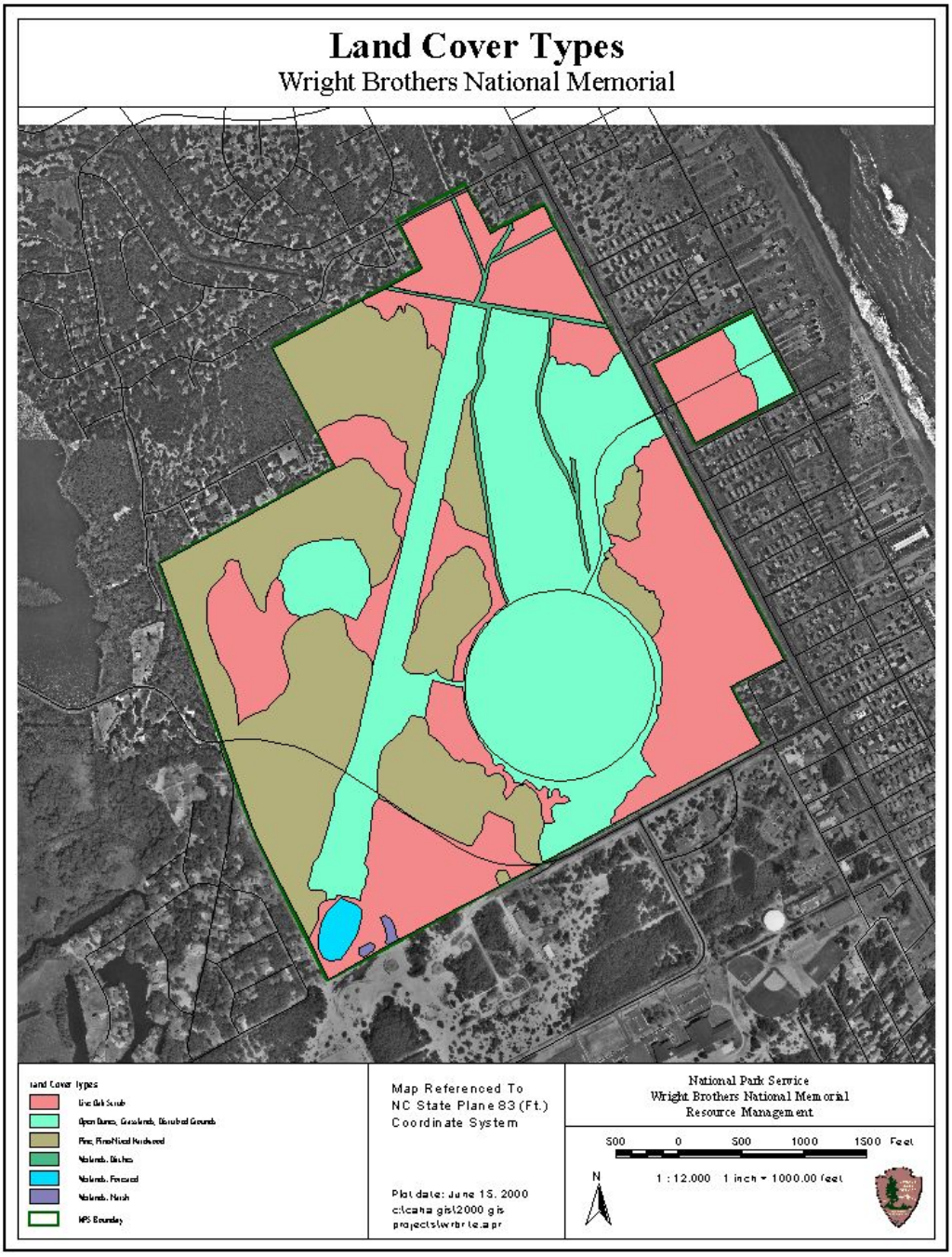
7.2.2 Fire Management Unit 2 – Wright Brothers

7.2.2.1 Description of the Unit

The Unit includes 421 acres of NPS lands within the boundary of Wright Brothers NM. The Unit is bounded by Highway 158 on the east, Collington Road and private land on the south, a power line right-of-way on the west, and subdivision on the north. Access is from a series of paved roads off of highway 158, and Collington Road (Figure 4). Within the Unit are a Visitor Center, reproductions of historic structures that were present during the Wright Brother's flights, various monuments, administrative and maintenance facilities, and an airstrip. A subdivision on the north and west side of the monument intermingle with vegetation from the park, creating a classic wildland – urban interface situation. At one point, the Service cleared a narrow fuel break along this section of the monument boundary to improve access and provide defensible space.

All wildland fires in this unit regardless of origin will be suppressed, using the appropriate management response, which in some cases may be direct attack utilizing engines or hand crews. Prescribed fire will be used primarily to manage hazard fuel and may be used to maintain drainage ditches and the historic scene, when practical.

Figure 4: Fire Management Unit 2 – Wright Brothers



7.2.2.2 Specific FMU Management Objectives

- Ensure firefighter and public safety receives the highest priority during all fire management activities.
- Reduce heavy concentrations of hazard fuel, especially along Unit boundaries.
- Utilize the appropriate management response during wildland fires suppression operations to protect the public, limit fire spread onto private property, and protect the natural, cultural, and historic resources of the Unit.
- Place emphasis on facilitating reciprocal fire management activities through the development and maintenance of cooperative agreements and working relationships with pertinent fire management entities.
- Use natural or existing man-made barriers to the greatest extent possible for control lines. (Minimum Impact Suppression Tactics [MIST] concept).
- Place emphasis on educating adjacent landowners regarding the risk of fire to property and effective strategies for reducing risks.
- Monitor and document results of fire management activities.

7.2.2.3 Relationship of FMU Management to FMP Objectives

A special concern for this FMU is the reduction of hazardous fuel, particularly along boundaries and adjacent to structures within or adjacent to the boundaries. Fire management activities initiated in the Wright Brothers Unit are designed to meet the following Fire Management Plan Objectives.

- Firefighter and public safety will be the highest priority on all fire management activities.
- Fuel complexes along boundaries and adjacent to values at risk will be modified to reduce fire behavior to a more manageable level using one or more, or a combination the following methods:
  - Fuel breaks and/or fire roads may be cut along critical sections of the boundary to allow access for fire suppression equipment needed to prevent wildland fires from crossing the Unit boundaries.
  - Vegetation may be mechanically removed to reduce fuel loading to manageable levels to safely initiate prescribed burning.
  - Periodic prescribed burning may be use to restore and maintain acceptable fuel levels.
- Prescribed fire may also be used to achieve resource management objectives documented in other park management plans.

7.2.2.4 Management Objectives that are Tactical in Nature

- No fire management operation will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions, and current and predicted fire weather and behavior.
- Park neighbors, visitors and local residents will be notified of all fire management activities that may affect them.

- Response time will be appropriate to the values to be protected.
- Minimum impact suppression tactics will be used, as appropriate.
- Fire behavior and fire effects will be monitored and documented in accordance with NPS guidelines.
- Interested publics will be informed of fire management activities and the role of fire in the natural process.
- Temporary area closures resulting from fire management operations will be implemented at the discretion of the Superintendent.

7.2.2.5 Management Constraints

- Smoke management reporting procedures for burning in North Carolina will be followed for all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- The safety of highway users will be a primary consideration in the development of prescribed burning plans, and will be addressed in the smoke management section.
- Protective measures for known historic and cultural resource must be assured and mitigated, if necessary, before a prescribed burn project is initiated.
- No off-road heavy equipment or vehicle use in closed areas unless there is imminent threat to human life or private or public property.

7.2.2.6 Physical Description of Fire Management Unit

The area has some topographical relief, with Kill Devil Hill being a focal point in the south-center portion of the unit. The fuels are mixed, divided fairly evenly between pine-mixed hardwood forest, live oak scrub, and areas of mowed grass. Fuel continuity varies though out the unit. Paved roads cross the unit. A paved airstrip and apron are located near the center of the unit with mowed and maintained approaches on either end of the runway, mowed grass, and large patches of oak scrub on the east side are isolated by open sand. There are drainage ditches locate on the northern end of the Unit.

7.2.2.7 FMU Fire History, Effects, and Behavior Characteristics

There have been no recorded reports of wildland fires occurring within the Unit (SACS 2000). The fuels are fairly typical to those found in other units. An overview of the fire history, fire effects, and expected fire behavior for the Outer Banks Group can be found in Section 7.2.3.6.

7.2.2.8 Values to be Protected and Special Concerns

The following are of special concern and will be given special consideration during fire management planning and operations:

- Private property and other developments in the vicinity of the Unit.
- Historic and administrative structures within the FMU, including the landing strip.
- Threatened and endangered species.

7.2.2.9 Annual Fire Weather Cycles

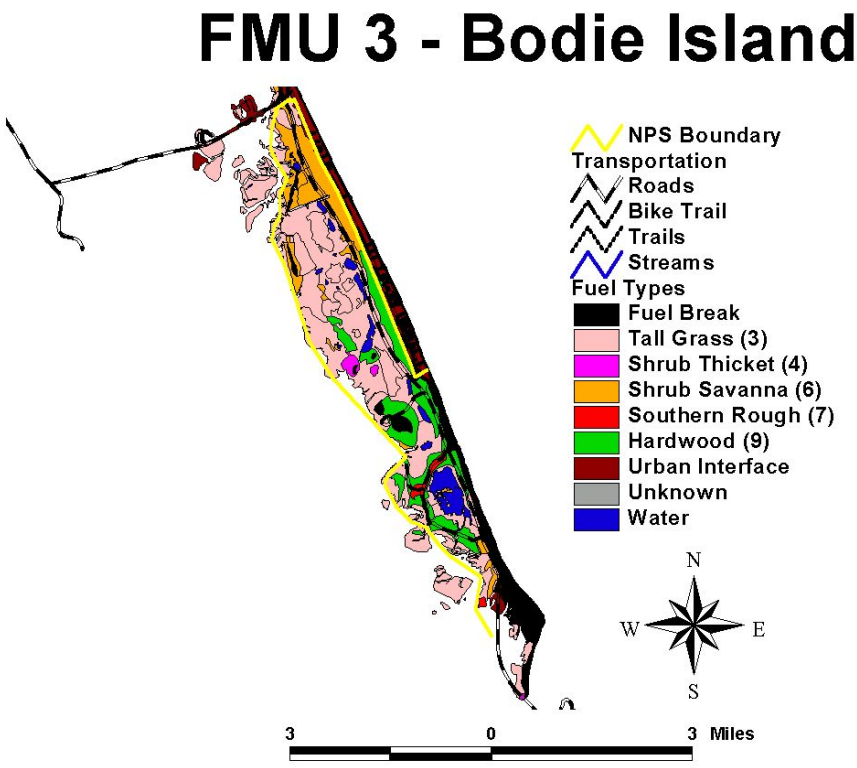
Annual fire weather cycles are similar throughout the Group and are described in Section 3.3 and further discussed in Section 7.2.1.9.

7.2.3 Fire Management Unit 3 – Bodie Island

7.2.3.1 Description of the Unit

Bodie Island is one of three units on the Outer Banks that make up Cape Hatteras National Seashore. The Unit includes approximately 6,900 acres of NPS lands within the boundary of the national seashore on Bodie Island. The unit is bounded by U. S. Highway 264 on the north, South Nags Head Road and the Atlantic Ocean on the east, Oregon Inlet on the south, and Roanoke and Pamlico Sounds on the west. Highway 12, which runs the length of the island, is the only vehicle access (Figure 5).

Figure 5: Fire Management Unit 3 – Bodie Island



A classic wildland-urban interface situation exists on the northern portion of the unit where many homes and some businesses and other commercial properties have been built

in close proximity to the Seashore. In many cases there is little defensible space between the structures and the wildland fuel.

All wildland fires in this unit regardless of origin will be suppressed using the appropriate management response, which in most cases may be indirect attack using the highway, area roads, power line right-of-way, or water drainage features as control lines. Prescribed fires will be used to manage hazard fuel and restore natural ecosystems.

7.2.3.2 Specific FMU Management Objectives

Fire management activities initiated in the Unit are designed to meet the following Fire Management Plan objectives.

- All fire management activities will have firefighter and public safety as the highest priority.
- Use fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.3.3 Relationship of FMU Management to FMP Objectives

- Firefighter and public safety will be the highest priority on all fire management activities.
- Use wildland fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.3.4 Management Objectives that are Tactical in Nature

- No fire management operation will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions, and current and predicted fire weather and behavior.
- Park neighbors, visitors and local residents will be notified of all fire management activities that may affect them.

- Response time will be appropriate to the values to be protected.
- Minimum impact suppression tactics will be used, as appropriate.
- Fire behavior and fire effects will be monitored and documented in accordance with NPS guidelines.
- Interested publics will be informed of fire management activities and the role of fire in the natural process.
- Temporary area closures resulting from fire management operations will be implemented at the discretion of the Superintendent.

7.2.3.5 Management Constraints

- Smoke management reporting procedures for burning in North Carolina will be followed for all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- Ordinances established by the Town of Nags Head limiting open burning will be followed.
- The safety of highway users will be a primary consideration in the development of prescribed burning plans, and will be addressed in the smoke management section.
- Protective measures for known historic and cultural resource must be assured and mitigated, if necessary, before a prescribed burn project is initiated.
- No off-road heavy equipment or vehicle use unless there is imminent threat to human life or private or public property.

7.2.3.6 Physical Description of Fire Management Unit

For the most part, the Unit is a typical barrier island with open beach, dunes held together with rhizomatous grasses that give way to brush and salt marsh. Marsh is the predominant habitat type followed by various shrub and pine associations. In the past, pines and other evergreens were planted in two locations, and in the case of the pines planted along the Bodie Island Lighthouse access road, have become part of the historic scene.

A power line right-of way and State Route 12 divide the island. Natural watercourses, small ponds, and man-made drainage ditches further break up the island. A small segment of the land in the vicinity of the Bodie Island Lighthouse is maintained by mowing.

7.2.3.7 FMU Fire History, Effects, and Behavior Characteristics

The wildland fire history outlined below is derived from statistics and information common to the entire Outer Banks Group.

As indicated in previous sections, barrier islands are subject to many disturbances, including fire. The normal fire regime and the role fire played in the area are not completely understood. Studies completed here and elsewhere in similar fuel types indicate that fire played an important role in species composition and distribution.

Davison (1983) found, for example, that the marsh and shrub communities of Cumberland Island were generally fire tolerant, however, while even a hot fire has difficulty burning into the more fire sensitive but less flammable live oak forest. Based on information contained in the Fire Effects Information System (FEIS) and other research documents, the following generalizations about natural fire frequencies can be made.

- Shrub Savanna naturally burned every 5 to 10 years (Ware et al. 1993). Fire exclusion has resulted in an increase in woody species and a decline in herbaceous species.

- Pine Forests - The remnant longleaf pine found in three locations in or near the park indicates that a natural fire interval was every year to every 5 to 10 years (Pratt et al. 1991). Fire exclusion has resulted in a reduction of longleaf pine and herbaceous species and in an increase of hardwood species in the understory and overstory. Stand stocking (stems/acre) is probably much greater than would be expected under a natural fire regime.

- Marsh – Salt meadow cordgrass is adapted to light fires and resprouts from rhizomes (Lynch 1941). Marsh vegetation naturally burned every 3 to 4 years (Lynch 1941). Fire exclusion has contributed to the invasion of the marsh by woody species like Southern bayberry, an early successional species and one of the first woody plants to invade secondary dunes and beach meadows in the Southeast (Davison and Bratton 1988).

- Dune Grassland - The natural fire return interval for this vegetation type is unknown, although sea oats recover quickly from fire. Fire exclusion has aided in the invasion of secondary dunes by woody species.

- Maritime Forest - These forests burned very infrequently in a natural fire regime. Full primary succession to mature live oak forest may take 300-400 years (Frost in prep.) Where the understory is kept open by fire at a frequency of 7-12 years, live oak may form an oak-pine savanna community, co-dominant with loblolly or longleaf pine.

Lightning does not appear to play a significant role in the Group's recent wildland fire history, although it remains a possible source of ignition. There have been six reported lightning ignited wildland fires that burned a total of 109.2 acres. Of that total, 109 acres were attributable to one fire (SACS 2000).

The majority of the fires occurring at Cape Hatteras National Seashore are human caused. Wildland fires caused by problems with power lines, smoking, and fireworks are the three most common types reported. On average the Group experiences 8.5 wildland fires per year. Wildland fires are typically small fires of moderate intensity, and are usually contained to an area averaging 4.9 acres. Over two-thirds of the fires are Class A and B (.0-9.9 acres). The largest reported wildland fire was 145 acres. The most fires occurred

in 1981 when 13 were reported. The year with the least number of wildland fires was 1985 when one was reported. Fires have been reported every month of the year, but the majority occur between May 31 and August 28th, a period of time that corresponds with the highest visitation (SACS 2000).

The range of vegetation present throughout the Outer Banks creates a variety of fuel conditions. Vegetation grows and accumulates quickly in the Outer Banks environment and contributes to the amount of fuel available (referred to as fuel loading) to feed a wildland fire and plays a significant role in determining fire behavior and the effectiveness of fire management strategies and tactics.

Fire behavior is basically a function of fuel type, fuel load, fuel moisture content, topography, and local weather conditions. Fire behavior prediction models developed by Albini (1976) at the Northern Forest Fire Laboratory (NFFL) and reported by Anderson (1982) were used to model potential fire behavior in various vegetation types found on the Outer Banks. Wildfires burning in all the fuel types present on the Outer Banks have the potential to display extreme fire behavior, particularly during wind events or in areas where the fuel loading is unusually high.

The expected fire spread and behavior characteristics for selected fuel models under normal and extreme conditions are outlined in Table 6.

Table 6: Expected Fire Behavior – Outer Banks Group

Condition	Fuel Model	Flame Length *feet*	Rate of Spread *Ch/hr*	Characteristics
Normal	4	19	75	Under even normal conditions, direct attack using mechanized equipment may not be possible.
Extreme	4	36	263	Under extreme conditions a fire in this fuel model can exhibit several blowup features including high-density, short-range spotting, a well-developed convection column, and rapid rates of spread.
Normal	7	5	20	Fires can run through surface and shrub strata with equal ease and can occur at higher dead fuel moisture contents because of the flammability of live foliage and other live materials.
Extreme	7	10	88	Depending on over story and stocking, torching and crowning can occur. Under drought conditions the level of volatility in live fuels increases and fires become highly resistant to suppression efforts.
Normal	8	1.0	1.6	Fires in this fuel type tend to be slow-moving ground fires with low flame lengths. Heavy concentrations of fuel may flare up.
Extreme	8	2.2	5.0	Under periods of severe weather involving high temperatures, low humidity, and high winds fires can exhibit fire behavior including rapid moving ground fire, total duff consumption, and possible torching and crown fires.
Normal	9	2.6	7.5	Fires occurring in this fuel type tend to exhibit a moderate rate of spread. Intensities will increase as

				fire enters brushy areas that support leaves or pine needles.
Extreme	9	5.1	28	Rates of spread often increase when winds are higher due to spotting caused by rolling and burning leaves. Torching out, spotting, and crown fires may be encountered during drought conditions.
Normal	3	12	104	Fires in this fuel are the most intense of the grass group and are influence by the wind.
Extreme	3			Under the influence of wind the wind will drive the fire into the upper heights of the grass and across standing water.
Normal	1	4.0	78	Even under conditions of light winds and reduced slopes, flames can move quickly through this fuel type
Extreme	1	8.0	311	Under windy conditions when fuel moistures and humidity are low, rapid rates of spread can be expected.

Source: Aids to Determining Fuel Models for Estimating Fire Behavior (Anderson 1982), and BEHAVE (Andrews 1986)

7.2.3.8 Values to be Protected and Special Concerns

- Cultural and historic sites.
- Urban interface areas and structures within and adjacent to the FMU.
- Threatened and endangered species.
- Utility cables and poles, including the antennae site.

7.2.3.9 Annual Fire Weather Cycles

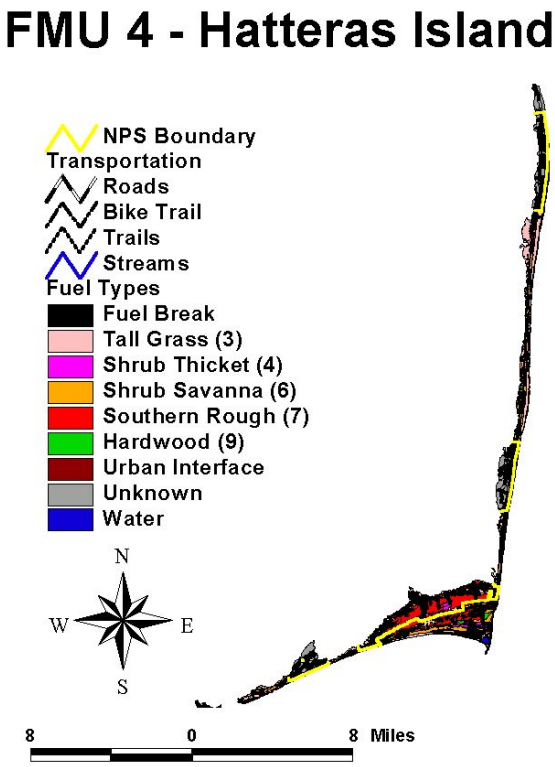
Annual fire weather cycles are similar throughout the Group and are described in Section 3.3 and further discussed in Section 7.2.1.9.

7.2.4 Fire Management Unit 4 – Hatteras Island

7.2.4.1 Description of the Unit

This unit includes approximately 17,400 acres of NPS lands within the boundary of Cape Hatteras National Seashore on Hatteras Island. The unit is bounded by Oregon Inlet on the north, the Atlantic Ocean on the east and south, and Hatteras Inlet and Pamlico Sound on the west. The communities of Rodanthe, Waves, Salvo, Avon, Buxton, Frisco, and Hatteras are excluded from the Seashore. Highway 12 runs the length of the island and is the only access by road. Ferry access from Ocracoke Island is available on the south end of the island (Figure 6).

Figure 6: Fire Management Unit 4: Hatteras Island



Of special concern for this FMU is the presence of hazardous fuel, particularly along boundaries with the various communities on the island and adjacent to structures within or near to the boundaries.

7.2.4.2 Specific FMU Management Objectives

Fire management activities initiated in the Unit are designed to meet the following Fire Management Plan objectives.

- All fire management activities will have firefighter and public safety as the highest priority.
- Use fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.

- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.4.3 Relationship of FMU Management to FMP Objectives

- Firefighter and public safety will be the highest priority on all fire management activities.
- Use wildland fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.4.4 Management Objectives that are Tactical in Nature

- No fire management operation will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions, and current and predicted fire weather and behavior.
- Park neighbors, visitors and local residents will be notified of all fire management activities that may affect them.
- Response time will be appropriate to the values to be protected.
- Minimum impact suppression tactics will be used, as appropriate.
- Fire behavior and fire effects will be monitored and documented in accordance with NPS guidelines.
- Interested publics will be informed of fire management activities and the role of fire in the natural process.
- Temporary area closures resulting from fire management operations will be implemented at the discretion of the Superintendent.

7.2.4.5 Management Constraints

- Smoke management reporting procedures for burning in North Carolina will be followed for all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- The safety of highway users will be a primary consideration in the development of prescribed burning plans, and will be addressed in the smoke management section.
- Protective measures for known historic and cultural resource must be assured and mitigated, if necessary, before a prescribed burn project is initiated.
- No off-road heavy equipment or vehicle use unless there is imminent threat to human life or private or public property.

7.2.4.6 Physical Description of Fire Management Unit

Hatteras Island is somewhat different than the other barrier islands that make up the national seashore. Hatteras Island stretches southward from Oregon Inlet to Cape Point where strong competing ocean currents converge to sweep ocean sands into well-recognized Cape Hatteras. Pea Island National Wildlife Refuge occupies the northern portion of the island. From Oregon Inlet south to the Buxton area, open beaches and dunes held together with rhizomatous grasses give way to brush and salt marsh to form a typical barrier island profile. Marshes are the predominant habitat type followed by various shrub and pine associations. The island in the Buxton-Frisco area is nearly a mile wide and contains remnant dunes lines interspersed with lens shaped ponds and sedges. The old dunes provide some topographical relief and the ponds and open sand, to some degree disturb the continuity of the fuel. The segment of the island from Buxton west to Hatteras is more wooded than the remainder of the island. Open beach, sand dunes, and marshland are the predominant features from Hatteras west to Hatteras Inlet.

Salt spray and other damage from past storms have killed large sections of forest west of Buxton, creating open stands of dense brush and young pine and standing snags. The Cape is home to Buxton Woods and Jeanette Sedge, two important biological communities. Both intermingled biological communities are within the wildland-urban interface. Past wildfires have spread from the areas now taken over by homes and other developments and swept over Jeanette Sedge and Open Pond to the beach (Bratton and Davison 1985). Under the right set of circumstances, the reverse could also occur.

7.2.4.7 FMU Fire History, Effects, and Behavior Characteristics

With the exception of Buxton Woods, the fuels are fairly typical to those found in other units. An overview of the fire history, fire effects, and expected fire behavior for the Outer Banks Group can be found in Section 7.2.3.6. That section also addresses maritime forests including Buxton Woods.

7.2.4.8 Values to be Protected and Special Concerns

- Buxton Woods is one of the largest surviving stands of maritime forest on the Outer Banks, and is considered to be an important botanical resource (Bratton and Davison 1985).
- Jeanette Sedge, a unique vegetation community.
- Threatened and endangered species.
- Historical and archeological sites within the FMU.
- Urban interface areas and structures within and adjacent to the FMU, including campgrounds and other national seashore developments.
- Billy Mitchell Airfield.
- Utility cables and poles and other improvements.

7.2.4.9 Annual Fire Weather Cycles

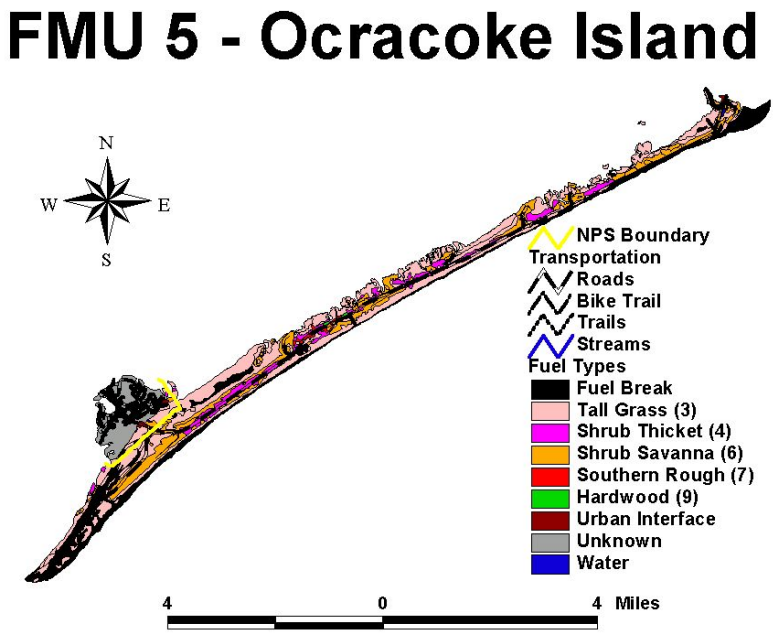
Annual fire weather cycles are similar throughout the Group and are described in Section 3.3 and further discussed in Section 7.2.1.9.

7.2.5 Fire Management Unit 5 – Ocracoke Island

7.2.5.1 Description of the Unit

The Ocracoke Fire Management Unit includes approximately 6,000 acres of NPS lands within the boundary of Cape Hatteras National Seashore on Ocracoke Island. The unit is bounded by Ocracoke Inlet on the east, the Atlantic Ocean on the south, Ocracoke Inlet on the west and, and Pamlico Sound on the north. The community of Ocracoke, located on south end of the island, is excluded from the Seashore. Highway 12 runs the length of the island, but is only accessible by ferry from Hatteras (approximately 40 minutes) or from Swan Quarter and Cedar Island, North Carolina (both trips take approximately 2.5 hours) (Figure 7).

Figure 7: Fire Management Unit 5 – Ocracoke Island



7.2.5.2 Specific FMU Management Objectives

Fire management activities initiated in the Unit are designed to meet the following Fire Management Plan objectives.

- All fire management activities will have firefighter and public safety as the highest priority.
- Use fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.5.3 Relationship of FMU Management to FMP Objectives

- Firefighter and public safety will be the highest priority on all fire management activities.
- Use wildland fire when appropriate as a tool to manage and enhance natural resources, maintain drainage ditches, and to reduce hazard fuel accumulations that may affect suppression efforts.
- Use fire when appropriate as a tool to manage cultural landscapes.
- All wildland fire will be suppressed in a cost-effective manner, consistent with firefighter and public safety and the values to be protected.
- Suppression strategies are designed to lessen the possibility of adverse impact to the environment, including air quality.
- Wildland fire will be restored as an ecological process.

7.2.5.4 Management Objectives that are Tactical in Nature

- No fire management operation will be initiated until all personnel involved receive a safety briefing describing known hazards and mitigating actions (LCES), current fire season conditions, and current and predicted fire weather and behavior.
- Park neighbors, visitors and local residents will be notified of all fire management activities that may affect them.
- Response time will be appropriate to the values to be protected.
- Minimum impact suppression tactics will be used, as appropriate.
- Fire behavior and fire effects will be monitored and documented in accordance with NPS guidelines.
- Interested publics will be informed of fire management activities and the role of fire in the natural process.
- Temporary area closures resulting from fire management operations will be implemented at the discretion of the Superintendent.

7.2.5.5 Management Constraints

- Smoke management reporting procedures for burning in North Carolina will be followed for all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- The safety of highway users will be a primary consideration in the development of prescribed burning plans, and will be addressed in the smoke management section.
- Protective measures for known historic and cultural resource must be assured and mitigated, if necessary, before a prescribed burn project is initiated.
- No off-road heavy equipment or vehicle use unless there is imminent threat to human life or private or public property.

7.2.5.6 Physical Description of Fire Management Unit

For the most part, the Unit is a typical barrier island with open beach, dunes held together with rhizomatous grasses that give way to brush and salt marsh. Marshes are the predominant habitat type followed by various shrub and pine associations.

A power line right-of way and State Route 12 divide the island and a small community is located near the southern tip. Natural watercourses, small ponds, man-made drainage ditches, and open sand further break up the island. The island is the site of the largest recorded wildland fire to date occurring on the Seashore.

7.2.5.7 FMU Fire History, Effects, and Behavior Characteristics

An overview of the fire history, fire effects, and expected fire behavior for the Outer Banks Group can be found in Section 7.2.3.6.

7.2.5.8 Values to be Protected and Special Concerns

- Historical and archeological sites within the FMU.
- Threatened and endangered species.
- Urban interface areas and structures within and adjacent to the FMU.
- Campgrounds and other seashore developments.
- Ocracoke Island Airfield.
- Ocracoke Pony Enclosure
- Utility cables and poles, towers, and other improvements.

7.2.5.9 Annual Fire Weather Cycles

Annual fire weather cycles are similar throughout the Group and are described in Section 3.3 and further discussed in Section 7.2.1.9.

26.0 FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

8.1 Staff Responsibilities

Individual responsibilities that relate to fire management are identified in Table 7. Fire management is a Group wide program. It is the goal of the Group to involve all employees as members of the fire management team. The following list details fire management responsibilities:

Table 7: Staff Responsibilities

Position	Primary Fire Management Related Responsibilities
Superintendent	• Responsible for the overall management of the Outer Banks Group including fire management. • Responsible for delegating and coordinating fire management activities between divisions. • Responsible for signing the periodic assessment certifying that continued management of wildland fire use actions is acceptable (not currently an option under this plan). • Appoints Agency Administrator's Representative. • Signs Interagency Fire Management Agreements • Ensures that both a briefing statement and delegation of authority are prepared for each incoming Incident Management Team, as required. • Declares closures of NPS lands when necessary. • Approves prescribed burn plans. • Ensures that fire information is managed in accordance with the Group's FMP. • Approves the use of mechanized equipment and off-road operation when necessary.
Deputy Superintendent	• May be delegated the responsibilities assigned to the Superintendent. • May be delegated to represent the Superintendent or serve as acting in his/her absence.
Chief Ranger, Resource and Visitor Protection Division	• Ensures that a comprehensive fire management program for the Group is adequately planned and implemented and that the Fire Management Plan is reviewed annually and revised as necessary. • Supervises the Fire Management Officer. • Ensures that an adequately trained and experienced staff of Red Card-qualified personnel is available to handle a normal fire year workload. Issues Red-Cards annually. • Maintains a public awareness program for all aspects of fire management, and ensures that positive relationships are maintained with cooperators, other agencies and

	adjacent landowners. • Negotiates and coordinates Interagency Fire Management Agreements. • Coordinates with the Regional Fire Management Officer and staff. • Manages aviation program. • Ensures an adequate, effective fire prevention program is implemented. • Designs and implements the park evacuation plan at the discretion of the superintendent. • Serves as a collateral duty firefighter, as qualified.
Fire Management Officer **Duties delegated by the Chief Ranger in writing to an existing staff member until the Fire Management Officer position is filled. At that time the Fire Management Officer will assume these duties and other duties currently assigned to the Chief Ranger.**	• Implements the operational aspects of the Fire Management Plan, including fire prevention, wildland fire suppression, prescribed fire operations, and dispatching and mobilization. • Ensures that the fire program is managed within NPS guidelines as defined in RM-18 and DO-18. • Represents the Group and coordinates fire related activities with other NPS areas, regional and national fire staff, and local, state, and federal fire organizations. • Supervises fire management staff. • Prepares and revises cooperative agreements. • Writes Prescribe Fire Burn Plans and reviews similar plans written by others. • Compiles the Annual Prescribed Fire/Hazard Fuel Reduction Plan and forwards it to the Superintendent for approval. • Prepares and submits annual normal year FIREPRO budget, and approves expenditures for emergency presuppression, suppression, and prescribed fire activities. • Maintains training and qualification records for Group personnel, assesses staffing needs, recommends staff development to meet IA and prescribed fire needs, administers the fitness testing program, coordinates the training program, updates individual fire qualification records, prepares Red-Cards and recommends individual qualifications for approval by the Chief Ranger. • Coordinates mobilization of Group resources for in-park and out-of-park assignments. Assigns Type III or Type IV Incident Commanders for suppression operations and Prescribed Burn Bosses for prescribed fire activities. • Approves the use of air attack resources on all wildland fires occurring within the Group. • Serves as Agency Administrator Representative, when assigned, and drafts the Limited Delegation of Authority

	and briefing statement for approval by the Superintendent. • Completes daily situation reports and transmits ICS 209s as required. • Ensures Individual Fire Reports (DI-1202) are entered in to SACS. • Coordinated cache project work with other divisions. Serves as point of contact for Fire Use Modules and Fire Effects Teams. • Serves as a collateral duty firefighter, as qualified.
Chief, Resource Management Division **The duties indicated may be delegated to staff members.**	• Lead for fire-related monitoring and research, resolving air quality issues, and developing and implementing rehabilitation projects. • May serve as Resource Advisor during wildland fire suppression operations, as assigned. • Provides oversight for all prescribed fire planning activities. • Recommends prescribed fire and hazard fuel reduction projects, and reviews and comments on similar plans written by others. • Ensures the proper preparation and approval of individual hazard fuel reduction and prescribed fire plans. • Reviews fire management plans and other planning documents. • Supports the fire management program with staff as needed. • Serves as a collateral duty firefighter, as qualified.
Administrative Officer	• Tracks expenditures against fire accounts for prescribed fire operations, mechanical fuel treatment projects, and preparedness activities. • Tracks expenditures for suppression and prescribed fire/hazard fuel reduction projects. • Reports status of funds/expenditures to the Chief Ranger. • Prepares a final financial report as an official record.
Chief of Interpretation	• Supports the fire management program with staff as needed. • Integrate collateral duty firefighters assigned to their respective Division into the fire management program in accordance with the Fire Management Plan. • Incorporates fire management materials in visitor programs. • Through the Public Information Officer, issues press releases prior to prescribed fire operations.
Fire Technician(s)	• Manages the Group's fire caches and maintains all fire suppression equipment to full readiness. • Designated engine foreman, as qualified. Operates and

	maintains all wildland fire engines assigned to a District. • Conducts preparedness patrols. Gathers fire intelligence and reports situation to the District Ranger and the FMO. • Assists with the coordination and presentation of Group-level fire training. • Performs monitoring duties and gathers other fire related information, including fire history and fuels inventories. • Responsible for maintaining their own records, issued personal protective equipment, and physical conditioning. • Successfully completes the annual fitness test prior to the start of fire season or within two weeks of reporting for duty. • Uses all assigned safety gear. • Assists the FMO maintain accurate fire records.
Chief of Maintenance	• Maintains fire equipment. • Coordinates and or facilitates annual maintenance of fuel breaks and fire roads. • Supports fire management operations with staff as needed.
District Ranger(s)	• Manages assigned fire engines, equipment and caches. • Coordinates initial attack of wildland fires within District. • Coordinates with local cooperators • Assists the FMO an others in the planning and implementation of prescribed fire and fuel reduction projects. • Conducts fire prevention patrols. • Responsible for the investigation of all human-caused wildland fires. • Serve as a collateral duty firefighter, as qualified.
Collateral Duty Firefighters	• Responsible for maintaining their own records, issued personal protective equipment, and physical conditioning. • Successfully completes the annual fitness test prior to the start of fire season or within two weeks of reporting for duty. • Completes Annual Refresher Training prior to June 1st. • Maintains assigned fire equipment in ready state and using all safety gear assigned. • Assists the FMO maintain accurate fire records. • Performs fire management duties, as qualified.
Incident Commander Type IV (ICT4)	• The Incident Commander (IC) will be responsible for the safe and efficient suppression of the assigned wildland fire. • Fulfills the duties described for the IC in the Fireline Handbook. • Notifies the Fire Management Officer or Dispatcher of all resource needs and provides situation updates, including

	the need for an extended attack. Briefs the incoming ICT3, when necessary. • Ensures that wildland fire behavior is monitored and required data is collected. • Ensures that personnel are qualified for the duties they are performing. • Identifies and protects endangered and threatened species and sensitive areas. • Uses Minimum Impact Suppress Tactics where applicable. • Ensures the fire is staffed or monitored until declared out. • Submits completed DI-1202, Crew Time Report, and a listing of any other fire related expenditures or losses to the Chief Ranger within 3 days of the fire being declared out.
Incident Commander Type III (ICT3)	In addition to the duties outlined in the Fireline Handbook that are normally assigned to an ICT3, the individual performs the following tasks: • Requests the assignment of an incident dispatcher. • Requests logistical support, as needed. • Requests air attack resources. • Requests the assignment of an Incident Management Team when the fire exceeds or can be expected to exceed the capabilities of the Incident Commander and/or the Type III team.

8.2 Firefighter Qualifications

The fire management program currently (CY 2001) does not have qualified individuals on staff to fully implement the fire management program. A listing of fire positions which need to be developed over the next five years in order to gain the adequate level of self-sufficiency necessary to fully implement the program at the level proposed in this plan can be found in Table 8.

Table 8: Minimum Staffing Targets

Position	Minimum Staffing	Target Staffing	Current Staffing (Perm. Only)
Incident Commander - Multiple Resources (ICT3)	0	1	1
Incident Commander - Initial Attack (ICT4)	3	4	3
Strike Team Leader - Engines (STEN)	0	1	1
Engine Boss (ENGB)	3	6	1
Firing Boss (FIRB) or Ignition Specialist (RXI2)	1	3	0
Advanced Firefighter (FFT1)	0	3	2
Firefighter (FFT2)	9	15	12
Prescribed Fire Burn Boss (RXB2)	1	2	0
Prescribed Fire Monitor (RXFM)	1	3	0

Notes:

- A firefighter may be qualified in more than one position.
- At a minimum, each ranger district should develop and maintain 1 ICT4/ENGB and 2 FFT2's in order to fully staff an engine for initial attack response. The Bodie Ranger District provides protection for Fort Raleigh and Wright Brothers.
- Helicopter positions were not included in this table, but the Group and Alligator River NWR should cooperate to develop and maintain a Group helitack module and Aerial Ignition Device Operator(s).

Currently, the Group does not receive base funding for permanent or Subject to Furlough fire management positions, and must rely on collateral duty staff supplemented by seasonal Fire Technicians. For several years the has Group received funding for two to four Fire Technicians who work during the summer months on fuel reduction projects and supplement fire suppression staff. It has become obvious that this level of staffing is barely adequate to meet suppression needs, and does not provide the level of support necessary to start a prescribed fire program. Additional prescribed fire staffing needs will be discussed in Sections 9.2.3.2 and 10.2.3.

The Group may soon qualify through FIREPRO for funding and FTE to hire an Engine Foreman or similar position. Every effort will be made to work with the U.S. Fish and Wildlife Service to develop a joint position, such as a Fuels Management Specialist or Wildland Suppression Specialist. The position would either be full-time or Subject to Furlough, depending on funding and position management concerns, and would be supervised as outlined in an Annual Operating Plan between the FWS and the Group.

8.3 Interagency Coordination

Close interagency cooperation is critical to meeting fire management objectives due to the limited numbers of NPS firefighters on the Outer Banks, the extensive boundary and associated wildland-urban interface, and the potential for extreme fire behavior. The Outer Banks Group is developing good working relationships with federal and state fire management agencies and local fire departments. The Fire Management Officer is the primary liaison for wildland fire.

- **Federal Cooperators**

  - The Alligator River/Pea Island NWR Complex managed by the U.S Fish and Wildlife Service (FWS) is the closest federal wildland fire cooperator and maintains a large wildland fire management program. While the NPS and FWS have a master cooperative agreement at the national level, it is important that an Annual Action Plan (AAP) be maintained between the FWS and the Group at the local level. The Annual Action Plan will cover issues such as jointly-owned or shared staff and equipment, dispatch services, planning assistance, joint training, project implementation, and reimbursement for services (such as prescribed fire planning, fire effects monitoring, and/or dispatch assistance), when permitted.

  - A helicopter module is stationed at Alligator River National Wildlife Refuge. The Annual Operating Plan should also address this resource.

  - Resources are available from other federal land management units, but must be resource ordered through the North Carolina Interagency Coordination Center at Asheville, North Carolina. Few of the other federal resources are within a 2-hour travel time of the Outer Banks.

- **North Carolina Forest Service (NCFS)** – The cooperative agreement between the Group and the NCFS has expired and needs to be updated and approved. The NCFS maintains an office at Stumpy Point supervised by a County Forester with staff for a marsh tractor/plow unit. Response time (1/2 hour to Fort Raleigh and 2 hours to Buxton) and resource impact considerations associated with the tractor/plow unit limit the usefulness of this equipment. However, the NCFS also maintains helicopters and a fleet of Single Engine Air Tankers (SEAT) and Type 3 CL-215 Air Tankers. Several of these resources are stationed in the eastern part of the state and are within a reasonable response time of the Outer Banks. Past wildland fires have demonstrated these aviation resources are extremely useful in the event of a wildland fire in the wildland-urban interface. The NCFS and the Group should work together to inform the public the role fire plays in the environment, and how to protect one's home in the wildland-urban interface.

- **Local Fire Departments** - The Group maintains agreements with several local fire departments for structural fire and wildland fire suppression (Appendix G). These

agreements need to be reviewed and updated. All but one is a volunteer fire department (VFD). Currently, none of the departments meet National Wildfire Coordinating Group (NWCG) training standards. By NPS policy, personnel from departments that do not meet NWCG standards may only assist with initial attack, and must be released as soon as possible. They also can not participate in prescribed fire operations.

As part of the Wildland-Urban Interface Initiative Response as authorized by the Fiscal Year 2001 Interior Appropriations Bill (H.R. 4578) and the President's Fire Initiative (National Fire Plan), the Group will work with local fire departments to provide them personal protective equipment, training (S-130 and S-190), and basic hand tools. The goal of the Group is to support up to 10 firefighters per department. Through this initiative, a trained core of firefighters that meet NWCG standards will be available to assist the Group carry out prescribed fire activities, primarily the reduction of hazardous accumulations of fuel in the wildland-urban interface.

Individuals who meet minimum training and fitness standards as required by the NPS will be eligible to receive compensation as Emergency Workers (USDOI 1999). The Department of the Interior and the Department of the Treasury permit the NPS to use the Emergency Workers hiring authority for wildland fire suppression incidents, monitoring, and on prescribed fires during the period 24 hours prior to planned ignition until 24 hours after the perimeter is secured, without restrictions.

- **The North Carolina Coastal Reserve** - An Annual Action Plan should also be developed with the North Carolina Coastal Reserve to jointly manage fires occurring in Buxton Woods.

Table 9: Fire Related Agreements

Cooperator	Type of Agreement
North Carolina Forest Service	Memorandum of Understanding (Expired)
Avon Volunteer Fire Department	Cooperative Agreement
Buxton Fire Prevention Association, Inc.	Cooperative Agreement
Chicamacomico Bank Volunteer Fire Dept	Cooperative Agreement
Collington Volunteer Fire Department	Cooperative Agreement
Frisco Volunteer Fire Department	Cooperative Agreement
The Hatteras Volunteer Fire Department	Cooperative Agreement
The Kill Devil Hills Fire Department	Cooperative Agreement
Town of Nags Head	Cooperative Agreement
Ocracoke Volunteer Fire Department	Cooperative Agreement
Roanoke Island Volunteer Fire Department	Cooperative Agreement
Salvo Volunteer Fire Department, Inc.	Cooperative Agreement
North Carolina Coastal Reserves	Annual Action Plan (In the future)
USDOI FWS Alligator River NWR	Annual Action Plan (In the future)

The fire department having responsibility for fire suppression in the area of a reported fire will in all likelihood respond to incidents within their areas of jurisdiction (Fire

District), as will the North Carolina Forest Service. The North Carolina Forest Service and the fire department will manage wildland fires occurring on private lands adjacent to Service lands. The National Park Service will manage wildland fires occurring on NPS lands. The U.S. Fish and Wildlife Service will manage wildland fires occurring on Pea Island National Wildlife Refuge.

The Group may directly request assistance for support from the North Carolina Forest Service by contacting the District Fire Management Officer. Assistance from the various fire departments can be requested by calling the appropriate fire department or the Dare or Hyde County Communication Centers, as appropriate. Support from the U.S. Fish and Wildlife Service can be obtained by contacting the District Fire Management Officer. The National Park Service can be contacted through the Dare County Dispatcher. A listing of key interagency contacts is included in Appendix G.

Currently, the Group does not have adequate staffing to fully implement this plan. There are two fire-staffing shortcomings that can be addressed with help from the Group's cooperators at the local, Regional and national level.

- The present Group staff has an adequate level of experience to manage the majority of the wildfires occurring on NPS lands. However, often there may not be an adequate number of firefighters available to meet expected staffing needs. Until the Group can recruit and develop its own fire suppression staff, assistant from area cooperators to staff engines or suppress a wildfire may be required.

- The Group currently lacks experienced personnel to implement a prescribed burn program. Burn Bosses and other experienced prescribed fire personnel must be requested to assist the Group until its personnel can become qualified.

Interagency meetings at the local level are held late Fall and early Spring to discuss topics of mutual concern and to coordinate prescribed fire and wildfire suppression activities during the upcoming fire season.

8.4 Interagency Fitness and Training Standards

In keeping with NWCG guidelines, each agency will meet its own fitness and training standards. All fire suppression forces involved in fire suppression actions on fires occurring on NPS lands will meet Personal Protective Equipment (PPE) standards established by the National Wildfire Coordination Group (NWCG).

27.0 WILDLAND FIRE MANAGEMENT

9.1 Wildland Fire Use

Until the effects of fire on the resources are more fully known, all wildland fires regardless of origin will be suppressed using the appropriate management response. Following the completion a thorough monitoring program, the use of wildland fire to

achieve resource management objectives (Wildland Fire Use) will be evaluated. As part of the evaluation process, an environmental assessment will be completed. Pending the outcome of the study and the environmental assessment, Wildland Fire Use may be instituted. In that event, the Fire Management Plan will be revised, as necessary, to reflect the change.

9.2 Wildland Fire Suppression

All wildland fires will be suppressed using the appropriate management response. The appropriate management response will vary from fire to fire and sometimes even along the perimeter of a fire depending on the situation. Appropriate management response options range from monitoring with minimal on-the-ground disturbance, to aggressive initial attack on all perimeters of the fire, to a combination of strategies to achieve confinement. The Incident Commander will develop the appropriate management response as part of the initial evaluation (size-up) process by analyzing the current situation and expected fire weather.

All use of wildland fire for resource management benefit requires a formal prescription that is clearly defined in a unit's Fire Management Plan (Wildland and Prescribed Fire Policy 1998). Until the Group determines that it is appropriate to include Wildland Fire Use as a management option and prescriptions are developed, the benefits of maintaining and enhancing natural resources will not be considered when determining the appropriate management response. The appropriate management response will be determined after evaluating factors such as firefighter and public safety, values to be protected (unique biological communities, cultural and historic sites, structures, and other man-made developments), external concerns, land use, and estimated cost of suppression.

9.2.1 Firefighter Safety

The 1995 Federal Wildland Fire Management Policy mandates that "public and firefighter safety is the first priority in every fire management activity." This policy will be emphasized during all fire management operations and continuously addressed.

The safety of NPS firefighters and cooperators involved in fire management activities is of primary concern. **Only trained, qualified, and current Red-Carded personnel will be assigned to fire management duties**. Fire management personnel will be issued personal protective equipment and will be trained in its proper use. No NPS employee, contractor or cooperator will be purposely exposed to life threatening conditions.

The primary threat to firefighter safety is from fast moving wildland fires driven by the wind that can quickly overtake and trap firefighters. **Fireline supervisors will designate lookouts and all fire suppression personnel will communicate, identify escape routes and know were safety zones are located.** Spot weather forecasts should be requested early-on during initial attack to gain insight into the possibility of shifting winds from approaching fronts, and other weather related phenomena.

The following threats specific to the Group have been identified.

- Snags and dead trees with weak root systems
- Dehydration, heat exhaustion and heat stroke
- Heavy concentrations of fuel that can block escape routes
- Stinging insects and poisonous snakes and plants

Smoke from wildland fires and prescribed fires is a recognized health concern for firefighters. Prescribed burn bosses and wildland fire incident commanders will plan to limit exposure to heavy smoke to one hour or less, at which time the firefighter should be rotated to a smoke free area.

NPS policy does not permit wildland firefighters who are not properly trained and equipped to fight structure fires and other fires routinely fought by structural fire brigades, such as fires involving hazardous materials. NPS policy permits NPS wildland firefighters to assist in the suppression of structure and other non-wildland fires by providing structure protection or suppressing a wildland fire associated with the incident.

9.2.2 Range of Potential Fire Behavior

Fire behavior in and adjacent to the Group can range from fast moving surface fires or crown fires to creeping duff fires in sheltered areas or smoldering peat fires. For a more detailed discussion refer to the fire behavior descriptions in Section 7.2.3.7.

9.2.3 Preparedness Actions

9.2.3.1 Prevention and Wildland and Prescribed Fire Education Activities

Fire prevention includes all activities designed to reduce the number of human-caused wildland fires that occur in the Group. The objective of the fire prevention program will be to minimize preventable fires. A prevention analysis of the Group is included in Appendix H.

Prevention activities for the Outer Banks Group will carried out by interpreters, rangers, and resource management staff. Part of the prevention program will be the development and presentation of prevention message concerning wildland/urban interface awareness and educational messages tailored for adjacent landowners and visitors. Fire prevention and education will be discussed at selected staff safety meeting through out the year to make sure all staff are aware of prevention concerns as well as the procedures regarding response to wildfires and actions related to prescribed fires.

The staff will undertake the following prevention activities:

- Post appropriate signing during periods of high fire danger.
- Participate in fire prevention and safety programs at public schools.
- Public contact will be made through environmental education, outreach, and interpretive programs to explain the fire management program and to emphasize prevention of human-caused wildfires and activities that landowners can take to minimize the risk of wildfire on their property.
- Conduct prevention patrols during periods of very high fire danger. As part of these patrols, RM & VP staff will contact local residents to inform them of the situation.
- Campground staff and hosts will contact visitors to emphasize fire safety and prevention.
- Issue press releases and distribute materials at the visitor center informing the public about the benefits of prescribed fire as opposed to the adverse impacts of wildland fire.
- Staff will participate in local parades and fairs and include a prevention message.
- Fire staff will work with District Rangers to provide inspections of private structures adjacent to the park upon request.
- The FMO will sponsor annual meetings with cooperators to develop prevention strategies.
- Park staff will attend citizens' group meetings to address wildfire prevention, structure protection strategies and fire management practices.
- Park staff will work with power and telephone companies to reduce starts due to downed power lines through or adjacent to NPS lands. All new rights-of-way will have provisions insuring that the utility companies conduct annual mowing.
- Investigations will be conducted on wildfires to determine specific causes.
- Reduce activity fuels in visitor use developed areas, such as campgrounds, to lower the likelihood of wildland fire.
- Fire management staff will coordinate with District Rangers to include prevention activities as a part of routine patrols.
- Conduct prevention patrols during the first week of July when wildfires are most common. In the past, a number of fires have started due to the use of fireworks. During this week, the visiting public will be reminded that the 36 CFR regulations prohibit the use of fireworks on NPS lands and all fire must be contained.
- Prior to fire season, gasoline powered equipment used off paved roads during fire season will be checked for spark arresters. Personnel using equipment off paved roads will carry a fire extinguisher.

9.2.3.2 Annual Training

All persons involved in fire management activities are required to participate in 8 hours of fire management related refresher training annually in order to be qualified for fire management activities in that calendar year. Refresher training will concentrate on local conditions and factors, the Standard Fire Orders, LCES, 18 Situations, and Common Dominators. NWCG courses such as Standards for Survival, Lessons Learned, Look Up, Look Down, Look Around, and others meet the firefighter safety-training requirement.

Efforts should be made to vary the training and use all or portions of other NWCG courses to cover the required topics. Fire shelter use and deployment, under adverse conditions, **will** be included as part of the annual refresher. The training can be given in an eight-hour block or presented in increments. Once completed, the training should be documented in SACS for each firefighter.

There is a pressing need to expand the number of wildland firefighters at the Group. It may be necessary to recruit and develop firefighters from both within and outside the Service who are interested only in prescribed fire assignments at the Group. However, every effort should be made to develop well-rounded firefighters who are qualified to respond to any given situation.

Individual development plans should be created for each firefighter. There is a need to develop single resource bosses, Initial Attack Incident Commanders, and prescribed burn bosses, for example, to adequately manage the fire program at the Group (See Section 8.2). Emphasis should be placed on sending interested personnel to the appropriate training and details, including the Prescribed Fire Training Academy and assignments with the fire use modules, and to arrange for outside evaluators to assess progress towards taskbook completion in order to gain qualified staff members.

FIREPRO funds are available to cover the cost of 100 and 200 level courses sponsored by the Group and for a limited number of courses held outside the area. In order to participate, firefighters must submit requests for specific training courses to the FMO for approval. Firefighters receiving approval to attend training outside the area are provided the FIREPRO account number. Travel documents are prepared and arrangements are made by the appropriate personnel.

9.2.3.3 Annual Preparedness Activities

Table 10: Annual Preparedness Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Inventory Fire Engines and Cache		x										
Order needed supplies		x										
Initiate Bi-weekly Engine Preparation Checks			x									
Weigh Engines to verify GVW Compliance			x									
Complete Training Analysis	x											
Annual Refresher Training			x									
Fire Physical Exams in accordance with NPS Policy	x											
Annual Fitness Testing	x											
Prescribed Fire Plan Preparation						x						
Review and Update Fire Mgt. Plan												x
Prepare Pre-season Risk Analysis						x						
Prepare Fire Management Budget Request						x						
Submit Fire Management Budget Request						x						

Live Fuel Moisture Sampling						x	x	x	x			
Winterize Fire Equipment											x	
Update Interagency Agreements/AAP's												x
Update Firefighter Qualifications	x											
Review Past Year's Activities												x

Activity should be completed prior to the end of the month indicated

The Fire Management Officer is responsible for ensuring that all qualified firefighters are issued a full set of personal protective equipment (PPE). Firefighters are responsible for the maintenance of issued equipment and will carry PPE with them while on duty. Hatteras Island Ranger District will maintain a 20-person fire cache, Ocracoke will maintain a 10-person fire cache, Wright Brothers will maintain a Slip-on/Trailer unit, and the Group will maintain a primary fire cache at Buxton. An inventory of fire equipment can be found in Appendix I.

9.2.3.4 Step-up Plan

Preparedness activities throughout the year are based on the National Fire Danger Rating System (NFDRS). Fire days are broadly divided into five staffing classes according to the expected fire behavior as indicated by the Burning Index (BI) and the Probability of Ignition Component (PI). The BI integrates the effects of weather, fuel, and topography to estimate potential fire behavior and the corresponding amount of effort required to contain a fire. The PI relates to chance that a firebrand falling on receptive fuel will result in a fire. The staffing classes relate to the expected severity of fire conditions. Preparedness actions are those actions taken to provide extra protection during periods extreme or unusual fire danger, and using WIMS, are based on the actual fire weather recorded on that day for all staffing classes.

Emergency funds are available from the Regional Fire Management Office when Staffing Classes IV is reached at the 90th percentile of the BI. The funds can be used for hiring emergency temporary firefighters, placing existing staff on extended tours of duty, pre-positioning resources, increasing or initiating special detection operations, and leasing initial attack aircraft. All of these actions are aimed at ensuring prompt responses should fires occur.

The Group's authority to spend emergency presuppression funds is tied to the BI. When a value equal to or greater than the 90th percentile (BI of 45) is reached, funds can be expended as outlined in the approved Step-up Plan.

Preparedness actions are based on the predicted fire weather before 1400 hours and on actual fire weather after 1400 hours for all staffing classes. The breakpoints of the Burning Index outlined in Table 10 are based on 1993 to 1999 fire weather data from the Croatan National Forest. This data will be used to estimate Burning Index breakpoints for the Outer Banks Group until adequate local fire weather data has been collected to refine this analysis (See Section 6.4). NFDRS Fuel Model O (High Pocosin) has been selected as the most representative fuel type for the majority of the NPS lands and is the

fuel model used by the FWS and NCFS to calculate their fire dangers. Because the Group does not have a weather station, the BI and other pertinent information is obtained from the FWS or the NCFS.

Table 11: Burning Index, Staffing Classes, and Expected Fire Behavior

Staffing Class	Burning Index	Fire Behavior
I	**0-10**	Fires should present a low level of control difficulty. Fires occurring at this level can generally be controlled with existing forces.
II	**11-22**	Fires may present a moderate level of control difficulty. Fires occurring at this level can generally be controlled with existing forces. Expect the grasses, but few of the shrubs, to burn in the grasslands and savannas. Expect fire in forests to be limited to the needle layer and possibly to low underbrush.
III	**23-44**	Fires will present a moderate to high level of control difficulty depending upon access, size, and values at risk. Expect active burning in all fuel types except maritime hardwood forest during the peak burning hours. Fire may holdover in heavy brush or pines. Mop-up will be more difficult and time-consuming.
IV	**45-72**	Fire may present a high level of control difficulty depending upon access, size, and values at risk. Initial attack and reinforcing crews may have difficulty controlling a fire at this level. Expect active burning in all fuel types except maritime hardwood forest during all daytime hours, along with potential extreme fire behavior during the peak burning hours. Expect active burning into the night with holdovers in brush and pine. Mop-up will be difficult and time-consuming.
V	**73+**	Fire may present a high level of control difficulty depending upon access, size, and values at risk. Initial attack and reinforcing crews may have difficulty controlling a fire at this level. Expect active burning in all fuel types during all daytime hours, along with potential extreme fire behavior during the peak burning hours. Expect active burning into the night with holdovers in brush and pine. Mop-up will be very difficult and time-consuming.

Table 12 summarizes preparedness actions to be taken based upon the day's staffing class.

Table 12: Step-up Plan

PREPAREDNESS ACTIONS	STAFFING CLASS				
	I	II	III	IV	V
Staff					
• Firefighters to carry PPE with them while on duty	X	X	X	X	X
• Firefighters may be assigned to an engine at a station or patrol				X	X
• Extend Firefighters work weeks and/or tours of duty				X	X
• Stage park pilot and aircraft				X	X
• Stage an Incident Commander (ICT4) at Buxton				X	X
Equipment					
• Conduct weekly checks of all engines and equipment	X	X	X	X	X
• Staff an engine with an Engine Boss (ENGB) and a firefighter (FFT2) at Bodie Island from 1000 Hr. until sundown				X	X
• Staff an engine with ENGB and FFT2 at Hatteras Island from 1000 Hrs. until sundown				X	X
• Staff an engine with ENGB and FFT2 at Ocracoke Island from 1000 Hrs. until sundown				X	X
• Consider pre-positioning helitack crew w/ FWS					X
Prevention Activities					
• Post appropriate signs at campgrounds and public use areas			X	X	X
• Interpretive staff include fire message in programs & contacts			X	X	X
• Law enforcement staff will increase patrols				X	X
• Issue news release and/or Public Service Announcements				X	X
• Close high hazard off-road trails to public use				X	X
• Close campground to all open fires (except stoves)					X
Administrative					
• Monitor fire weather forecasts and NFDRS indices	X	X	X	X	X
• Increase one staffing class if KBDI > 400	X	X	X	X	X
• Increase one staffing class when dry lightning is forecast or observed	X	X	X	X	X
• Increase one staffing class when significant NPS or cooperator resources are committed to an uncontained fire	X	X	X	X	X
• Increase one staffing class if special events significantly increase man-caused risk	X	X	X	X	X
• Submit situation reports to NC Interagency Coordination Center, NPS Shared Applications Computer System, and FWS			X	X	X
• Notify Regional Fire Management Coordinator (RFMC) and open emergency presuppression acct.				X	X
Note: • Outside resources may be needed to meet preparedness requirements in staffing class IV and V					

9.2.4 Pre-attack Plan

Due to the scope of the fire program at the Group, no formal pre-attack plan has been written. Certain preparations and procedures are established by the Fire Management Officer prior to and during the fire season and communicated to the Group staff. Many topics addressed in a pre-attack plan are mentioned in the Annual Preparedness Activities section and the Step-up Plan section of this plan. The value of a written pre-attack plan, or a checklist is recognized. Pre-Attack plans will be prepared as time permits for the following areas:

- Fort Raleigh NHS
- Wright Brothers NM
- South Nags Head
- Buxton Woods and Frisco Campgrounds
- Ocracoke

Pre-attack plans should include the following information:

- Detailed Map(s) including:
  - Safety hazards
  - Structures or other values at risk
  - Water sources
  - Roads and engine access points
  - Trails or fuel breaks
  - Perimeter and dates of any recent fires or burns in the area
- Listing of neighboring cooperators and available resources
- Assessment of structure protection requirements
- Assessment of resources needed to hold fuel breaks, fire roads
- Assessment of any safety hazards and mitigation actions

9.2.5 Detection

There are many ways wildland fires occurring in or near the Outer Banks Group can be reported to NPS officials. The Fish and Wildlife Service routinely flies detection patrols during periods of high fire danger. The northern portion of the Group is generally covered during these patrols. The section of the seashore south of Pea Island NWR may be checked by request.

Fires that are reported by visitors, local residents, or other counties are usually reported to the local fire authority, the North Carolina Forest Service, or local law enforcement. Dare and Hyde County dispatchers and the North Carolina Forest Service will contact the Group if the reported wildland fire appears to be on NPS lands.

During periods of high fire danger, increased probability of starts, and when burn bans are in effect, Rangers conduct fire prevention patrols. All wildland fires observed by Group employees are reported to the Ranger Division.

9.2.6 Initial Reporting and Dispatching

All fires occurring within or adjacent to Group lands will be immediately reported to Headquarters or the Fire Management Officer (FMO). When a report of a fire or smoke is received, the following information should be collected from the reporting party.

- Name of the reporting party
- Address of the reporting party
- Contact telephone number
- Location of fire and size
- Fuels and observed fire behavior

The person receiving the report at Headquarters will assume the duties of Fire Dispatcher until relieved or released. The Fire Dispatcher will be responsible for coordinating the filling and delivery of any resource orders made by the Incident Commander (IC) for all operational and logistical needs, including engines, aircraft, tool, supplies, meals, and personnel. The IC will place all resource orders through the Fire Dispatcher, and specify what is needed, when it is needed, and where it is needed. A Resource Order Form (NFES 1470) will be used by the Fire Dispatcher to document all requests. The Fire Dispatcher will promptly determine if the resource orders can be filled or procured locally and notify the IC of the status of the order. If a resource order can not be filled locally, the Fire Dispatcher will place the order with the North Carolina Interagency Coordination Center. The FMO will generally be able to assist in ordering resources from outside the local area. All resources dispatched to a fire must be fully qualified for the position for which they are ordered.

Requests for assistance from cooperators on fires not threatening Group lands must be made to and approved by the FMO. The FMO will not commit firefighters for over one burning period without the concurrence of the Chief Ranger. Only qualified and properly equipped resources will be dispatched.

9.2.7 Mobilization

9.2.7.1 In-Park Assignments

A pre-approved roster of firefighters available to respond to wildland fires reported in the Group or interagency response is maintained by the Fire Management Officer. When a report of a wildland fire is received, the District Ranger or Fire Management Officer designates an Incident Commander and firefighters are contacted based on type and number needed. Personnel are selected from the roster in priority order.

A copy of the Group's Mobilization Plan can be found in Appendix J.

9.2.7.2 Out-of-Area Assignments

When firefighters or other wildland fire suppression resources are need for interagency assignments, the Fire Management Officer is generally contacted by the North Carolina Interagency Coordination Center. The Coordination Center provides the FMO the information contained on the Resource Order.

A pre-approved roster of firefighters available to respond to interagency incidents is maintained by the FMO during periods of high fire danger in the region or nation. When an order is received, the Fire Management Officer contacts the appropriate Division Chief to verify that the firefighter is still available and to gain permission to commit the firefighter. Once permission is received, the firefighter is contacted, and if personally available, committed to the incident. Normally there is a 1-hour "Fill or Kill" time specified by an Interagency Coordination Center.

9.2.8 Initial Attack

When multiple fires are reported, fires occurring in the wildland-urban interface will be of higher priority than fires occurring in natural areas. When multiple fires are reported in the same unit the following will be used to set priorities:

- Threat to human life;
- Threat to private property;
- Threat to threatened and endangered species, and sensitive habitats;
- Threat to cultural and historic sites;
- Threat to Group developments.

Criteria for appropriate initial attack response that is consistent with Group goals and objectives:

- Public and firefighter safety;
- Protection of cultural, historic, and natural resources;
- Protection and improvements and private property;
- Minimum fireline construction;
- Availability of suppression resources and response times;
- Fire behavior based on fuel, weather, and topography;
- Minimizing the use of mechanized equipment except where deemed necessary to meet criteria listed above.

Suppression actions that restrict the spread of a fire to a given area may be used for initial attack strategy as long as it is not being used solely to meet resource management objectives. Resource benefits may be a by-product, but the strategy must be based on the criteria previously listed. A confinement strategy may also be selected in the WFSA process when the initial attack action failed to halt the spread a wildland fire.

Typical response times to wildland fires may vary depending on staffing and individual personnel work assignments. An effort will be made to respond to a wildland fire within 30 minutes of receiving a report.

Table 13: Recommended Initial Attack Actions to be Taken Based on Staffing Class

INITIAL ATTACK ACTIONS	STAFFING CLASS				
	I	II	III	IV	V
Initial Reporting					
• Receive report of fire and complete fire report form	X	X	X	X	X
• Notify closest cooperator	X	X	X	X	X
• Notify NC Forest Service (NCFS)		X	X	X	X
• Notify FMO or Chief Ranger			X	X	X
Initial Dispatching (no structures reported threatened)					
• Dispatch closest NPS engine w/ ENGB and two FFT2	X	X	X	X	X
• Dispatch additional NPS engine with ICT4/ENGB and 2 FFT2			X	X	X
• Request cooperator engine and crew				X	X
• Gather additional NPS staff for dispatch as requested by IC				X	X
• Dispatch park pilot and aircraft for aerial resonance flight			X	X	X
Initial Dispatching (structures reported threatened)					
• Dispatch closest NPS engine w/ ENGB and two FFT2	X	X	X	X	X
• Request cooperator engine and crew	X	X	X	X	X
• Dispatch additional NPS engine with ICT4/ENGB and 2 FFT2	X	X	X	X	X
• Gather additional NPS staff for dispatch as requested by IC		X	X	X	X
• Inquire availability of additional resources from cooperators		X	X	X	X
• Dispatch ICT3 or Strike Team Leader- Engines (STEN)			X	X	X
• Dispatch park pilot and aircraft for aerial resonance flight		X	X	X	X
• Inquire availability of aircraft from NCFS and FWS			X	X	X
• Dispatch closest helicopter or air tanker if requested by IC or FMO				X	X

• **Note:**
  • 1st NPS ICT4 or ENGB on scene will serve as Incident Commander until relieved
  • IC to conduct size up and order/release additional resources as needed
  • IC to direct fire suppression following standard safety and operational procedures.					

9.2.9 Extended Attack

Extended attack occurs when a fire has not been contained or controlled by the initial attack forces and continues either until transition to a higher level incident management team is completed or until the fire has been contained and or controlled. Whenever it appears a fire will escape initial attack efforts, leave NPS lands, or when fire complexity exceeds the capabilities of command or operations, the IC will take appropriate, proactive actions to ensure additional resources are ordered. **Extended attack action requires that a Wildland Fire Situation Analysis (WFSA) be completed to re-evaluate the suppression strategies**.

The WFSA is a checklist intended to guide the Agency Administrator (Superintendent) in assessing the current situation, developing alternatives, evaluating those alternatives, and deciding on a course of action. The situation is reviewed daily to determine the effectiveness of the strategy chosen (Appendix K).

In the event an Incident Commander or Incident Management Team is ordered, the transfer of responsibility for suppression actions on the fire will be documented through a Limited Delegation of Authority signed by the Superintendent or designated acting official. A draft copy is included in Appendix K.

9.2.10 Minimum Impact Suppression Tactics (MIST)

Fire management activities within the Group will be carried out in a manner that minimizes impacts to the area's natural and cultural resources, while maintaining the safety of firefighters, the public, and other personnel. Minimum Impact Suppression Tactics (MIST) to be used when suppressing fires in the Group include:

- The approval of the Superintendent is needed for off-road use of vehicles and the use of plows and other mechanized equipment, unless there is imminent threat to human life or private or public property.
- Minimum use of chemical retardant.
- Use of natural or manmade barriers whenever possible.
- Use leaf blowers and wetlines wherever possible.
- Cold-trail the fire edge when practical.
- Branches and other debris from line construction will be scattered in accordance with guidelines contained in the Fireline Handbook (PMS 410-1).
- Use mop-up kits and other low pressure nozzles setting to prevent erosion.
- Minimize the falling of trees. Snags near the firelines will be removed only if they present a hazard to firefighters or constitute a threat to the fireline integrity. Lower branches on living trees will be pruned to remove ladder fuels as opposed to falling the tree.

9.2.11 Rehabilitation

All rehabilitation actions will be in accordance with NPS Policy. After the fire is declared out, all flagging, litter and trash associated with the suppression operations will be removed. Firelines will be rehabbed and erosion control devices installed as necessary. Brush will be scattered and stumps will be flush cut and covered with soil. Plow furrows will be rehabilitated by rolling the materials back into the furrow. Public use trails will be patrolled and measures taken to ensure public safety.

The severity of the burn and the resulting impacts will dictate the need to re-seed or reestablish native plant species. Although the likelihood of the need is considered to be quite low, before any action is taken a rehabilitation plan will be prepared and approved in accordance with NPS policy.

NPS policy states that only damage to improvements caused by suppression efforts and repairs required to protect Group resources from imminent damage can be repaired using fire funds. NPS fire funds cannot be used to repair damage caused by the fire itself (i.e. burnt power poles, bridges, structures, etc.) These funds must come from other sources.

9.2.12 Records and Reports

9.2.12.1 Individual Fire Report (DI-1202)

The Individual Fire Report (Commonly referred to as a DI-1202 or 1202) is the primary means of documenting fire management activities for the Department of the Interior. A DI-1202 is to be used to document wildland fires, including natural outs, support actions, false alarms, and prescribed burns.

The Initial and/or Extended Attack Incident Commander is responsible for completing the DI-1202 as well as Crew Time Report(s) for personnel assigned to the incident, requisitions for items expended on the incident, Compensation and Claims For Injury forms, and other documents relating to the incident. The person completing the DI-1202 will enter the fire number from the list maintained by the Group and request an account number from the Southeast Regional Office.

A completed DI-1202 actually forms a package that may include the following:

- Any written documents signed by the Superintendent;
- A copy of the WFSA;
- The original copy of the Resource Order Form(s);
- Copies of Crew Time Reports, Individual Firefighter Time Reports;
- Listing of firefighters, including positions held;
- Copies of requisitions;
- Situation maps which indicate the daily fire advance, weather data, etc.;
- Accident reports;
- Press clippings;
- Rehabilitation Plan.

The completed package is submitted, as a draft document, to the Fire Management Officer who will review the report for completeness. Once the review has been completed, the data is entered into the SACS database within 10 days of the fire being declared out and the package filed in the Chief Rangers Office for permanent record keeping.

9.2.12.2 Resource Order Form (NFES 1407)

All requests for outside assistance will be documented on a Resource Order Form (NFES 1407). The order form is, in essence, an obligating procurement document. When incoming orders are received for Group resources, the coordination center should fax a copy of the Resource Order for Group files.

9.2.12.3 Daily Situation Report

Daily Situation Reports should be submitted on those days when the Group moves into Staffing Classes IV and V, or when a fire has occurred or is on-going. The Fire Management Officer is responsible for preparing the report and entering it into SACS by 0930 Hrs. An ICS 209 form is completed and forwarded to the North Carolina Interagency Coordination Center when fires exceed 100 acres for timber or brush or 300 acres for grass fuels.

9.2.12.4 Fire Experience and Qualifications

The Wildland Fire Management Computer System at NIFC is the central repository for all individual firefighter experience, fitness, and training records. The Fire Management Officer is responsible for entering all training and experience into the system and ensuring the information is up to date. Prior to the Spring Fire Season, each firefighter should be given the opportunity to check and validate their records and make any corrections, if necessary. This can be done as part of an annual Individual Development Plan (IDP) process.

9.2.12.5 Year-end Accomplishment Report

The Fire Management Officer will complete and submit the year-end accomplishment reports in time to meet Southeast Region and national deadlines.

28.0 PRESCRIBED FIRE MANAGEMENT

Between 1987 and 1994, 15 prescribed burn which treated 933 acres at the National Seashore were conducted (Appendix F). Since that time the Group has not conducted any prescribed burning due to staffing limitations and changes in policy.

10.1 Scope of Long-term Prescribed Fire Program

Prescribed fire has become a recognized management technique to accomplish beneficial resource objectives including fuel treatment and reduction, site preparation, seedbed preparation, species conversion, forest stand thinning, wildlife habitat improvement, ecosystem health maintenance, and numerous other objectives (National Park Service 1999). Federal Wildland Fire Management Policy directs federal agencies to achieve a balance between suppression to protect life, property, and resources, and fire use to regulate fuel and maintain healthy ecosystems (NWCG 1998). One of the guiding principles established by the policy recognizes the role of wildland fire as an essential ecological process and natural change agent and requires that it be incorporated into the planning process. A second guiding principle requires fire management actions be based on the best available science. Project Statements listed in Section 5.1 of this plan strive to meet these policy requirements.

Congress has determined that the buildup of hazardous levels of fuel is threatening federally owned resources and developments directly and visitor and employees safety indirectly, and has provided funding to treat the problem.

NPS policy states that units shall minimize, as possible, hazardous fuel in the wildland/urban interface. NPS-18 recognizes that hazard fuel management activities reduce fire hazard of natural fuel in areas where weather and risk assessments demonstrate a reasonable chance for wildland fire damage. Hazard fuel management activities protect real property, natural and cultural resources and enhance public and firefighter safety.

The purpose of the prescribed fire program, based on resource management objectives established for the Outer Banks Group and mandated by policy, will be to use wildland fire in combination with other means to manage fuel, protect private and government property, and enhance the natural processes.

10.2 Prescribed Fire Planning

10.2.1 Planning Process

The following guidelines will be used to develop and plan annual prescribed burning plans:

- The Group will develop the annual burn program. Staff will identify areas to be treated, develop burn objectives, determine who, in addition to the FMO, will write the various burn plans or review burn plans written by others, insure monitoring is conducted in accordance with established guidelines, and identify research project and monitoring needs.

- A park management/inter-disciplinary team composed of the Superintendent and/or Deputy Superintendent, Chief Ranger, Chief of Resource Management, Resource Management Specialist, Historian, Fire Management Officer, and cooperators and other interested agencies, as appropriate, will meet annually to review the fire management program. The purpose of this meeting will be to review proposed burns, assure the Annual Action Plans with the Fish and Wildlife Service and agreements with the North Carolina Forest Service reflect the Group's prescribed fire program, and schedule burns, if possible.

- Once approved by the Superintendent, the plans will be submitted as part of the FIREPRO budgeting process for consideration for funding. The Resource Management Division may also request funding from other sources for monitoring and research projects.

- The Chief Ranger will implement approved projects with the assistance of other Division Chiefs.

10.2.2 Five Year Prescribed Fire Plan

The Group's strategy will be to periodically burn marsh, grassland, shrub, and pine vegetation types to reduce fuel loading and restore a more natural composition and structure to native vegetation communities. Prescribed burns will be conducted for two primary reasons.

- **Restoration** - The purpose of these burns will be to reduce extremely high concentrations of fuel and restore a more natural composition and structure to native vegetation communities. These burns are expected to be relatively complex due to the high levels of hazard fuel that have accumulated over the years and the adjoining wildland-urban interface areas. Some areas may require only one restoration burn, while the majority will require a series of relatively light frequent burns to achieve restoration goals. Many areas will require mechanical treatments ranging from fuel break construction to mechanical brush removal before the areas can be safely and effectively burned. Prescribed burns will be scheduled to mitigate smoke impacts and/or alleviate other concerns, and may initially be conducted outside the normal fire season in deference to the same concerns.

- **Maintenance** - Maintenance burns will be initiated once more natural fuel levels and vegetation community structure and composition have been restored. At that point, periodic prescribed burns will continue to maintain natural conditions, but will generally be less frequent and complex. Actual maintenance fire return frequencies will need to be determined based upon fire effect monitoring results obtained from restoration burns, but are expected to be similar to estimated natural fire return intervals ranging from 2-4 years in the mixed pine communities to 7-10 years in the southern shrub savannas.

During the initial restoration stage, the Group will need to burn an estimated 4,841 acres annually to meet treatment objectives (Table 14). In order to meet this goal between 5 to 15 prescribed burns must be conducted each year. The number of acres treated would be significantly reduced once the maintenance prescriptions are implemented.

Table 14: Proposed Treatment Objectives

Estimated Restoration Target Acres /FMU/Fuel Type/Year							
Fuel Model	**Description**	**FMU 1**	**FMU 2**	**FMU 3**	**FMU 4**	**FMU 5**	**Total Acres**
0	Fuel Break	0	0	0	0	0	0
3	Tall Grass	13	0	743	1047	752	2555
4	Shrub Thicket	0	0	15	195	131	340
6	Shrub Savanna	1	0	211	814	337	1363
7	Southern Rough	67	56	20	425	14	583
9	Hardwood	0	0	0	0	0	0
	Grand Total	81	56	990	2,481	1,234	4,841

Note: The targets represented in this table were calculated from gross estimates of acreage per fuel type in each fire management unit. These estimates also utilized fairly conservative treatment rotations. Additional fuel mapping and GIS analysis be part of the 5-year program and will be used to further refine the program.

Treatment priorities will be based on the proximity of fuel to structures and developments. Specific areas have been identified for each fire management unit and are outline in the following table.

Table 15: Treatment Priorities by Fire Management Unit

Fire Management Unit	Priority Treatment Area
Ft. Raleigh	Maintenance and Employee Residence Area
Wright Brothers	Northwest wildland-urban interface area
Bodie Island	Area south of Route 264 between NPS boundary and Route 12 to the junction of Old Oregon Inlet Road (Route 1243).
Hatteras Island	Wildland-urban interface on south side of Salvo Wildland-urban interface with Buxton Woods
Ocracoke Island	Wildland-urban interface with Ocracoke

As indicated above, a great deal of work will be required in the first phase of the program to ensure that it is successfully implemented. Primary administrative tasks include:

- Coordinating and managing the necessary mechanical fuel reduction activities prior to burning an area.
- Implementing a fire education program and informing landowners adjacent to or within, burn blocks in order to gain support for the program.
- Initiating and implementing cooperative agreements with cooperators to facilitate sharing of staff and equipment, as well as conducting interagency prescribed burns across agency boundaries.
- Managing a relatively high number of complex prescribed burns within a limited burn window.
- Developing, implementing and managing a fire effects monitoring program.

The 1987 - 1994 efforts were much smaller in scope and complexity. The program failed to meet management objectives because there were not enough resources available to complete the backlog of work that was needed. Since then, the fuel problem has

continued to worsen, and the adjacent values at risk, primarily structures, have continued to increase. Based on policy and other factors, it is not acceptable to ignore the problem. Although the target acreage is about 5,000 acres, for the first few years the minimum target will be 1,000 acres. The overall success of the program is dependent upon the level of support that is available from other sources (See following section).

A fire effects monitoring program will be implemented to evaluate the success of the program in meeting management objectives, and to provide data that can be used to refine prescriptions in the future.

10.2.3 Personnel Requirements

The Group does not have a large enough wildland fire qualified staff to meet the operational staffing needs necessary to implement the plan. (Table 8: Minimum Staffing Targets, contains a listing of the positions required to be fully self-sufficient.) Until adequate numbers of firefighters can be recruited and Group personnel can become trained and qualified, the Group must rely on outside staffing. Possible sources include: the North Carolina Forest Service, the U.S. Fish and Wildlife Service, Asheville Hotshots, Great Smoky Mountains National Park (including the Fire Use Module and Fire Effects Team hosted by the Great Smoky Mountains National Park), and other federal and cooperator personnel from the Outer Banks and the Southeast who are experienced in the particular fuel type(s) found in the Group. The resources will be ordered based on the complexity of the burn as determined by the Complexity Analysis completed as part of the planning process for each burn unit.

10.2.4 Fire Behavior and Fire Effects Monitoring

A fire effects monitoring program will be included as part of the prescribed fire program. Long-term monitoring will include the installation of permanent plots in representative habitats to determine the effects of prescribed fire. The program will ascertain if the quantifiable burn unit objectives identified in the individual burn plans have been achieved and if the desired long-term biological changes are occurring (e.g., conversion of brush fields to native grasses). Monitoring results will be used to validate the program, adjust prescriptions, and identify new units suitable for similar treatment.

All prescribed fire monitoring activities will follow the guideline in the NPS's Fire Monitoring Handbook. The Resource Management Division in consultation with the Southeast Region Monitoring Module will determine the appropriate monitoring technique to be used to sample the permanent plots. All plots will be sampled prior to treatment and will be sampled after the treatment to gather data for both short-term and long-term effects.

Additional sites can be established at the discretion of the Chief, Division of Resource Management. As the program grows, a Monitoring Plan will be developed and will become part of this plan (Appendix L).

A copy of the National Park Service Fire Monitoring Handbook is available at the Group Headquarters.

10.2.5 Documentation and Reporting Requirements

As the prescribed fires are conducted, they will be reported in the Shared Applications Computer System (SACS).

The Burn Boss is responsible for completing the Individual Fire Report DI-1202 and submitting it to the Fire Management Officer within three (3) days for entry into SACS. The Burn Boss will also update the report, as required, and submit the additional documentation to the Fire Management Officer who will enter it into the system. The Prescribed Fire Monitor will complete the forms specified in the Monitoring Handbook. The Burn Boss will also be responsible for the completion of fire time reports and completing necessary forms to replace expended supplies and document other charges to the project.

10.2.6 Critiques

This important activity will be conducted in accordance with RM-18 guidelines. Before personnel are released from a burn, the Burn Boss will hold a brief critique. The purpose of the debriefing is to gather information that will be useful to improve the effectiveness of the prescribed burn program, and to gather information for the final report.

The Superintendent will notify the appropriate officials and may request that the Regional Prescribed Fire Specialist and/or the Regional Fire Management Officer conduct a formal review in the event of:

- Entrapment, serious accident, injury, or fatality;
- An escaped prescribed fire resulting in significant property or resource damage;
- Significant safety concerns are raised (Incidents with potential);
- Adverse media attention;
- A significant smoke management problem occurred.

29.0 AIR QUALITY AND SMOKE MANAGEMENT

The National Park Service considers visibility and clean air to be primary natural resource values. All NPS units are directed to comply with the requirements of the Clean Air Act and meet National Ambient Air Quality Standards (NAAQS). The national seashore is designated as Air Quality Classification II (National Park Service 1979).

Smoke management concerns have been successfully mitigated during past prescribed burns within Cape Hatteras National Seashore and Pea Island National Wildlife Refuge. This is primarily due to the prevailing wind that is from the southwest in the summer and from the northeast in the winter (Hardy and Carney 1969). These winds disperse most air pollutants in this region.

Planning will become more complex as prescribed burns are written for units adjacent to wildland-urban interface areas and/or major highways, and will require active smoke management techniques. Other obstacles will have to be overcome as well. For example, the Town of Nags Head has an ordinance that does not permit open burning by their residents within the Town's corporate limits. The Group will have to work with the Town to overcome this potential obstacle.

The State has delegated to the North Carolina Forest Service responsibility for the development of wildland smoke management regulations and permitting. The North Carolina Forest Service has issued guidelines for prescribed burning. The Group will obtaining necessary permits and adhere to their guidelines. The guidelines will be incorporated into each burn plan.

Smoke management concerns requiring mitigation in fire management operations include:

- Visibility impairment on highways and roads - particularly major roads with no option for detouring such as NC 12
- The effect of smoke on the health of visitors, local residents, and firefighters.
- National Ambient Air Quality Standards (NAAQS) within park and adjacent airsheds.

The Group will utilize the following tactics to manage smoke impacts as needed:

- **Planning**
  - Detailed smoke management actions will be made part of each prescribed burn plan.
  - Smoke trajectory maps will be developed and sensitive targets identified.
  - Mitigation measures will be defined in the plan and a contingency plan developed. Arrangements will be made prior to ignition to insure designated resources are available if needed to implement the mitigation measures.
  - A spot weather forecast will be requested the day of the burn from the National Weather Service (NWS) prior to ignition of any prescribed fire
  - Advanced notice will be provided to the NCFS District Office, and permission to burn requested based upon the following information:
    - location
    - fuel loading estimate
    - proposed ignition time
    - forecast Burn Category Day (BCD)

- **Avoidance**
  - Prescribed burns will not be initiated unless burn category days (ventilation), available fuel loading, and distance to nearest downwind smoke sensitive area are within the limitations set in the NCFS smoke management guidelines.
  - Prescribed burns may be conducted in the winter, spring, or fall instead of the preferred summer season to mitigate potential smoke impacts.

- **Reduction**

  - If the smoke emissions are predicted to be within the guidelines prescribed for the BCD, the burn can be initiated. If the prescriptive criteria for smoke emissions are exceeded, the burn boss can mitigate the problem by breaking the burn into smaller parcels or waiting until better smoke dispersal conditions are present.
  - Initiate aggressive mop-up, as needed.
  - Fuel breaks may be established to limit the spread of a prescribed burn.
  - Mechanical fuel reduction may be utilized to reduce fuel loading as needed and where practical.

- **Dilution**
  - All prescribed burning in the parks will be conducted under adequate smoke dispersion conditions as determined through by NCFS burn category day criteria.

- **Traffic Management and Public Safety**
  - Prescribed burn plans will contain specific monitoring requirements for nighttime monitoring of smoke on roads.
  - In the event that smoke from a fire obscures visibility below the state defined limit or creates a safety hazard, the following actions will be initiated:
    - NPS rangers will be requested to respond to the scene to provide for public safety.
    - The North Carolina Highway Patrol, North Carolina Department of Transportation and the appropriate county law enforcement agency will be notified of the smoke incident and requested to dispatch personnel to the scene to provide for public safety. NPS Rangers will assist as needed.
    - If a park road is involved, the Ranger(s) on scene will determine what type of traffic control is needed and take immediate action. Additional rangers and/or fire management staff will assist as needed.

30.0 FIRE RESEARCH

Implementation of the Fire Management Plan should be based on the best available science (NWCG 1998). Sufficient research exists on file at Group Headquarters that can be used as a guide. The fire behavior data and environmental effects observed following the completion of existing prescribed fire projects will be used to refine prescriptions and to improve the over-all program.

There are several areas where additional fire management research is needed to better adapt the fire management program to meet management objectives:

- **Specific Vegetation Objectives for the Outer Banks Group** – There is a need to establish specific vegetation composition and structure restoration and maintenance targets for all parks.

- **Update of Fuel Mapping** - The fuel mapping that was conducted in the park in the 1980s needs to be updated. The update should include Fort Raleigh NHS and Wright Brothers NM, as well as attempt to estimate fuel loading.

- **Development of NFDRS custom fuel models for unique park fuel types** – This is required to provide a more accurate fire behavior model or models for shrub savannas and maritime forest.

- **Development of a photo series for identifying fuel types and loading** – Use the data from fire effects monitoring to develop a photo series for identifying fuel types and determining fuel loading.

31.0 MONITORING

The Group will develop short and long term monitoring programs to assess the effectiveness of fire management activities on natural resources. The NPS Fire Monitoring Handbook protocol will be used to fulfill monitoring plan requirements. Other valid monitoring strategies and protocols developed locally as part of a Fire Monitoring Plan for the Group may be substituted for standard monitoring protocols to meet specific management and information needs. Such protocols should complement those used by cooperators or be used in conjunction with joint monitoring efforts. See the Prescribed Fire Section for further discussion.

32.0 PUBLIC SAFETY

All aspects of the fire management program will provide for public safety, and the incident will be managed so that the safety of firefighters and visiting public are protected. The safety of all people in the area is the primary concern of the Incident Commander or Burn Boss.

The typical wildland fire in the Group is held to one acre or less. This makes it somewhat easy to monitor the entire perimeter of the fire to ensure the public is kept out of the immediate area and are far enough away that they will not hinder the suppression activities. Under no circumstances will anyone be permitted near a fire without the appropriate training and required personal protective equipment. Members of the press will be allowed in the vicinity of the fire provided they meet the standards established for the Light fitness rating, wear personal protective equipment, including a fire shelter, and are accompanied by a trained, qualified firefighter who can assist them.

During a wildland fire, it may be necessary for the Superintendent to close a portion of the Group lands to the visiting public for a short period of time. The Chief Ranger is responsible for enforcing the closure. Every effort will be made to inform hikers and campers and the public of the situation and evacuate the area, if necessary. Signs will be posted at the trailhead and at other locations warning hikers and others of the situation.

When a fire threatens to escape the from NPS lands or has the potential to do so, adjacent authorities and landowners will be given as much advanced notice as possible so that they may take appropriate action.

Mitigation measures will be outlined in each individual prescribed burn plan. Necessary action will be taken to ensure public safety including:

- Contacting Group neighbors;
- Posting warning signs on roads;
- Providing for pilot cars or rerouting traffic;
- Closing backcountry areas;
- Posting signs at trailheads warning hikers and others of the situation;
- Evacuating Group neighbors who may be adversely affected by smoke. Group neighbors are to be given as much advanced notice as possible to properly plan for the event.

33.0 PUBLIC INFORMATION AND EDUCATION

An informed public is a vital component of the prescribed fire program. Areas that have been burned will present opportunities for the public to actually see the effects of fires, and offer staff members an opportunity to explain the purpose of the burns to the public. There are several ways to convey this message to the public including interpretive folders such as Wildland Fire in the National Park Service, presentations to school children in the field or in the classroom, attendance at meetings, and through press releases. If the situation warrants and adequate supervision is available, the public may actually observe a prescribed burn as it is conducted. During the burn, the Burn Boss is responsible for dispersing information to the public, however, it is best to delegate this responsibility to a Public Information Officer (PIO) or Fire Information Officer (FIO) whenever possible.

The visiting public and local population will be made aware of local conditions during periods of high fire danger. This can be accomplished primarily through signing and the issuance of press releases. Wildland fires convey a different set of circumstances in that they are unplanned events that constitute emergency situations. Public access must be managed. Any media access to wildland fires will be in compliance with the safety guidelines outlined above. During the fire, Incident Commander is responsible for dispersal of information to the press and the public. This activity may be delegated. Post-fire information will be issued in accordance with Group public information guidelines.

The North Carolina Forest Service has taken the lead on contacting local homeowners and informing them of ways to make their property "Fire Safe". The Group will incorporate this program into their fire management program as well.

The Chief of Interpretation will prepare and implement an annual fire information and action plan. The plan and other fire information and education materials can be found in Appendix M.

34.0 PROTECTION OF SENSITIVE RESOURCES

16.1 Archeological/Cultural/Historical Resources

Fire Management activities within the Group will be implemented in accordance with the regulations and directions governing the protection of cultural resources as outline in Departmental Manual Part 519, Code of Federal Regulations (36 CFR 800), the Archeological Resources Protection Act of 1979, as amended, and the Archeological and Historic Preservation Act of 1974 as required by NPS policy. Section 106 of the National Historic Preservation act of 1966 compliance will be conducted for any fire management activity that may affect historic structures or archeological resources. A complete listing of cultural resources is on file at Group Headquarters.

Although decades of fire ecology research allows ecologists to predict impacts on biotic communities, the possible impacts of prescribed burning (and wildland fires) on archeological resources are not well known (Seabloom et al. 1991). Research conducted in North Dakota indicate that fire-related impacts to buried artifacts are negligible, but effects on surface-exposed artifacts can be significant, depending on artifact type and size (Seabloom et al. 1991).

Impacts to archeological resources by fire vary. The four basic factors determining the severity of impact are (1) fire intensity, (2) duration of heat, (3) heat penetration into soil, and (4) suppression actions. Of the four, the most significant threat is from equipment during line construction for prescribed fires or wildland fire holding actions (Anderson 1983).

The following actions will be taken to protect archeological and cultural resources:

- The staff will consult files and records of cultural resources when planning prescribed burns or hazardous fuel reduction projects, developing pre-attack plans, and performing other preparedness actions. The potential for adverse impacts to cultural resources will be evaluated prior to prescribed burning and in the selection of fire suppression strategies during wildland fires.
- The Historian for the Group will be contacted during the development phase of the burn plan writing process when cultural resources are suspected or known to exist in the project area.
- The North Carolina State Historic Preservation Officer (SHPO) will be contacted by the Group's Historian when it is known a planned management action may impact

archeological or cultural resources. By law, the SHPO has 30-days to respond. The Group will follow any programmatic archeological/cultural resources management plan that may be implemented in the future.

- Low impact wildland fire suppression tactics (cold-trailing, use of foam/wet-water/water, use of natural and manmade barriers, change in vegetation, mowing, etc.) will be used to the fullest extent possible. Line construction for prescribed fire activities will follow the same principle. Maps indicating the known location of significant cultural resources will be consulted prior to laying out prescribed burn units, and whenever possible, before constructing fireline to halt the spread of a wildland fire.
- Prescriptions for prescribed fires will take into account the presence of known cultural sites. Cooler fires with short residence time will be used in areas containing known cultural sites, whenever possible.
- Known surface sites will be marked, protected, and excluded from the burn, if possible. Foam will not be used in areas known to harbor surface artifacts.
- The use of mechanized equipment within the Group must be approved by the Superintendent on a fire by fire basis, unless there is imminent threat to human life or private or public property.
- The location of sites discovered as the result of fire management activities will be protected and reported by the Group's Historian.
- Rehabilitation plans will address cultural resources and will be reviewed by the Group's Historian.

16.2 Natural Resources Requiring Treatment or Protection

Threatened and endangered species such as the loggerhead sea turtle, leatherback sea turtle, and Piping Plover are primarily limited to beach sites and therefore will not be impacted by fire management activities. During certain key periods, such as nesting times, managers may find it necessary to close sections of the beach. Peregrine Falcons and Bald Eagles are occasionally sighted in the parks, but due to the time of year and their mobility should not be impacted by fire management activities. The dune blue curls and seabeach amaranth are federal species of concern which inhabits dune and disturbed areas, and may possibly respond favorably to fire. The federally listed Brown Pelican is known to nest on land in the vicinity of the National Seashore. State listed species such as the Little Blue Heron, Snowy Egret, and the Carolina salt marsh snake can be found in the marshy areas on Pamlico Sound and therefore mitigation measures may need to be taken to avoid impacting them.

In addition to federally and state listed species or species of concern, the Coastal Fringe Evergreen Forest on Roanoke Island has been listed as a unique ecosystem in the park.

16.3 Development/Infrastructure/Inholdings Requiring Protection

A complete listing of NPS owned development and improvements are on file at Group Headquarters.

Wildland – urban interface (interface) mitigation techniques should be applied to prevent or at least reduce negative impacts to NPS and other improvements within the boundary of the Group. Areas or developments requiring special consideration include Fort Raleigh National Historic Site, Wright Brothers Memorial, South Nags Head, Salvo, Buxton Woods, and Ocracoke. Hazard fuel management projects will be initiated to create areas where fires can be suppressed more easily.

35.0 FIRE CRITIQUES AND ANNUAL PLAN REVIEW

17.1 Critiques

All wildland and prescribed fires occurring in the Group will receive at a minimum a review by those involved to evaluate operational aspects associated with the incident. The Incident Commander and the Chief Ranger and/or the Fire Management Officer will conduct the review. The purpose of the review is to recognize and document actions that were successful and identify and correct actions that did not contribute to the successful conclusion of the incident or compromised firefighter safety.

The Superintendent and the Chief Ranger and/or the Fire Program Manager will conduct a closeout meeting with Incident Management Teams (IMT) to ensure a successful transition of the incident back to the Group. Chapter 13, Exhibit 1 of RM-18 contains a sample closeout review with an IMT.

A Regional or National level fire review may be conducted at the request of the Superintendent at any time, and may be required, if one of the following occurs:

- The fire crosses the Group's boundary into another jurisdiction without the approval of landowner or agency.
- Adverse media attention is received.
- The incident resulted in serious injury or death or significant property damage is reported.
- There is controversy involving another agency.

All entrapments and fire shelter deployments will be reported and investigated in accordance to NPS policy as soon as possible after the action occurred.

17.2 Fire Plan Review

The Fire Management Officer will review the plan annually and identify any changes that need to be made to the plan. A formal fire management review will be conducted every five years. The Superintendent must approve significant changes to the body of the plan. The only exceptions to this procedure will include grammatical corrections, minor procedural changes, deletions, corrections, and additions to the appendices. Copies of all changes will promptly be forwarded to the Regional Fire Management Officer. Changes requiring approval and concurrence will be submitted with a new cover sheet for

signature and dates, which will replace the original cover sheet on receipt by the Superintendent.

18.0 CONSULTATION AND COORDINATION

The Draft Fire Management Plan and associated Environmental Assessment from Colorado National Monument were used to provide guidance in the development of this plan. These two documents were prepared by a work group to serve as a guide for small to medium sized parks that do not have a heavy fire load. The Fire Management Plan and associated Environmental Assessment for Big South Fork National River and Recreation Area were also consulted.

The following individuals were consulted during the development of this plan:

Francis Peltier	Superintendent, Outer Banks Group, Manteo, NC
Chris Bernthal	Deputy Superintendent, Outer Banks Group, Manteo, NC
Mary Doll	Superintendent, Wright Brothers NM, Kill Devil Hills, NC
Jeff Cobb	Chief Ranger, Cape Hatteras National Seashore, Manteo, NC
Steve Harrison	Chief, Resource Management, Outer Banks Group, Manteo, NC
Patty Lockamy	Chief, Interpretation, Outer Banks Group, Manteo, NC
Keith Watson	Natural Resource Specialist, Outer Banks Group, Manteo, NC
Doug Stover	Historian, Outer Banks Group, Manteo, NC
Nikki Ernst	Cartography Technician, Outer Banks Group, Manteo, NC
Robert Trick	Pilot, Outer Banks Group, Manteo, NC
Jon Anglin	District Ranger, Cape Hatteras National Seashore, Manteo, NC
Stephen Ryan	District Ranger, Cape Hatteras National Seashore, Manteo, NC
Dann Trexler	District Ranger, Cape Hatteras National Seashore, Manteo, NC
Barry Munyan	Park Ranger, Cape Hatteras National Seashore, Manteo, NC
Tom Crews	Fire Management Officer, Alligator River NWR, Manteo, NC
John Segar	South Zone Fire Management Officer, Boise National Forest, Boise, ID
Roger Stallard	District Forester, North Carolina State Forest Service, Fairfield, NC
Ron Hollifield	Dare County Ranger, North Carolina State Forest Service, Manns Harbor, NC
Kevin Zorc	Deputy Fire Chief, Nags Head FD, Nags Head, NC
Wayne Byrum	Asst. Public Safety Director, Nags Head FD, Nags Head, NC
Craig Clark	Deputy Fire Chief, Kill Devil Hills FD, Kill Devil Hills, NC
Barb Blonder	Northern Sites Manager, NC Coastal Reserve, Kitty Hawk, NC
Aaron McCall	Preserve Steward, TNC, Nags Head Woods, Nags Head, NC

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APPENDIX B: GLOSSARY OF TERMS

Appropriate Management Response: Specific actions taken in response to a wildland fire to implement protection and fire use objectives.

BI - Burning Index: A number related to the contribution that fire behavior makes to the amount or effort needed to contain a fire in a particular fuel type within a rating area. An Index for describing Fire Danger.

Catastrophic Wildfire: A large scale, high-intensity wildland fire that could result in high plant mortality, removal of the majority of ground cover over a large area, possibly damage or destroy structures and other property, and/or severely impact water and air quality.

Closed Area: An area in which specified activities or entry are temporarily restricted to provide for to public safety or to reduce risk of human-caused fires.

Closure: Legal restriction, but not necessarily elimination of specified activities such as smoking, camping, or entry that might cause fires in a given location.

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

Ecosystem: An interacting system of interdependent organisms.

Expected Weather Conditions: Weather conditions indicated as common, likely, or highly probable based on current and expected trends when compared to historical weather records.

Experienced Severe Weather Conditions: The most severe, though infrequent, weather conditions that have been observed on the fire site area during the period weather records have been kept. These conditions can be used in making fire behavior forecasts for different scenarios.

Fire Effects: The physical, biological, and ecological impacts of fire on the environment.

Fire Management: Activities required for the protection of burnable wildland values from fire and the use of prescribed fire to meet land management objectives.

Fire Management Plan (FMP): A strategic plan that defines a program to manage wildland and prescribed fires and documents the Fire Management Program in the approved land use plan. The plan is supplemented by operational plans such as preparedness plans, preplanned dispatch plans, prescribed fire plans, and prevention plans.

Fire Management Unit (FMU): Any land management area definable by objectives, topographic features, access, values-to-be-protected, political boundaries, fuel types, or major fire regimes, etc., that set it apart from management characteristics of an adjacent unit. FMU's are delineated in FMP's. These units may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire Regime: A combination of fire frequency, fire timing and fire behavior characteristics operating in an ecological system.

Fire Retardant: Any substance except plain water that by chemical or physical action reduces flammability of fuels or slows their rate of combustion.

Fire Use: The combination of wildland fire use and prescribed fire applications to meet resource objectives.

Fuel Complex: Combinations of material that burn in a fire including organic soils, duff, litter, grass, dead branch wood, snags, logs, stumps, brush and to a limited degree, live tree foliage. Thirteen standard fuel models have been developed and are used to predict fire behavior within fuel complexes.

Fuel Loading: The amount of dead fuel present on a particular site at a given time; the percentage of fuel available for combustion changes with the season.

Hazard: A fuel complex defined by kind, arrangement, volume, condition, and location that forms a special threat of ignition and resistance to control.

Hazardous fuels: See Hazard.

Hazard Fuel Reduction: **Any treatment of living and dead fuels that reduces the threat of ignition and spread of fire.**

Heavy fuels: **Fuels of large diameter such as snags, logs, large limbwood, which ignite and are consumed more slowly that flash fuels.**

Initial Attack: An aggressive suppression action consistent with firefighter and public safety and values to be protected.

Mitigation Actions: Actions taken by Park officials to reduce the severity of a wildland fire.

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

Natural Fires: Fires resulting from lightning or other forms of natural ignitions.

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

Prescribed Fire Plan: A plan required for each fire application ignited by managers. It must be prepared by qualified personnel and approved by the appropriate agency administrator prior to implementation. Each plan will follow specific agency direction and must include critical elements described in agency manuals.

Prescription: Measurable criteria that define conditions under which a prescribed fire may be ignited, guide selection of appropriate management responses, and indicate other required actions. Prescription criteria may include safety, economical, public health, environmental, geographic, administrative, social, or legal considerations.

Wildfire: An unwanted wildland fire.

Wildland Fire: any nonstructural fire, other than prescribed fire, that occurs in the wildland. *This term encompasses fires previously called both wildfires and prescribed natural fires.*

Wildland Fire Management Program: The full range of activities and functions necessary for planning, preparedness, emergency suppression operations, and emergency rehabilitation of wildland fires, and prescribed fire operations, including fuels management to reduce risks to public safety and to restore and sustain ecosystem health.

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

Wildland Fire Suppression: An appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire.

Wildland Fire Use: The management of naturally ignited wildland fires to accomplish specific prestated resource management objectives in predefined geographic areas outline in FMP's.

Wildland – Urban Interface: The location where homes and other structures are co-mingled with wildland fuel complexes.

APPENDIX C: ENVIRONMENTAL ASSESSMENT

APPENDIX D: COMPLIANCE WITH NHPA

APPENDIX E: FEDERAL AND STATE LISTED SPECIES

A Listing of Federal and State Protected Species
Occurring in the Outer Banks Group as of September 1, 2000

Compiled by
North Carolina Heritage Program
North Carolina Division of Parks and Recreation
Department of Environment, Health, and Natural Resources

Table 1: Plants

Scientific Name	Common Name	State Status	Federal Status
Amaranthus pumilus	Seabeach Amaranth	T	T
Hudsonia tomentosa	Wooly Beach Heather	SR	
Lilaeopsis carolinensis	Carolina Grasswort	T	
Ludwigia alata	Winged Seedbox	SR	
Trichostema sp 1	Dune Bluecurls	C	SC

Note: NC Heritage Program uses a database developed and maintained by The Nature Conservancy

State Codes:
E Endangered
T Threatened
SR Significantly Rare
C Candidate

Plant status are determined by the Plant Conservation Program and the Natural Heritage Program. E, T, and SC species are protected by state law. C and SR designations indicate rarity and the need for population monitoring and conservation action.

Federal Codes:
E Endangered
T Threatened
P Proposed
C Candidate
SC Species of Concern

Table 2: Animals

Scientific Name	Common Name	State Status	Federal Status
Condylura cristata pop 1	Star-nosed mole – Coastal Plain	SC	
Peromyscus leucopus easti	Pungo White-footed Mouse	SR	
Bataurus lentiginosus	American Bittern	SR	
Charadrius melodus	Piping Plover	T	T
Charadrius wilsonia	Wilson's Plover	SR	
Circus cyaneus	Northern Harrier	SR	
Coturnicops noveboracensis	Yellow Rail	SR	
Egretta caerulea	Little Blue Heron	SC	
Egretta thula	Snowy Egret	SC	
Egretta tricolor	Tricolored Heron	SC	
Falco peregrinus	Peregrine Falcon	E	
Haliaeetus leucocephalus	Bald Eagle	E	
Laterallus jamaicensis	Black Rail	SR	SC
Pelecanus occidentalis	Brown Pelican	SC	
Plegadis falcinellus	Glossy Ibis	SC	
Rynchops niger	Black Skimmer	SC	
Sterna antillarum	Least Tern	SR	
Sterna caspia	Caspian Tern	SR	
Sterna dougallii	Roseate Tern	E	E
Sterna hirundo	Common Tern	SR	
Sterna nilotica	Gull-billed Tern	T	
Alligator mississippiensis	American Alligator	T	T(S/A)
Caretta caretta	Loggerhead Sea Turtle	T	T
Chelonia mydas	Green Sea Turtle	T	T
Dermochelys coriacea	Leatherback Sea Turtle	E	E
Malaclemys terrapin	Northern Diamondback Terrapin	SC	SC
Nerodia sipedon williamengelsi	Carolina Salt Marsh Snake	SC	
Papilio cresphontes	Giant Swallowtail	SR	

Note: NC Heritage Program uses a database developed and maintained by The Nature Conservancy

State Codes:
E Endangered
T Threatened
SR Significantly Rare
C Candidate

Animal status are determined by the Plant Conservation Program and the Natural Heritage Program. E, T, and SC species are protected by state law. C and SR designations indicate rarity and the need for population monitoring and conservation action.

Federal Codes:
E Endangered
T Threatened
P Proposed
C Candidate
SC Species of Concern

T(S/A) This species is no longer biologically endangered or threatened and is not subject to Section 7 consultation.

APPENDIX F: FIRE HISTORY

FIRE SUMMARY LIST BY FIRE TYPES FOR 1972 THRU 2000

FOR UNIT: Cape Hatteras National Seashore
FIRE TYPES: ALL FIRE TYPES
CAUSE CODES: ALL CAUSES
PEOPLE CODES ALL PEOPLE CODES
CLASS SIZE: ALL CLASS SIZES

FIRE YEAR	FIRE TYPE	FIRE NUMBER	FIRE NAME	DISCOVERY DATE	DECLAR OUT DATE	DURATION DAYS	CLASS SIZE	AGENCY ACRES BURNED	TOTAL ACRES BURNED
1972	11	2001		08-22	08-22	1	A	0.1	0.1
	11	2002		07-20	07-20	1	B	3.0	3.0
	11	2003		07-09	07-09	1	B	1.0	1.0
	11	2004		07-02	07-02	1	B	4.0	4.0
	11	2005		06-28	06-28	1	A	0.1	0.1
	11	2006		06-25	06-25	1	B	1.0	1.0
	11	2007		06-07	06-07	1	B	1.0	1.0
1973	16	3001		11-14	11-14	1	A	0.0	0.1
	11	3002		10-26	10-26	1	B	4.0	4.0
	11	3003		10-25	10-25	1	A	0.1	0.1
	11	3004		10-25	10-25	1	A	0.1	0.1
	11	3005		10-06	10-06	1	A	0.1	0.1
	11	3006		09-07	09-07	1	A	0.1	0.1
	11	3007		08-16	08-16	1	A	0.1	0.1
	11	3008		08-15	08-15	1	A	0.1	0.1
	11	3009		08-01	08-01	1	A	0.1	0.1
	11	3010		07-22	07-22	1	A	0.1	0.1
	11	3011		06-10	06-10	1	A	0.1	0.1
	11	3012		04-06	04-06	1	A	0.0	0.1
1974	16	4001		03-03	03-03	1	A	0.0	0.1
	11	4002		03-03	03-03	1	B	6.0	6.0
	11	4003		03-03	03-03	1	B	4.0	4.0
	11	4004		07-21	07-21	1	A	0.0	0.0
	11	4005		09-05	09-05	1	B	1.0	1.0
	11	4006		11-16	11-16	1	A	0.1	0.1
	11	4007	MilePost	11-09	11-09	1	A	0.1	0.1
	11	4008	PI Comp	10-16	10-16	1	B	7.0	7.0
	12	4009	Pea Is	10-05	10-07	3	C	0.0	23.0
	11	4010	M.T.	04-24	04-25	2	B	5.0	5.0
1975	11	5001	Ramp 52	11-08	11-08	1	B	1.0	1.0
	11	5002	Dirt Bag	09-14	09-14	1	B	1.0	1.0
	11	5003		08-17	08-17	1	B	1.0	1.0
	11	5004	Frisco W	10-20	10-20	1	B	3.0	3.0
	11	5005	Fire cra	08-09	08-09	1	B	1.0	1.0
	11	5006	Billy M	07-02	07-02	1	B	1.0	1.0
	11	5007	Hot Foot	06-23	06-23	1	B	1.0	1.0
	11	5008	Bad Time	06-16	06-16	1	B	1.0	1.0
	11	5009	Frisco 1	06-09	06-09	1	B	1.0	1.0
	11	5010	Ramp 18-	04-20	04-20	1	B	1.0	1.0
	11	5011	Joe’s Ba	03-29	03-29	1	A	0.1	0.1
1976	11	6001	Whalebon	11-13	11-13	1	A	0.1	0.1
	11	6002	Frisco 3	09-03	09-03	1	A	0.1	0.1
	11	6003	Flicker	08-06	08-06	1	B	1.0	1.0
	11	6004	Frisco 1	07-04	07-04	1	B	1.0	1.0
	11	6005	Powerlin	06-01	06-01	1	B	3.0	3.0
	11	6006	Cattail	06-15	06-15	1	A	0.1	0.1
	11	6007	Cape Pt	05-21	05-22	2	B	1.0	1.0
	11	6008	OR Inlet	04-24	04-24	1	B	4.0	4.0
	11	6009	Cook Out	04-17	04-17	1	A	0.1	0.1
	11	6010	Mine	03-31	03-31	1	B	5.0	5.0
	11	6011	Ramp 54	03-05	03-05	1	B	1.0	1.0
1977	11	7001	Avon 1	06-04	06-4	1	B	1.0	1.0
	11	7002	Hatteras	08-08	08-08	1	B	1.0	3.0
	11	7003	Lightnin	08-09	08-09	1	A	0.0	0.0
	11	7004	Salvo 1	07-18	07-18	1	B	1.0	1.0
	11	7005	Frisco	07-20	07-20	1	B	1.0	1.0

FIRE YEAR	FIRE TYPE	FIRE NUMBER	FIRE NAME	DISCOVERY DATE	DECLARED OUT DATE	DURATION DAYS	CLASS SIZE	AGENCY ACRES BURNED	TOTAL ACRES BURNED
1977	11	7006	Ramp 46	04-11	04-11	1	B	2.0	2.0
	11	7007	Comfort	05-15	05-15	1	A	0.1	0.1
	11	7008	Lighthou	02-07	02-07	1	A	0.1	0.1
	11	7011	Airstrip	02-21	02-21	1	A	0.1	0.1
	11	7012	Dough fi	02-21	02-21	1	A	0.1	0.1
1978	11	8001	Ramp 22	10-28	10-28	1	A	0.1	0.1
	11	8002	Wimble	10-21	10-21	1	A	0.1	0.1
	11	8003	Cape Pt	10-02	10-02	1	A	0.1	0.1
	11	8004	MP-59	08-15	08-15	1	B	2.0	2.0
	15	8005	Avon 1	07-12	07-12	1	A	0.0	3.0
	11	8007	Salt Fla	04-08	04-08	1	B	3.0	3.0
	16	8008	Indian H	05-12	05-12	1	A	0.0	30.0
1979	11	9001	Ramp 70	09-08	09-08	1	B	1.0	1.0
	11	9002	Ramp 18	08-11	08-12	2	B	9.0	9.0
	11	9003	Frisco 1	08-09	08-09	1	A	0.1	0.1
	11	9004	One Way	07-08	07-08	1	B	1.0	1.0
	11	9004	Ramp 16	06-21	06-22	2	B	2.0	2.0
	11	9006	Frisco D	05-27	05-27	1	A	0.1	0.1
	11	9007	500 Ft R	05-01	05-01	1	A	0.1	0.1
	16	9008	Buxton	03-23	03-23	1	A	0.0	4.0
	11	9008	Hatteras	03-13	03-14	2	B	2.0	2.0
1980	11	0001	Mos Lot	06-10	06-10	1	A	0.1	0.1
	11	0002	CG Housi	08-08	08-08	1	A	0.1	0.1
	11	0003	Ramp 14	07-04	07-04	1	A	0.1	0.1
	11	0004	Ramp 12	07-04	07-04	1	A	0.1	0.1
	11	0005	Ramp 55	06-11	06-12	2	B	1.0	1.0
	11	0006	Ramp 22	06-12	06-12	1	B	4.0	4.0
	11	0007	One Way	03-26	03-26	1	B	1.0	1.0
1981	11	1001	Goose Cr	02-10	02-13	3	B	7.0	7.0
	11	1002	Milepost	01-27	01-27	1	B	6.0	6.0
	16	1010	Waves Sa	10-14	10-15	2	A	0.0	50.0
	11	1011	First Gr	04-05	04-05	1	C	17.0	17.0
	16	1901	Waves SA	10-14	10-15	2	A	0.0	50.0
	11	2816	Goose Cr	02-10	02-13	3	B	7.0	7.0
	11	1817	Milepost	01-27	01-27	1	B	6.0	6.0
	11	2818	Ramp 16	01-23	01-24	2	A	0.1	0.1
	11	2819	Pline 1	06-30	06-30	1	A	0.0	0.1
	11	2820	Lightnin	07-17	07-17	1	A	0.0	0.1
	11	2821	Lightn 2	07-17	07-17	1	A	0.0	0.1
	11	2822	Pline 2	08-01	08-01	1	A	0.0	0.1
	11	2823	Ramp 70	07-12	07-12	1	A	0.1	0.1
1982	16	2815	NagsHead	07-27	07-27	1	A	0.0	0.1
	11	2816	Pittman	04-24	04-25	2	A	0.1	0.1
	11	2817	Grt swas	04-04	04-05	2	B	9.0	9.0
	11	2818	Hammock	07-27	07-27	1	A	0.0	0.1
	11	2819	Surfnsou	07-17	07-18	2	A	0.1	0.1
	11	2820	Kinnakee	10-12	10-13	2	A	0.1	0.1
	11	2821	Ramp 38	08-30	08-30	1	A	0.1	0.1
	11	2822	Frisco W	12-18	12-18	1	B	1.0	1.0
1983	11	2815	Styron H	04-11	04-11	1	A	0.1	0.1
	11	2816	Plane Cr	04-15	04-16	2	A	0.1	0.1
	11	2817	Firshat	06-21	06-22	2	A	0.1	0.1
	11	2818	Perkins	07-23	07-24	2	A	0.1	0.1
	11	2819	P Vogt	07-27	07-28	2	A	0.1	0.1
	11	2820	Frinco 1	07-04	07-05	2	A	0.1	0.1
	11	2821	N Buxton	08-02	08-03	2	A	0.1	0.1
	11	2822	Frisco 2	08-26	08-27	2	A	0.1	0.1
	16	2823	S Curves	09-27	09-28	2	A	0.0	50.0
	11	2824	Butch	11-14	11-14	1	A	0.1	0.1
1984	11	2841	Island C	04-06	04-06	1	A	0.1	0.1
	11	2930	Austin C	08-18	08-18	2	A	0.1	0.1
	11	2986	Lori	09-09	09-10	2	C	30.0	30.0
1985	11	0002	Surfnsou	07-02	07-03	2	A	0.1	0.1
1986	11	0001	Routetwe	02-09	02-09	1	A	0.1	0.1
	11	0002	St Pat	03-17	03-18	2	C	19.5	19.5
	16	0004	NorthBea	03-31	0401	2	A	0.0	65.0

FIRE YEAR	FIRE TYPE	FIRE NUMBER	FIRE NAME	DISCOVERY DATE	DECLARED OUT DATE	DURATION DAYS	CLASS SIZE	AGENCY ACRES	TOTAL ACRES
1986	11	0006	Myrtle	06-04	06-06	3	B	3.7	3.7
	13	0007	Ramp 30-	06-11	06-11	1	A	0.1	0.1
	11	0008	Ramp 70	07-04	07-04	1	A	0.2	0.2
	13	0009	Windsurf	07-10	07-11	2	A	0.1	0.1
	14	0010	Ramp 27	11-06	11-07	2	B	1.0	1.0
1987	48	0001	BuxtonWa	02-12	02-15	4	C	14.0	14.0
	48	0002	BodiePon	03-19	03-19	1	B	2.0	2.0
	48	0003	Patenshr	03-24	03-27	4	C	55.0	55.0
	48	0004	Juncusiv	03-24	03-27	4	C	10.0	10.0
	48	0005	Dunestud	04-02	04-03	2	B	1.0	1.0
	48	0007	Phragmit	04-30	04-30	1	B	2.0	2.0
	48	0008	Avondune	05-04	05-06	3	C	15.0	15.0
	14	0009	Marina	06-10	06-13	4	A	0.2	0.2
	11	0011	Wayside	10-16	10-17	2	A	0.1	0.1
	11	0012	Bridge	10-18	10-19	2	A	0.1	0.1
	14	0013	Range Da	10-22	10-23	2	B	4.0	4.0
1988	48	0001	S Mgt Bu	03-29	03-29	1	B	9.0	9.0
	48	0002	N Marshr	03-29	03-29	1	B	6.0	6.0
	13	0003	OCR CG	04-21	04-21	1	A	0.1	0.1
	12	0004	USCG	04-23	04-23	1	A	0.1	0.1
	11	0005	Hatteras	06-13	06-14	2	A	0.1	0.1
	13	0006	Kona KAI	07-01	07-02	2	A	0.2	0.2
	11	0007	S. Pine	07-02	07-03	2	A	0.2	0.2
	12	0008	Cuttysar	07-05	07-06	2	A	0.1	0.1
	11	0009	Hatteras	07-08	07-09	2	A	0.1	0.1
	16	0010	Boat Ram	07-19	07-19	1	A	0.0	0.6
	11	0011	OCR Ramp	07-16	07-16	1	A	0.1	0.1
	16	0012	Needleru	07-27	07-28	2	A	0.0	7.4
	11	0013	Ferry Do	08-16	08-16	1	A	0.1	0.1
	51	0014	Dory Rd	None	None	0		0.0	0.0
1989	21	0001	Lighthou	01-19	01-19	1	A	0.1	0.1
	11	0002	Kinnekee	01-27	01-28	2	A	0.1	0.1
	16	0003	N Beach	05-13	05-13	1	A	0.0	1.2
	11	0005	K Shore	07-13	07-14	2	A	0.1	0.1
	16	0006	Surfer	07-18	07-18	1	A	0.0	100.0
	11	0008	Ramp 55	08-22	08-23	2	B	0.2	0.2
	11	0009	Ramp 30	08-25	08-26	2	A	3.7	3.7
	12	0010	Seagull	10-28	10-28	1	A	0.1	0.1
	11	0012	Niceday	10-28	10-29	2	A	0.2	0.2
	56	0013	Cross Rd	None	None	0	A	0.0	0.0
	37	0014	Tanner	None	None	0		0.0	0.0
	37	0015	Maple Fl	None	None	0		0.0	0.0
	37	0016	Chalk Cr	None	None	0		0.0	0.0
	37	0017	Lowman	None	None	0		0.0	0.0
1990	16	0001	Highscho	01-11	01-12	2	A	0.0	1.0
	56	0002	Support	None	None	0	A	0.0	0.0
	11	0003	Tower	02-28	02-28	1	B	8.8	8.8
	56	0004	Avon2Aid	None	None	0	A	0.0	0.0
	16	0005	Hatsand	06-07	06-07	1	A	0.0	0.1
	11	0006	Styronhi	06-10	06-12	2	B	3.5	3.5
	11	0007	Innerdun	06-23	06-24	2	A	0.1	0.1
	16	0008	Bigbang	07-04	07-05	2	A	0.0	0.0
	11	0009	Juice	08-14	08-14	1	B	0.3	0.3
	11	0010	Frisco 1	10-15	10-16	2	A	0.2	0.2
	48	0011	Lths Pon	11-14	11-15	2	B	2.0	2.0
	48	0012	Patenshr	11-04	11-05	2	C	53.0	53.0
	16	0013	Buxton	11-28	12-03	6	A	0.0	5.0
1991	16	0001	Fish hou	02-28	02-28	1	A	0.0	2.0
	16	0003	Oceanwav	05-14	05-15	2	A	0.0	5.0
	16	0003	Oyster C	05-18	05-19	2	A	0.0	0.1
	11	0004	Ferry	06-12	06-13	2	A	0.1	0.1
	21	0005	Firework	07-03	07-04	2	A	0.1	0.1
	37	0006	Support	None	None	0	A	0.0	0.0
	48	0007	Bimarsh2	10-23	10-26	4	E	600.0	600.0
	48	0008	RX2E	10-27	10-27	1	C	47.0	47.0
	11	0009	Oldstati	10-28	10-29	2	B	1.0	1.0
	37	0010	NZComple	None	None	0	A	0.0	0.0
	11	0012	Hallowee	11-01	11-01	1	B	2.5	2.5
	11	0013	N Pond	11-03	11-03	1	B	1.0	1.0

FIRE YEAR	FIRE TYPE	FIRE NUMBER	FIRE NAME	DISCOVERY DATE	DECLARED OUT DATE	DURATION DAYS	CLASS SIZE	AGENCY ACRES BURNED	TOTAL ACRES BURNED
1992	16	0001	Flowers	03-02	03-04	3	A	0.0	3.0
	11	0004	Frisco 6	05-24	05-24	1	A	0.1	0.1
	11	0005	Campgrou	06-23	06-23	1	A	0.1	0.1
	16	0006	Bubba	06-23	06-23	1	A	0.0	0.1
	11	0007	Buck	06-26	06-29	4	A	0.1	0.1
	11	0010	Fiestiva	07-04	07-05	2	A	0.1	0.1
	37	0013	Foothill	None	None	0	E	0.0	0.0
	37	0014	Support	None	None	9	E	0.0	0.0
	48	9215	Bilight	11-10	11-10	1	A	87.0	87.0
1993	56	0001	Elec-com	None	None	0	A	0.0	0.0
	37	0002	Support	None	None	0	A	0.0	0.0
	37	0004	Support	None	None	0	A	0.0	0.0
	11	0006	Power Li	07-03	07-03	1	A	0.1	0.1
	11	0007	Wright 2	07-09	07-09	1	A	0.1	0.1
	37	0008	Boerma R	None	None	0	A	0.0	0.0
	16	0013	Aydlett	10-02	10-03	2	A	0.0	1.5
1994	48	0001	Avon S	02-17	02-19	3	C	30.0	30.0
	16	0003	Oyster C	04-19	04-19	1	A	0.0	0.1
	11	0006	B Loop	06-07	06-07	1	A	0.1	0.1
	11	0007	July 4	07-04	07-04	1	A	0.1	0.1
	11	0008	S Point	07-07	07-07	1	A	0.1	0.1
	16	0009	Storm Co	08-01	08-02	2	A	0.0	0.1
	11	0012	FriscoII	10-11	10-11	1	A	1.5	1.5
	37	0013	Hatchery	None	None	0		0.0	0.0
	37	0014	Idaho Ci	None	None	0		0.0	0.0
	37	0015	Blackwel	None	None	0		0.0	0.0
	37	0016	P41875	None	None	0		0.0	0.0
	37	0018	Lake Fir	None	None	0		0.0	0.0
	37	0019	Idahocit	None	None	0		0.0	0.0
	37	0020	Mankato	None	None	0		0.0	0.0
	37	0021	Thunderb	None	None	0		0.0	0.0
	37	0022	Ltmalheu	None	None	0		0.0	0.0
	37	0023	Pennycli	None	None	0		0.0	0.0
	37	0024	Idahocit	None	None	0		0.0	0.0
1995	15	0001	J Dunes	04-20	04-20	1	A	0.0	0.3
	11	0002	M. Uhr	06-14	06-15	2	A	0.1	0.1
	11	0003	Lightnin	06-12	06-12	1	A	0.1	0.1
	11	0004	OneWayRD	07-04	07-05	2	A	0.1	0.1
	11	0005	J Logsdo	07-04	07-05	2	B	0.3	0.3
	11	0006	Framk	07-05	07-06	2	A	0.1	0.1
	11	0007	Mcdonna	08-02	08-02	1	A	0.2	0.2
1996	11	0001	Rocket	03-30	03-31	2	B	1.8	1.8
	11	0002	Savoy	06-28	06-28	1	A	0.1	0.1
	37	0003	Pungo Lk	None	None	0	A	0.0	0.0
	13	0004	S Shore	07-26	07-26	1	A	0.1	0.1
	11	0005	Beachcom	08-12	08-12	1	A	0.1	0.1
	37	0006	Simnasho	None	None	0	A	0.0	0.0
	37	0007	Kaweak	None	None	0	A	0.0	0.0
	11	0008	Soundsid	10-28	10-28	1	B	1.0	1.0
1997	37	0001	Flare	None	None	0	A	0.0	0.0
	13	0002	Fugitive	04-25	04-26	2	A	0.1	0.1
	13	0003	B30	05-18	05-19	2	A	0.1	0.1
	51	0004	False I	None	None	0	A	0.0	0.0
	11	0005	Lighthou	06-13	06-20	8	D	109.0	109.0
	13	0006	Kamp	08—02	08—03	2	A	0.1	0.1
	13	0007	Oceanvie	08-03	08-04	2	B	0.3	0.3
	13	0008	Fax	08-06	08-07	2	A	0.1	0.1
	37	0009	SundayBe	None	None	0	A	0.0	0.0
	16	0010	Runboat	10-20	10-21	2	A	0.0	0.1
1998	11	0001	Welder	01-02	01-03	2	A	0.1	0.1
	11	0002	Wire	05-07	05-09	3	C	13.2	13.2
	13	0003	Sofa	06-10	06-11	2	A	0.1	0.1
	37	0004	Florida	None	None	0		0.0	0.0
	12	0005	C Point	07-04	07-05	2	A	0.2	0.2
	13	0006	Mazda	07-29	07-30	2	A	0.1	0.1
	37	0007	Texas	None	None	0		0.0	0.0
	13	0008	Nichols	08-08	08-10	3	A	0.1	0.1

FIRE YEAR	FIRE TYPE	FIRE NUMBER	FIRE NAME	DISCOVERY DATE	DECLARED OUT DATE	DURATION DAYS	CLASS SIZE	AGENCY ACRES BURNED	TOTAL ACRES BURNED
1999	11	0001	Interdun	07-18	07-19	2	A	0.2	0.2
2000	37	0001	TestBurn	None	None	0		0.0	0.0
	37	0002	Quad 5	None	None	0		0.0	0.0
	11	0003	Pole	05-19	05-22	4	D	145.0	145.0
	37	0004	Support	None	None	0		0.0	0.0
	37	0005	Support	None	None	0		0.0	0.0
	37	0006	Support	None	None	0		0.0	0.0
	37	0007	Support	None	None	0		0.0	0.0
	37	0008	Support	None	None	0		0.0	0.0
	13	0009	Old Nag	08-15	08-16	2	B	0.5	0.5
	37	0010	Support	None	None	0		0.0	0.0

Numbers in red indicate possible dual entry

FIRE TYPES:

1. Suppressed Fires
2. Natural Outs
3. Support Actions
4. Prescribed Fires
5. False Alarm

CAUSE CODES:

1. Lightning
2. Campfire
3. Smoking
4. Debris Burning
5. Incendiary
6. Equipment Use
7. Railroads
8. Children
9. Miscellaneous

PEOPLE CODES

0. For all fires where cause is lightning or unknown
1. For all individuals who own land or business within National Area
2. Special Use Permittees
3. Contractors and their agents or employees
4. For all federal, state, county, municipal, or other public employees
5. Permanent residents living inside or within one mile outside the National Area
6. Seasonal residents or workers residing inside or within one mile outside the National Area
7. All tourist, motorists, campers, etc.
8. All people not included above

CLASS SIZE:

A: 0 - 0.2 Acres
B: 0.3 – 9 Acres
C: 10 - 99 Acres
D: 100-299 Acres
E: 300-999 Acres
F: 1000–5000 Acres
G: >5000 Acres

SOURCE:

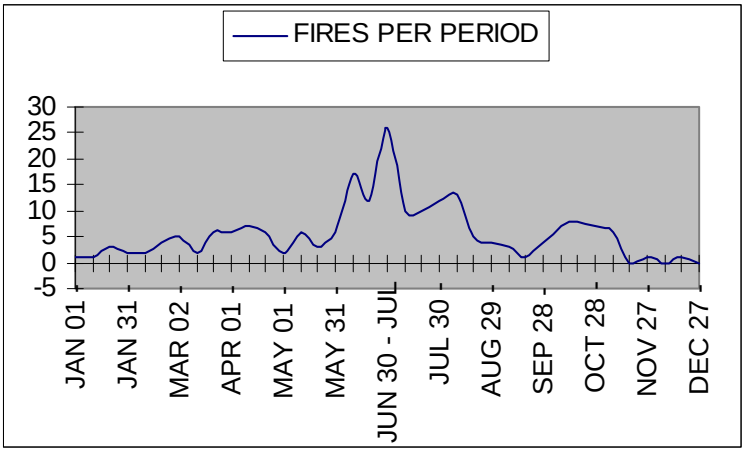
SHARED APPLICATION COMPUTER SYSTEM (SACS), 2000. Branch of Fire and Aviation. National Park Service. Boise, Idaho.

FIRE SUMMARY LIST BY FIRE TYPES FOR 1972 THRU 1999

FOR UNIT: Cape Hatteras National Seashore
FIRE TYPES: SUPPRESSION - ALL WILDFIRES
CAUSE CODES: ALL CAUSES
PEOPLE CODES ALL PEOPLE CODES
CLASS SIZE: ALL CLASS SIZES

YEAR	TOTAL FIRES	AGENCY ACRES BURNED	TOTAL ACRES BURNED
1972	7	10.2	10.2
1973	12	4.9	5.0
1974	10	23.2	46.3
1975	11	12.1	12.1
1976	11	16.4	16.4
1977	10	6.4	8.4
1978	7	5.3	38.3
1979	9	15.3	19.3
1980	7	6.4	6.4
1981	10	30.2	80.6
1982	8	10.4	10.6
1983	10	0.9	50.9
1984	3	30.2	30.2
1985	1	0.1	0.1
1986	8	24.8	89.7
1987	4	4.4	4.4
1988	11	1.1	9.1
1989	9	4.5	104.6
1990	9	12.9	19.0
1991	8	4.7	11.7
1992	6	0.4	3.5
1993	3	0.2	1.7
1994	6	1.8	32.0
1995	7	0.9	1.2
1996	5	3.1	3.1
1997	7	109.7	109.8
1998	6	13.8	13.8
1999	1	0.2	0.2
2000	2	145.5	145.5

SHARED APPLICATION COMPUTER SYSTEM (SACS), 2000. Branch of Fire and Aviation. National Park Service. Boise, Idaho.


FIRES PER PERIOD
30
25
20
15
10
5
0
-5
JAN 01
JAN 31
MAR 02
APR 01
MAY 01
MAY 31
JUN 30 - JUL
JUL 30
AUG 29
SEP 28
OCT 28
NOV 27
DEC 27

APPENDIX G: FIRE AGREEMENTS

Table 1: Key Interagency Contacts

Contact	Title	Phone Number
Thomas G. Crews, Jr.	District FMO	252-473-1131 ext. 232
Roger Stallard	District Forester, NCFS	
Barb Blonder	Northern Sites Mgr., NCCR	
Ron G. Hollifield	Dare County Forest Ranger, NCFS	252-475-2531
	Chief, Avon VFD.	
	President, Buxton VFPA	
	Chief, Chicamacomico Banks VFD	
	Chief, Collington VFD	
	Dare Co. Communications Center	
	Chief, Frisco VFD	
	Chief, Hatteras VFD	
	Hyde Co. Communications Center	
Doug Penland	Chief, The Kill Devil Hills FD	
Tim Morrison	Fire Chief, Town of Nags Head	252-441-5909
	Chief, Ocracoke VFD	
	Chief, Roanoke VFD	
	President, Salvo VFD	

APPENDIX H: FIRE PREVENTION ANALYSIS

RESERVED

APPENDIX I: FIRE CACHE INVENTORY

Table 1 – Normal Unit Strength – Equipment

ITEM	YEAR PURCHASED	PERCENT OF FIRE FUNDING	HAVE	GVW	NEED Or REP-LACE	MIN. GVW
Engine Module						
❑ Type 6X – Bodie			1			18K
❑ Type 6X – Buxton			1			18K
❑ Type 6X – Ocracoke			1			18K
Slip-on Units/Trailer						
❑ 200 gallon - WBNM			1			
❑ 200 gallon – Bodie			1			
❑ 200 gallon – Buxton			2			
❑ 200 gallon – Ft Raleigh			1			
Water Tender						
Fold-a-Tank						
Power Saws						
❑ Brush saws					4	
❑ Chain Saw-Stihl .025			1			
❑ Chain Saw-Stihl .026			1			
❑ Chain Saw-Stihl .028			1			
❑ Chain Saw-Stihl .034			3		8	
❑ Chain Saw-Stihl .036			1			
❑ Chain Saw-Stihl .048			1		2	
Portable Pumps						
❑ Mark III			3		7	
❑ Float – A Pump					1	
Leaf Blower					1	
Weedeater – Heavy Duty					3	
Mowers						
Tractors						
ATV – 4wd w/pump & tank – foam capable					1	
Other:						
❑ Brush Hog					1	
❑ AX5 or D6 with Special Treads					1	
❑ RAWS					2	
❑ Chipper			2			
❑ Programmable Radios					20	

Table 2: Normal Unit Strength – Bodie Island Cache

Minimum Cache Inventory – 20 Person Cache		
A. Item	***B. Quantity***	
	Have	**Recommended Stocking Level**
Hose, lightweight, lined 1.5 inch x 100 feet	10	9
Hose, lightweight, lined 1 inch x 100 feet	10	9
Hose, lightweight, lined 3/4inch x 100 feet		9
Mop-up Kit		1
1.5 inch NH gated wye		9
1 inch Forester nozzle		9
Wrench, Hydrant spanner		3
Hose Clamp		5
Foam concentrate		10 gallons
Flapper		8
Pulaski w/sheath		10
Shovel w/sheath		10
Rake		8
Combi Tool		8
Drip Torch		8
Fusees		2 Cases
Safety Can – 3 Gallon		4
Backpack Pump		10
Canteen, Large		4
Belt Weather Kit		4
Hard Hat		24
Goggles		24
Fire Shelter		24
Line Pack w/harness		24
Water Bottle		96
Ear Plugs		24 Packs
Leather Gloves, assorted sizes		30 pair
Personal Gear Pack (Red Bag)		24
Personal First Aid Kits		24
Nomex Shirts Small Medium Large X-Large		 4 12 16 12

Nomex Pants –Mens 28x30 32x30 32x34 34x30 34x32 34x34 36x30 36x32 36x34 38x34 40x34		Enter Desired Number Should have 48 Assorted Pairs (Men and Wmn)
Nomex Pants – Womens Size 10 Size 12 Size 14 **Size 16**		
Flight Helmets		12 Assorted Sizes
Flight Suits and Gloves		16 pair each Assorted Sizes

Table 3: Normal Unit Strength – Buxton Cache

Minimum Cache Inventory – 20 Person Cache		
C. Item	***D. Quantity***	
	Have	**Recommended Stocking Level**
Hose, lightweight, lined 1.5 inch x 100 feet	12	18
Hose, lightweight, lined 1 inch x 100 feet	15	18
Hose, lightweight, lined 3/4inch x 100 feet		18
Mop-up Kit		2
1.5 inch NH gated wye		9
1 inch Forester nozzle		9
Wrench, Hydrant spanner		3
Hose Clamp		5
Foam concentrate		10 gallons
Flapper		8
Pulaski w/sheath		10
Shovel w/sheath		10
Rake		8
Combi Tool		8
Drip Torch		8
Fusees		2 Cases
Safety Can – 3 Gallon		4
Backpack Pump		10
Canteen, Large		4
Belt Weather Kit		4
Hard Hat		24
Goggles		24
Fire Shelter		24
Line Pack w/harness		24
Water Bottle		96
Ear Plugs		24 Packs
Leather Gloves, assorted sizes		30 pair
Personal Gear Pack (Red Bag)		24
Personal First Aid Kits		24
Nomex Shirts Small Medium Large X-Large		 4 12 16 12

Nomex Pants –Mens 28x30 32x30 32x34 34x30 34x32 34x34 36x30 36x32 36x34 38x34 40x34		Enter Desired Number Should have 48 Assorted Pairs (Men and Wmn)
Nomex Pants – Womens Size 10 Size 12 Size 14 **Size 16**		

Table 4: Normal Unit Strength – Ocracoke Island Cache

Minimum Cache Inventory – 10 Person Cache		
E. Item	***F. Quantity***	
	Have	**Recommended Stocking Level**
Hose, lightweight, lined 1.5 inch x 100 feet	10	9
Hose, lightweight, lined 1 inch x 100 feet	10	9
Hose, lightweight, lined 3/4inch x 100 feet		9
Mop-up Kit		1
1.5 inch NH gated wye		9
1 inch Forester nozzle		9
Wrench, Hydrant spanner		3
Hose Clamp		5
Foam concentrate		10 gallons
Flapper		4
Pulaski w/sheath		5
Shovel w/sheath		5
Rake		4
Combi Tool		4
Drip Torch		4
Fusees		2 Cases
Safety Can – 3 Gallon		4
Backpack Pump		5
Canteen, Large		2
Belt Weather Kit		2
Hard Hat		12
Goggles		12
Fire Shelter		12
Line Pack w/harness		12
Water Bottle		48
Ear Plugs		12 Packs
Leather Gloves, assorted sizes		15 pair
Personal Gear Pack (Red Bag)		12
Personal First Aid Kits		12
Nomex Shirts Small Medium Large X-Large		 2 6 6 6

Nomex Pants –Mens 28x30 32x30 32x34 34x30 34x32 34x34 36x30 36x32 36x34 38x34 40x34		Enter Desired Number Should have 24 Assorted Pairs (Men and Wmn)
Nomex Pants – Womens Size 10 Size 12 Size 14 **Size 16**		
Flight Helmets		2 Large or X-Large
Flight Suits and Gloves		4 Pair each Assorted Sizes

APPENDIX J: MOBILIZATION PLAN

Outer Banks Group

Manteo, North Carolina

WILDFIRE MOBILIZATION PLAN

Submitted: _____ Date: _____
Chief Ranger

Approved: _____ Date: _____
Superintendent

WILDLAND FIRE MOBILIZATION PLAN

Purpose

The purpose of this plan is to provide for a more efficient response to wildland fire emergencies by the prompt dispatching of initial attack forces and/or fire personnel for out of area assignments.

Scope

This plan will apply to all wildfire responses in and outside of the Outer Banks Group. The actions contained in this plan will provide for a faster response time to fires occurring in the various parks within the Outer Banks Group (Group) that require more than a limited number of firefighters, thus keeping the fire small and avoiding progression to project fire status or the loss of public and private property.

Background

The need for mobilization and organization of initial attack crews for park wildland fires has been recognized. Recent call-outs for fires occurring in the national seashore and to units outside the Group have necessitated this plan. It is believed this plan will contribute towards a better response during wildfire emergencies.

Definitions

- ***Activated Status*** – Personnel from the Callout Roster have been dispatched to a fire.
- ***Alert Status*** – When the Group reaches Staffing Classes IV and/orV, or during periods of high visitation such as the 4th of July when there is a high probability that firefighters will be activated, those personnel on the Callout Roster will be notified and be subject to call-out. Firefighters that are "On Call" are encouraged to notify the Fire Management Officer when they will be unavailable during off-duty time, or when they will be at alternate locations for extended periods.
- ***Availability Log*** – A listing of available firefighters that is maintained by the Fire Management Officer, or others as assigned.
- ***Callout Roster*** – A list of red-carded firefighters from which initial attack squads or firefighters are drawn. This roster will include firefighters available for hire under the Emergency Firefighter Hiring Authority.
- ***Initial Attack Squad*** – Six firefighters including a qualified Squad Boss. If a qualified Squad Boss is not available, the most experienced red-carded firefighter will assume this role until relieved by a qualified person or the fire is declared out.
- ***Routine Status*** – Callout listing personnel attend to regular duties during Staffing Classes I, II, and III. No availability check-in is required.

Individual Responsibilities

- Each red-carded firefighter will have their assigned fire gear with them and in a state of readiness at all times during the established fire season. Fire gear should be carried to and from work to insure that it is immediately available.

  Personal fire gear is minimally defined as; 8" leather boots, helmet, goggles, gloves, fire-resistant shirt and pants, 2 canteens, and fire shelter.

- Red-carded firefighters on the Callout Roster are expected to be available for fire callout with supervisory release. The supervisor should approve availability in advance. Personnel who routinely decline fire assignments will be removed from the firefighter roster. The Incident Dispatcher will note reasons for declinations.
- During the period when the firefighter is in alert status, they are encouraged to keep the Fire Management Officer informed of extended absence from the area during off-duty time.
- Any factors that would preclude fire assignments for the individual during alert status (injury, illness, absence from the area, etc.) should be reported to the Fire Management Officer so that individual can be removed from the Call-out Roster.
- At the end of a fire assignment, have the fire supervisor sign the experience block on the back of the red card and update any performance taskbooks

Dispatcher Duties

- Notifies the Fire Management Officer of the fire report.
- Acts as Incident Dispatcher until relieved or assigned the duties.
- Dispatches Crew Boss or Incident Commander, and firefighters.
- Notifies each firefighter's supervisor.
- Provides incoming Incident Dispatcher updated information on arrival.

Incident Dispatcher Duties

- Contacts Incident Commander (IC) for specific Initial Attack personnel and equipment needs.
- Contacts the Initial Attack Crew Boss, if required.
- Contacts Division Chiefs and request supervisory release for firefighters not on Callout Roster.
- Contacts firefighters from Callout Roster. Name requests received from the Crew Boss or IC will be given highest notification priority.
- Orders specialized equipment (helicopters, etc.).
- Notifies firefighters' immediate supervisors after the crew is dispatched.

Fire Management Officer Duties

- Gains supervisory approval to place the name of a firefighter on the Callout Roster.

- Fire Management Officer or appropriate District Ranger will select an Incident Commander for each incident.
- Fire Management Officer or appropriate District Ranger is responsible for ensuring that qualification standards are adhered to for all assigned positions. In the event a qualified individual is not available to fill a need, the most qualified red-carded individual will be assigned the duties and a qualified individual ordered, if necessary.
- Completes the firefighter listing, complete with phone numbers at the beginning of fire season.
- If not otherwise assigned, may respond to the fire to collect fire behavior, fuel and weather information.

System Activation

This plan will be activated by the Fire Management Officer during the fire season and at any other time where there is a substantial threat of fire as indicated by; fire activity, fire weather data, National Planning Level, or Staffing Class status.

Crew Assignments

- Fire Management Officer will list the red-carded personnel on the Availability Log based on qualifications, skill levels, fitness level, and experience. This will be done by April 1st annually.
- Qualified firefighters will be listed by the Fire Management Officer, as will Crew Bosses and/or Incident Commanders at the beginning of the season. Thereafter, these assignments will be rotated, if possible. Once an individual receives an assignment, their name will be placed on the bottom of the assignment list. Firefighters needing trainee assignments will be given priority consideration, based on the size and complexity of the incident.
- The Crew Boss will appoint squad Bosses, as necessary.

Call-Out Procedures

- Fire Management Officer or District Ranger will select an Incident Commander for each incident.
- Initial Attack Incident Commander sizes up the incident.
- If three (3) or less firefighters are required to handle the incident, the IC will request District resources for initial attack.
- If more than three (3) firefighters are needed, the IC will request that the Wildfire Mobilization Plan be activated.
- A Crew Boss, if needed, is selected from the Callout Roster, in accordance with the plan. This individual designates a staging area for all firefighters to meet at and receive their assignments.

Crew Composition

- The respective District Ranger will handle incidents requiring less than three firefighters.
- Incidents requiring more than three firefighters will be managed in accordance with this plan.
- Composition will depend on firefighter availability and the needs of the IC.
- The IC will inform the Incident Dispatcher of any requirements for firefighters with specialized skills.
- The Closest Available Forces concept will be used on all local call outs.
- If the incident exceeds the abilities and qualifications of the Initial Attack IC, the Fire Management Officer will appoint or use the resource ordering process to dispatch a more highly qualified IC.
- The Fire Management Officer or Incident Commander may request a Resource Advisor from the Resource Management Division, when appropriate.

Staging Area

- The Crew Boss or IC will designate initial staging area.
- Transportation will be pooled whenever possible to the designated staging area.
- Maximum reporting time by firefighters to the designated staging area will not exceed one hour whenever possible.
- Tools and equipment will be drawn from the Fire Cache designated by the Fire Management Officer or the District Ranger.
- Movement of personnel and equipment will be expedited with due concern for safety, following established response procedures.

> It is important to remember that fire is an emergency. The quicker the response time, generally the sooner the fire is contained. Wildland fire in the various parks has the potential to be a life-threatening emergency. The time span between discovery and containment must be fairly rapid to reduce acreage burned and the resultant costs. **However, the safety of personnel must always be the first priority**.

Out of Park Assignments

- During wildland fire emergencies, the Group may be requested to provide resources. All contacts of this type will be made through the Fire Management Officer by the North Carolina Interagency Coordination Center. It is not unusual to receive requests for specific skills or, in some cases, name requests. In those instances, firefighters qualified for the position will be selected. Every effort will be made to get those needing trainee assignments into trainee slots.
- The Fire Management Officer will maintain a listing of Group firefighters available for out of area assignments. Resources will be rotated so that all interested employees have an opportunity to go on a fire assignment.
- The Coordination Center will designate the staging area.
- The Fire Management Officer will make travel arrangements for those assigned to the callout response.

- Firefighters sent out of the park on a mobilization of this type may be gone for up to 14 days, so they need to plan accordingly.
- Firefighters must take their red card and performance taskbook so that it can be signed off or completed at the end of the assignment.

Table 1: Listing of Outer Banks Group Firefighters

Name	SS Number	Qualified Jobs		Trainee Jobs	Fit-ness	*Last Out of Park*	Availabili	
		WF	RX				I Pa	Ou Park
Jon Anglin	[redacted]	FFT2 FFT1		ENGB			X	X
Kenny Ballance	[redacted]	FFT2					X	X
Doug Blackmon	[redacted]	FFT2					X	X
Bill Blevins	[redacted]	FFT2					X	X
Bill Caswell	[redacted]	FFT2					X	X
Michael Ice	[redacted]	FFT2					X	X
Barry Munyan	[redacted]	FFT2 FFT1 ENGB FALB ICT4					X	X
Steve Ryan	[redacted]	FFT2 FFT1 CRWB					X	X
Paul Stevens	[redacted]	Not Current						
Doug Stover	[redacted]	FFT2 FFT1					X	X
Dann Trexler	[redacted]	FFT2 FFT1 CRWB STEN STDZ STCR ICT4 ICT3		DIVS			X	X
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							
	[redacted]							

Table 2: Listing of BISO Support Personnel

Name	SS Number	Qualified Jobs		Trainee Jobs	Fit-ness	Last Out of Park	Availability	
		WF	OTHER				In Park	Out of Park

Table 3: Telephone Directory – Outer Banks Group Employees

Name	Home Number	Work Number	Cell Phone	Pager
Jon Anglin		252-441-7425	252-475-8325	
Kenny Ballance		252-928-5111	252-475-8320	
Doug Blackmon				
Bill Blevins				
Bill Caswell		252-928-5111	252-475-8319	
Jeff Cobb		252-473-2111, x119		
Michael Ice				
Barry Munyan		252-441-7425	252-475-8309	
Steve Ryan		252-441-7425	252-475-8311	
Paul Stevens			252-475-8307	
Doug Stover				
Dann Trexler		252-928-5111	252-475-8314	

Table 4: Telephone Directory – Interagency Contacts

Name	Home Number	Work Number	Cell Phone	Pager
NC Interagency Coordination Cent. Doug Francis		1-828-257-4264		
SACC Richard Black		1-770-458-2464		
Regional FMO Ken Garvin		1-404-562-3108		
GRSM FMO Leon Konz		1-423-436-1304		
Cape Lookout		252-728-2250		
USFWS Manteo Office Fire Dispatcher Tom Crews		 252-473-1131 252-473-1744 252-473-1131, x232		
North Carolina FS Ron Hollifield Fire Dispatcher Fairfield Office	252-475-3936	 252-473-2531 252-926-3041		1-888-487-0889
Dare Co. Emergency Manteo Buxton		 252-473-3481 252-986-2144		
Dare Co Fire Marshall Doug Remaley		252-473-1101, x262		
Hyde Co Emergency Swan Quarter		252-926-3171		
USDA Forest Service Croatan NF - J. Cherry		1-910-638-5628		
NC Highway Patrol		1-800-662-7956		
US Coast Guard Duty Officer		252-995-6411		
NOAA Newport, NC		252-223-5327		

Table 5: Telephone Directory – Emergency Fire Fighters

Name	Home Number	Work Number	Cell Phone	Pager

Incident Commander Standard Operating Procedures

DISPATCH:

- Receive report of fire information from dispatcher.
- Make initial resource order based on current and expected resistance to suppression.
- Utilize current weather, weather forecast, and fireline handbook tables to estimate:
  - Current rate of spread and flame length;
  - Arrival size and perimeter of fire;
  - Worst case (1400 hrs) rate of spread and flame length.
- Respond with two engines when practical.
- Order a spot weather forecast whenever possible.

TRAVEL TO FIRE:

- Utilize radio to brief and deploy responding resources.
- Brief resources thoroughly on safety concerns.
- Caution crews to drive safely and take it easy on the equipment.
- Instruct crew to stop and lock hubs as soon they leave the pavement.

ARRIVAL AT FIRE:

- Upon arrival, size up the fire and deploy resources as needed.
- Approach fire from the rear or rear flanks, not from head. Beware of wind shifts, and determine and notify crews of escape routes whenever travelling in unburned fuel.
- Identify good safety zones and escape routes.
- Deploy resources in tandem or as groups whenever practical.
- Relieve any volunteers who are on the fire as soon as possible.
- Maintain radio contact with all resources on the fire and request periodic progress checks.
- Keep notes on deployments and events.
- Relay size-up and initial weather observations to dispatcher:
  - Terrain and fuel type;
  - Fire behavior and rate of spread;
  - Current fire acreage;
  - Projected fire acreage and time of control;
  - Values at risk.
  - Current Weather Observations (using belt weather kit);
    - Temperature;
    - relative humidity;
    - wind speed and direction;
    - cloud cover and comments;
- Insure planning, finance, and logistical support are provided for all resources assigned to the fire. Do not overlook providing drinking water, beverages, meals, and sleeping arrangements as necessary.
- Order additional resources, or release responding resources, as appropriate.

- ❑ Order whatever is needed to suppress the fire - let the dispatcher worry about filling the order.
- ❑ Release rural fire department resources and other cooperators as soon as practical.
- ❑ Keep adequate firefighters on fire until mop-up is complete.
- ❑ Order overhead resources (team or individuals) if any of the following conditions look probable (consult FMO or RFMC for advice if necessary):
  - Containment is not expected until the next day or later;
  - There is serious risk to life and/or structures;
  - Multiple fires are occurring and the IC(s) can not gain control of the situation and/or feel uncomfortable in performing their duties.
- ❑ Complete a Wildland Fire Situation Analysis (WFSA) if the fire has escaped Initial Attack or is expected to go into the next burning period.
- ❑ Effectively mop-up the fire and provide for patrols until the fire is declared out.
- ❑ Have crew informally critique the fire to see if preparations or operations could be improved.
- ❑ Insure all equipment is ready for the next fire before releasing crews. Report any repairs needed or missing equipment to the FMO.
- ❑ Insure all paperwork including fire reports, time reports, and resource orders are properly completed and routed to the FMO.

Engine Boss Standard Operating Procedures

DISPATCH:

- ❑ Receive dispatch information from Dispatcher, IC, or FMO:
  - Location and access to fire;
  - Type of engine and crew (2 or 3 person) ordered;
  - Assigned firefighters (have they been contacted?) and ETA to engine;
  - Supervisor (IC if park fire, on-scene officer if cooperator);
  - Fire size-up (reported size, behavior, fuel, weather).
- ❑ Report promptly to fire cache.

PREPARATION PRIOR TO DEPARTURE:

- ❑ Make sure all assigned crew have PPE and gear.
- ❑ Make a quick check of the engine:
  - Gas tanks for engine and pump filled;
  - Test run pump;
  - Test radios.
- ❑ Pick-up additional equipment:
  - Radio batteries (new or disposable);
  - Water and/or cooler;
  - Special equipment (saw, pump, extra tools).
- ❑ Inform the dispatcher or IC that you are in service.

TRAVELING TO THE FIRE:

- ❑ Obtain radio briefing from IC.
- ❑ Brief crew:
  - Expected weather and fire behavior;
  - Tactics;
  - Safety concerns and precautions.
- ❑ Drive safely and obey all traffic regulations.
- ❑ Travel in pairs or groups of engines when possible.
- ❑ Lock hubs when leaving pavement.
- ❑ Travel cautiously off-pavement to prevent getting stuck and/or damaging equipment.
- ❑ Make sure that you approach the fire in a safe manner (preferably from the rear) and that you have an escape route and safety zone should the wind shift or you get stuck.

ARRIVAL AT THE FIRE:

- ❑ Check-in (by radio or in person) with IC and receive assignment.
- ❑ Notify dispatcher that you are on scene.
- ❑ Size up the situation (weather, fire behavior, fuels, smoke plume, hazards, water sources.)

- ❑ Begin deployment as directed by IC.

DEPLOYMENT:

- ❑ Begin completion of assignment with a "SAFETY FIRST" attitude.
- ❑ Brief crew on LACES (Lookouts, Awareness, Communication, Escape Routes, and Safety Zones) and update crews periodically.
- ❑ Notify IC of any changes or concerns including weather, fire behavior, injuries, values at risk, hazards, visitors, and volunteer firefighters.
- ❑ Notify IC if you determine that you can not safely complete assignment and/or need additional assistance.
- ❑ Notify IC if you need to vary from assignments and instructions.
- ❑ Order any logistical support required from IC (food, water, fuel, tools, batteries).

DEMOB:

- ❑ Notify IC when you have completed assignment and wait for additional assignment or release.
- ❑ Travel carefully and safely back to fire cache.
- ❑ Insure that engine is ready for next fire before releasing crew:
  - Fuel and oil (vehicle, pump, spare cans) - charge to fire;
  - Fill water tank and foam reservoir;
  - Report and/or repair any damage;
  - Inventory supplies using inventory list in glove box and replace any equipment used or lost.
- ❑ Complete Crew Time Report
  - Record time for all firefighters - note regular and hazard pay.
- ❑ List supplies and equipment expended, lost, or damaged on back of Crew Time Report (CTR).
- ❑ Note any significant occurrences (minor injuries, concerns, etc.) on back of CTR.
- ❑ Notify IC and Dispatcher that you and crew are out of service.

WILDLAND FIRE SITUATION

G. ANALYSIS

Incident Name: _____
Jurisdiction: _____

Date and Time Completed: _____

This page is completed by the Agency Administrator(s).

Section I, WFSA Information Page

A. Jurisdiction(s): Assign the agency or agencies that have or could have fire protection responsibility, e.g., USFWS, BLM, etc.

B. Geographic Area: Assign the recognized "Geographic Coordination Area" the fire is located in, e.g., Northwest, Northern Rockies, etc.

C. Unit(s): Designate the local administrative unit(s), e.g., Hart Mountain Refuge Area, Flathead Indian Reservation, etc.

D. WFSA #: Identify the number assigned to the most recent WFSA for this fire.

E. Fire Name: Self-explanatory.

F. Incident #: Identify the incident number assigned to the fire.

G. Accounting Code: Insert the local unit's accounting code.

H. Date/Time Prepared: Self-explanatory.

I. Attachments: Check appropriate boxes to designate items used to complete the WFSA. "Other" could include data or models used in the development of the WFSA. Briefly describe the "other" items used.

I. Wildland Fire Situation Analysis

To be completed by the Agency Administrator(s)

A. Jurisdiction(s)	B. Geographic Area
C. Unit(s)	D. WFSA #
E. Fire Name	F. Incident #

G. Accounting Code:

H. Date/Time Prepared _____@_____

I. Attachments

- Complexity Matrix/Analysis * _____
- Risk Assessment/Analysis * _____
  - Probability of Success * _____
  - Consequences of Failure * _____
- Maps * _____
- Decision Tree ** _____
- Fire Behavior Projections * _____
- Calculations of Resource Requirements * _____
- Other (specify) _____

* Required

** Required by FWS

This page is completed by the Agency Administrator(s).

Section II. Objectives and Constraints

A. Objectives: Specify objectives that must be considered in the development of alternatives. Safety objectives for firefighter, aviation, and public must receive the highest priority. Suppression objectives must relate to resource management objectives in the unit resource management plan.

Economic objectives could include closure of all or portions of an area, thus impacting the public, or impacts to transportation, communication, and resource values.

Environmental objectives could include management objectives for airshed, water quality, wildlife, etc.

Social objectives could include any local attitudes toward fire or smoke that might affect decisions on the fire.

Other objectives might include legal or administrative constraints which would have to be considered in the analysis of the fire situation, such as the need to keep the fire off other agency lands, etc.

B. Constraints: List constraints on wildland fire action. These could include constraints to designated wilderness, wilderness study areas, environmentally or culturally sensitive areas, irreparable damage to resources or smoke management/air quality concerns. Economic constraints, such as public and agency cost, could be considered here.

II. Objectives and Constraints

To be Completed by the Agency Administrator(s)

A. Objectives (Must be specific and measurable)

1. *Safety*

   - Public

   - Firefighter

2. *Economic*

3. *Environmental*

4. *Social*

5. *Other*

B. Constraints

This page is to be completed by the Fire Manager and/or Incident Commander.

Section III. Alternatives

A. Wildland Fire Management Strategy: Briefly describe the general wildland fire strategies for each alternative. Alternatives must meet resource management plan objectives.

B. Narrative: Briefly describe each alternative with geographic names, locations, etc. that would be used when implementing a wildland fire strategy. For example: "Contain within the Starvation Meadows' watershed by the first burning period."

C. Resources Needed: Resources described must be reasonable to accomplish the tasks described in Section III.B. It is critical to also look at the reality of the availability of these needed resources.

D. Final Fire Size: Estimated final fire size for each alternative at time of containment.

E. Estimated Contain/Control Date: Estimates of each alternative shall be made based on predicted weather, fire behavior, resource availability, and the effects of suppression efforts.

F. Cost: Estimate all incident costs for each alternative. Consider mop-up, rehabilitation, and other costs as necessary.

G. Risk Assessment - Probability of Success/Consequences of Failure: Describe probability as a percentage and list associated consequences for success and failure. Develop this information from models, practical experience, or other acceptable means. Consequences described will include fire size, days to contain, days to control, costs, and other information such as park closures and effect on critical habitat. Include fire behavior and long-term fire weather forecasts to derive this information.

H. Complexity: Assign the complexity rating calculated in "Fire Complexity Analysis" for each alternative, e.g., Type II, Type I.

I. A map for each alternative should be prepared. The map will be based on the "Probability of Success/Consequences of Failure" and include other relative information.

III.	Alternatives		
To be completed by FMO / IC			
	A	**B**	**C**
A. Wildland Fire Strategy			
B. Narrative			
C. Resources needed Handcrews Engines Dozers Airtankers Helicopters	 _____ _____ _____ _____ _____	 _____ _____ _____ _____ _____	 _____ _____ _____ _____ _____
D. Final Size			
E. Est. Contain/ Control Date			
F. Costs			
G. Risk Assessment **- Probability of success** **- Consequence of failure**	 _____ _____	 _____ _____	 _____ _____
H. Complexity			
I.	**Attach maps for each alternative**		

This page is completed by the Agency Administrator(s), FMO and/or Incident Commander.

Section IV. Evaluation of Alternatives

A. Evaluation Process: Conduct an analysis for each element of each objective and each alternative. Objectives shall match those identified in Section II.A. Use the best estimates available and quantify whenever possible. Provide ratings for each alternative and corresponding objective element. Fire effects may be negative, cause no change, or may be positive. Examples are: 1) a system which employs a "-" for negative effect, a "0" for no change, and a "+" for positive effect; 2) a system which uses a numeric factor for importance of the consideration (soils, watershed, political, etc.) and assigns values (such as -1 to +1, - 100 to +100, etc.) to each consideration, then arrives at a weighted average. If you have the ability to estimate dollar amounts for natural resource and cultural values, this data is preferred. Use those methods that are most useful to managers and most appropriate for the situation and agency. To be able to evaluate positive fire effects, the area must be included in the resource management plan and consistent with prescriptions and objectives of the fire management plan.

Sum of Economic Values: Calculate for each element the net effect of the rating system used for each alternative. This could include the balance of: pluses (+) and minuses (-), numerical rating (-3 and +3), or natural and cultural resource values in dollar amounts. (Again, resource benefits may be used as part of the analysis process when the wildland fire is within a prescription consistent with approved Fire Management Plans and in support of the unit's Resource Management Plan.

IV. Evaluation of Alternatives			
To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander			
A. Evaluation Process	**A**	**B**	**C**
Safety Firefighter Aviation Public			
Sum of Safety Values			
Economic Forage Improvements Recreation Timber Water Wilderness Wildlife Other (specify)			
Sum of Economic Values			
Environmental Air Visual Fuels T & E Species Other (specify)			
Sum of Environmental Values			
Social Employment Public Concern Cultural Other (Specify)			
Sum of Social Values			
Other			

This page is to be completed by the Agency Administrator(s) and Fire Manager and/or Incident Commander.

Section V. Analysis Summary

A. Compliance with Objectives: Prepare narratives that summarize each alternative's effectiveness in meeting each objective. Alternatives that do not comply with objectives are not acceptable. Narrative could be based on effectiveness and efficiency. For example: "most effective and least efficient," "least effective and most efficient," or "effective and efficient." Or answers could be based on a two-tiered rating system such as "complies with objective" and "fully complies with or exceeds objective." Use a system that best fits the manager's needs.

B. Pertinent Data: Data for this Section has already been presented, and is duplicated here to help the Agency Administrator(s) confirm their selection of an alternative. Final Fire Size is displayed in Section III.D. Complexity is calculated in the attachments and displayed in Section III.H. Costs are displayed on page 4. Probability of Success/Consequences of Failure is calculated in the attachments and displayed in Section III.G.

C. External and Internal Influences: Assign information and data occurring at the time the WFSA is signed. Identify the Preparedness Index (1 through 5) for the National and Geographic levels. If available, indicate the Incident Priority assigned by the MAC Group. Designate the Resource Availability status. This information is available at the Geographic Coordination Center, and is needed to select a viable alternative. Designate "yes," indicating an up-to-date weather forecast has been provided to, and used by, the Agency Administrator(s) to evaluate each alternative. Assign information to the "Other" category as needed by the Agency Administrator(s).

V. Analysis Summary

To be Completed by the Agency Administrator(s) and Fire Manager / Incident Commander

Alternatives	A	B	C
A. Compliance with Objectives Safety Economic Environmental Social Other			
B. Pertinent Data Final Fire Size Complexity Suppression Cost Resource Values Probability of Success Consequences of Failure			

C. External / Internal Influences

National & Geographic Preparedness Level _____
Incident Priority _____
Resource Availability _____
Weather Forecast (long-range) _____
Fire Behavior Projections _____

VI. Decision

The Selected Alternative is: _____

Rationale:

_____ _____
Agency Administrator's Signature Date/Time

This Section is completed by the Agency Administrator(s) or designate.

Section VII. Daily Review

The date, time, and signature of reviewing officials are reported in each column for each day of the incident. The status of Preparedness Level, Incident Priority, Resource Availability, Weather Forecast, and WFSA validity is completed for each day reviewed. Ratings for the Preparedness Level, Incident Priority, Resource Availability, Fire Behavior, and Weather Forecast are addressed in Section V.C. Assign a "yes" under "WFSA Valid" to continue use of this WFSA. A "no" indicates this WFSA is no longer valid and another WFSA must be prepared or the original revised.

Section VIII. Final Review

This Section is to be completed by the Agency Administrator(s). A signature, date, and time are provided once all conditions of the WFSA are met.

VIII. Daily Review

To be completed by the Agency Administrator(s) or Designate

Selected to be reviewed daily to determine if still valid until containment or control

			PREPAREDNESS LEVEL	INCIDENT PRIORITY	RESOURCE AVAILABILITY	WEATHER FORECAST	FIRE BEHAVIOR PROJECTIONS	WFSA VALID
Date	**Time**	**By**						

If WFSA is no longer valid, a new WFSA will be completed!

VIII. Objectives Final Review

The elements of the selected alternative were met on: _____ _____
Date Time

By:_____
(Agency Administrator(s)

A GUIDE FOR ASSESSING FIRE COMPLEXITY

The following questions are presented as a guide to assist the Agency Administrator(s) and staff in analyzing the complexity or predicted complexity of a wildland fire situation. Because of the time required to assemble or move an Incident Management Team to wildland fire, this checklist should be completed when a wildland fire escapes initial attack and be kept as a part of the fire records. This document is prepared concurrently with the preparation of (and attached to) a new or revised Wildland Fire Situation Analysis. It must be emphasized this analysis should, where possible, be based on predictions to allow adequate time for assembling and transporting the ordered resources.

Use of the Guide:

1. Analyze each element and check the response "yes" or "no."

2. If positive responses exceed, or are equal to, negative responses within any primary factor (A through G), the primary factor should be considered as a positive response.

3. If any three of the primary factors (A through G) are positive responses, this indicates the fire situation is, or is predicted to be, Type I.

4. Factor H should be considered after all the above steps. If more than two of these items are answered "yes," and three or more of the other primary factors are positive responses, a Type I team should be considered. If the composites of H are negative, and there are fewer than three positive responses in the primary factors (A-G), a Type II team should be considered. If the answers to all questions in H are negative, it may be advisable to allow the existing overhead to continue action on the fire.

GLOSSARY OF TERMS

Potential for blow-up conditions - Any combination of fuels, weather, and topography excessively endangering personnel.

Rate or endangered species - Threat to habitat of such species or, in the case of flora, threat to the species itself.

Smoke management - Any situation that creates a significant public response, such as smoke in a metropolitan area or visual pollution in high-use scenic areas.

Extended exposure to unusually hazardous line conditions - Extended burnout or backfire situations, rock slide, cliffs, extremely steep terrain, abnormal fuel situation such as frost killed foliage, etc.

Disputed fire management responsibility - Any wildland fire where responsibility for management is not agreed upon due to lack of agreements or different interpretations, etc.
Disputed fire policy - Differing fire policies between suppression agencies when the fire involves multiple ownership is an example.

Pre-existing controversies - These may or may not be fire management related. Any controversy drawing public attention to an area may present unusual problems to the fire overhead and local management.

Have overhead overextended themselves mentally or physically - This is a critical item that requires judgment by the responsible agency. It is difficult to write guidelines for this judgment because of the wide differences between individuals. If, however, the Agency Administrator feels the existing overhead cannot continue to function efficiently and take safe and aggressive action due to mental or physical reasons, assistance is mandatory.

FIRE COMPLEXITY ANALYSIS

A. FIRE BEHAVIOR: Observed or Predicted	Yes	No
1. Burning Index (from on-site measurement of weather conditions).	___	___
2. Predicted to be above the 90% level using the major fuel model in which the fire is burning.	___	___
3. Potential exists for "blowup" conditions (fuel moisture, winds, etc.)	___	___
4. Crowning, profuse or long-range spotting.	___	___
5. Weather forecast indicating no significant relief or worsening conditions.	___	___
Total	___	___

B. RESOURCES COMMITTED		
1. 200 or more personnel assigned.	___	___
2. Three or more divisions.	___	___
3. Wide variety of special support personnel.	___	___
4. Substantial air operation which is not properly staffed.	___	___
5. Majority of initial attack resources committed.	___	___
Total	___	___

C. RESOURCES THREATENED		
1. Urban interface.	___	___
2. Developments and facilities.	___	___
3. Restricted, threatened or endangered species habitat.	___	___
4. Cultural sites.	___	___
5. Unique natural resources, special designation zones or wilderness.	___	___
6. Other special resources.	___	___
Total	___	___

D. SAFETY		
1. Unusually hazardous fire line conditions.	___	___
2. Serious accidents or facilities.	___	___
3. Threat to safety of visitors from fire and related operations.	___	___
4. Restricted and/or closures in effect or being considered.	___	___
5. No night operations in place for safety reasons.	___	___
Total	___	___

E. OWNERSHIP **Yes/No**

1. Fire burning or threatening more than one jurisdiction. ___ ___
2. Potential for claims (damages). ___ ___
3. Conflicting management objectives. ___ ___
4. Disputes over fire management responsibility. ___ ___
5. Potential for unified command. ___ ___

Total ___ ___

F. EXTERNAL INFLUENCES

1. Controversial wildland fire management policy. ___ ___
2. Pre-existing controversies/relationships. ___ ___
3. Sensitive media relationships. ___ ___
4. Smoke management problems. ___ ___
5. Sensitive political interests. ___ ___
6. Other external influences. ___ ___

Total ___ ___

G. CHANGE IN STRATEGY

1. Change in strategy to control from confine or contain. ___ ___
2. Large amount of unburned fuel within planned perimeter. ___ ___
3. WFSA invalid or requires updating. ___ ___

Total ___ ___

H. EXISTING OVERHEAD

1. Worked two operational periods without achieving initial objectives. ___ ___
2. Existing management organization ineffective. ___ ___
3. IMT overextended themselves mentally and/or physically. ___ ___
4. Incident action plans, briefings, etc., missing or poorly prepared. ___ ___

Total ___ ___

Signature_____

Date_____ **Time**_____

Outer Banks Group
Manteo, North Carolina

DELEGATION OF AUTHORITY

As of (time) , (Date) , I have delegated authority to manage the (Fire Incident Name), (Fire Number) , Outer Banks Group to Incident Commander (Name) and his/her Incident Management Team.

I am assigning (Name) as the Line Officer's Representative to act as liaison and provide any help you need. (S)he is authorized to speak for me in the event a decision is needed.

My specific considerations for management of this fire are:

1. Ensure the safety of firefighters, visitors, and neighbors.

2. Protect private and park property to the extent possible.

3. Minimize damage to environmental resources.

4. Key resource considerations are: protecting rare, threatened, and endangered species; protecting historical and cultural resources; and limiting degradation of the Group's aesthetic values.

5. Manage the fire in accordance with the guidelines established in the WFSA, specifically…

6. Restrictions for suppression actions are no earthmoving equipment (dozers, plows) without my approval.

7. Manage the fire cost-effectively for the values at risk.

8. Provide training opportunities for National Park Service personnel is requested to strengthen our organizational capabilities.

_____ _____

Superintendent, Outer Banks Group Date

APPENDIX L: MONITORING PLAN

RESERVED

APPENDIX M: FIRE INFORMATION PLAN

Initial Outer Banks Group Fire Education Action Plan

- **Purpose**
  - Guide interagency outreach efforts for fire education.
  - Reduce loss from unwanted wildland fires.
  - Educated audiences on the role of fire in nature.

- **Key Messages**
  - Fire Danger (when very high).
  - Why the fire danger is high (Usually due to weather conditions).
  - Wildland fires can exceed local suppression capabilities.
  - Help prevent unwanted human-caused wildland fires.
  - The difference between prescribed fire and human-caused wildland fire.
  - Know and observe fire restrictions.
  - Use spark arresters on all power equipment.
  - Use fire carefully.
  - Make your property fire safe.
    - Best way to ensure that the fire department can protect house;
    - Modify burnable vegetation around structures to provide defensible space;
    - Ensure access and turnaround space for fire vehicles and egress for evacuation;
    - Store firewood and other flammables away from structures.
  - Fire professionals will plan and introduce fire to the ecosystem.
    - Detailed planning by professional wildland fire managers;
    - Only under predetermined (prescribed) conditions, and only with the necessary staff and equipment on site;
    - Reduce hazardous fuel conditions;
    - Maintain the natural role of fire.

- **Target Audience(s)**
  - Property owners.
  - Park and refuge visitors.
  - Community contacts.
  - Agency personnel.

- **Strategies**
  - Property owners
    - Door-to-door contacts with handout information (self-inspection);
    - Courtesy site inspections by firefighters upon request;
    - Traveling "Firesafe" display for local functions.
  - Park and refuge visitors
    - Fire education info (prevention and prescribed fire) posted on park bulletin boards;

        - ♦ Fire education displays (prevention and prescribed fire) developed for visitor centers/contact stations;
        - ♦ Fire prevention handouts to campers during periods of very high fire danger;
        - ♦ Individual contacts by patrols.
    - Community contacts
        - ♦ Inform and involve local community groups (civic groups, housing associations);
        - ♦ Inform and involve community leaders.
    - All audiences
        - ♦ PSAs in local media (TV, radio, and print);
        - ♦ Community bulletin boards;
        - ♦ Internet page and links.
    - Agency personnel
        - ♦ Provide office and field personnel with fire information and messages.

- Evaluation Criteria - The following criteria will be tracked:
    - Number of personal visitor contacts.
    - Number of adjacent landowners visited.
    - Number of adjacent landowners given courtesy site inspections.
    - Number of park and community bulletin boards with info posted.
    - Number of news releases and PSAs issued to local media outlets.
    - Interagency coordination efforts.
    - Partnerships established: Regional cable TV outlets, United Parcel Service, utilities (billing inserts), etc