National park Service
U.S. Department of the Interior

Big South Fork National River and Recreation Area
Oneida, Tennessee

Fire Management Plan

For
Big South Fork National River and Recreation Area

September 2004

U.S. Department of the Interior
National park Service
Big South Fork National River and Recreation Area
Kentucky and Tennessee

1.0 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 National Area's Resource Management Plan (1996). This plan implements the selected management actions from the Resource Management Plan, with over-all guidance provided by the General Management Plan (2000). The purpose of this plan is to outline in as detailed a manner as possible, actions that will be taken by Big South Fork National River and Recreation Area (National Area) in meeting the fire management goals established for the area.

Authority for carrying out a fire management program at the National Area 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 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).

[1] Service wide 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.

- 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 B). Compliance with the National Historical Preservation Act (NHPA) is documented in Appendix C.

1.1 Fire in the Big South Fork

The current version of the Big South Fork NRRA Fire Management Plan represents a first step toward a judicious reintroduction of fire in the National Area. We, the fire and resource managers, anticipate this reintroduction to be an adaptive process; one in which early lessons will provide a foundation on which to build a more comprehensive program. Although initially, prescribed fire will be introduced to achieve a limited set of objectives, the experience and data accrued during this first step will prove instrumental in adapting the plan to meet additional objectives. With this goal in mind, this document is intended to be a five year plan that will be reviewed and revised to incorporate any new information gained.

Fire management objectives in the current plan include reducing hazard fuel accumulations, maintaining cultural landscapes, and controlling exotic species. To meet these objectives, prescribed burns will be focused around historic structures, around developed areas, near park boundaries, and in selected meadows. These are important objectives, and the emphasis is rightfully placed on safety and the protection of resources and property.

We also recognize a need to ultimately adapt this management plan to include additional ecological considerations. We need to consider the role of the introduced fire regime on the landscape, on plant and animal communities, and, in some cases, on specific species. Certain communities or species in the Natural Area are adapted to fire or may require fire; others may be adversely impacted by fire. As managers charged with protecting the resources, we are obligated to recognize where fire is necessary as well as where it should be excluded. Our design for a broad fire management strategy should integrate our understanding of the natural role of fire. Such a strategy will achieve the objectives outlined by the current plan while simultaneously addressing important ecological concerns.

2.0 COMPLIANCE WITH NPS POLICY AND RELATIONS 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 fuels and maintain healthy ecosystems. This plan describes actions necessary to carry out fire management policies and objectives.

The National Area was established by Congress (P.L. 93-251), March 7, 1974,

> "(F)or the purpose of conserving and interpreting an area containing unique cultural, historic, geologic, fish and wildlife, archeological, scenic, and recreational values, [and] preserving as a natural, free-flowing stream, the Big South Fork of the Cumberland River…for the benefit and enjoyment of present and future generations, the preservation of the natural integrity of the scenic gorges and valleys, and the development of the area's potential for healthful outdoor recreation."

The mission statement developed for the National Area as identified in the General Management Plan (2000) is:

> "The Big South Fork NRRA is developed and interpreted for healthful outdoor recreation while preserving the free-flowing condition of the Big South Fork and its tributaries, the scenic, natural, and cultural values of the area, and the essentially primitive condition of the gorge."

3.0 DESCRIPTION OF UNIT

3.1 Location

The National Area, a unit administered by the National Park Service, is composed of approximately 125,000 acres located on the Cumberland Plateau, a rugged scenic area in southeastern Kentucky and northeastern Tennessee (Figure 1). The National Area (Figure 2) is located approximately 70 highway miles north and west of Knoxville in portions of Scott, Fentress, Morgan, and Pickett counties in Tennessee and McCreary County, Kentucky. Nearby communities include Oneida, Jamestown, and Huntsville in Tennessee and Whitley City in Kentucky.

3.2 Topography

The Cumberland Plateau is an elevated plateau rising to a height of about 2,000 feet above sea level. The general elevation of the plateau ranges from 1,300 feet above sea level in Kentucky to 1,840 feet

above sea level in Tennessee. The plateau is the result of a hard sandstone layer that eroded slowly. As a result of differences in rates of weathering, the plateau appears to have a smooth, rounded appearance, interspersed with numerous intermittent streams. Where the sandstone overlays the shale, the landscape is benched with outcroppings rising above steep slopes, with large boulders lying at the base.

The topography of the National Area is characterized by a dendritic drainage pattern and narrow, v-shaped gorges created by stream incision. The headwaters of the Big South Fork of the Cumberland River (Big South Fork) have deeply dissected stream valleys with no floodplain development. Further down stream and to the north, the terrain is less rugged with minor floodplain development (Hamilton and Turrini-Smith 1997). Slopes range from 10 - 70% and are broken in the river gorge and many tributaries by vertical cliffs. Typical slopes are 30-45%. The average is about 25%.

3.3 Climate

The National Area is located in a humid climate region, typified by moderately cool winters and moist, warm to hot summers. The average annual temperature is 55 degrees Fahrenheit, with a record low of –22 degrees Fahrenheit and a record high of 104 degrees Fahrenheit. The average winter temperature is 38 degrees Fahrenheit with an average daily minimum temperature of approximately 29 degrees F. In the summer, the average temperature is 73 degrees Fahrenheit with an average daily maximum temperature of 85 degrees Fahrenheit.

The average annual precipitation is 51 inches, varying from 48 inches in downstream areas to 59 inches in upstream areas. Precipitation is generally well distributed throughout the year with the winter and early spring receiving the most precipitation and the fall receiving the least. Approximately 27 inches, or slightly over half, usually falls in April through September. Thunderstorms may occur in any month but are more frequent from March through August, and account for the majority of the summer precipitation. These storms are generally of short duration but result in heavy rainfall. On average, thunderstorms are reported about 51 days each year.

Figure 1: Big South Fork National River and Recreation Area Region and Vicinity Map

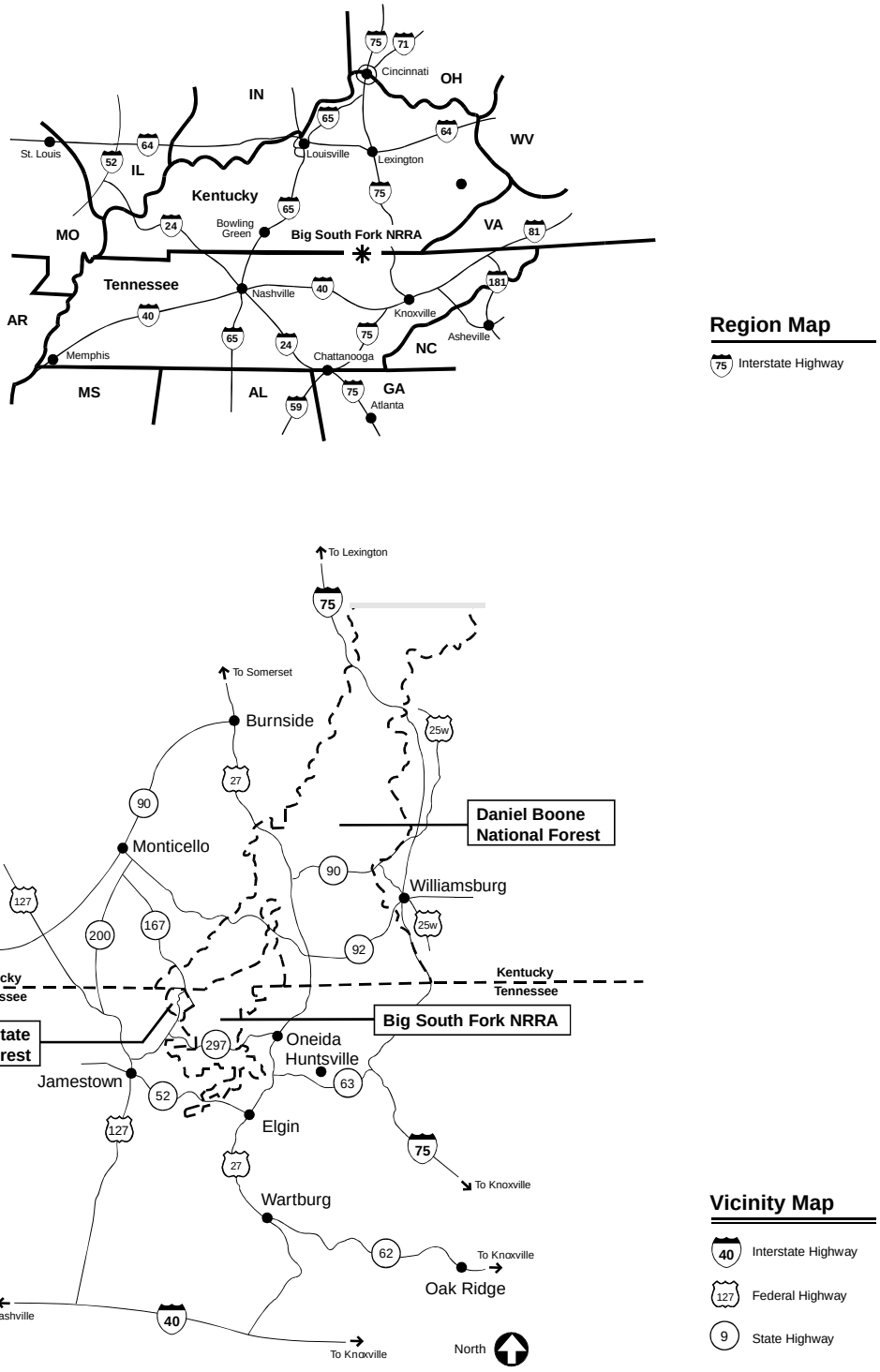
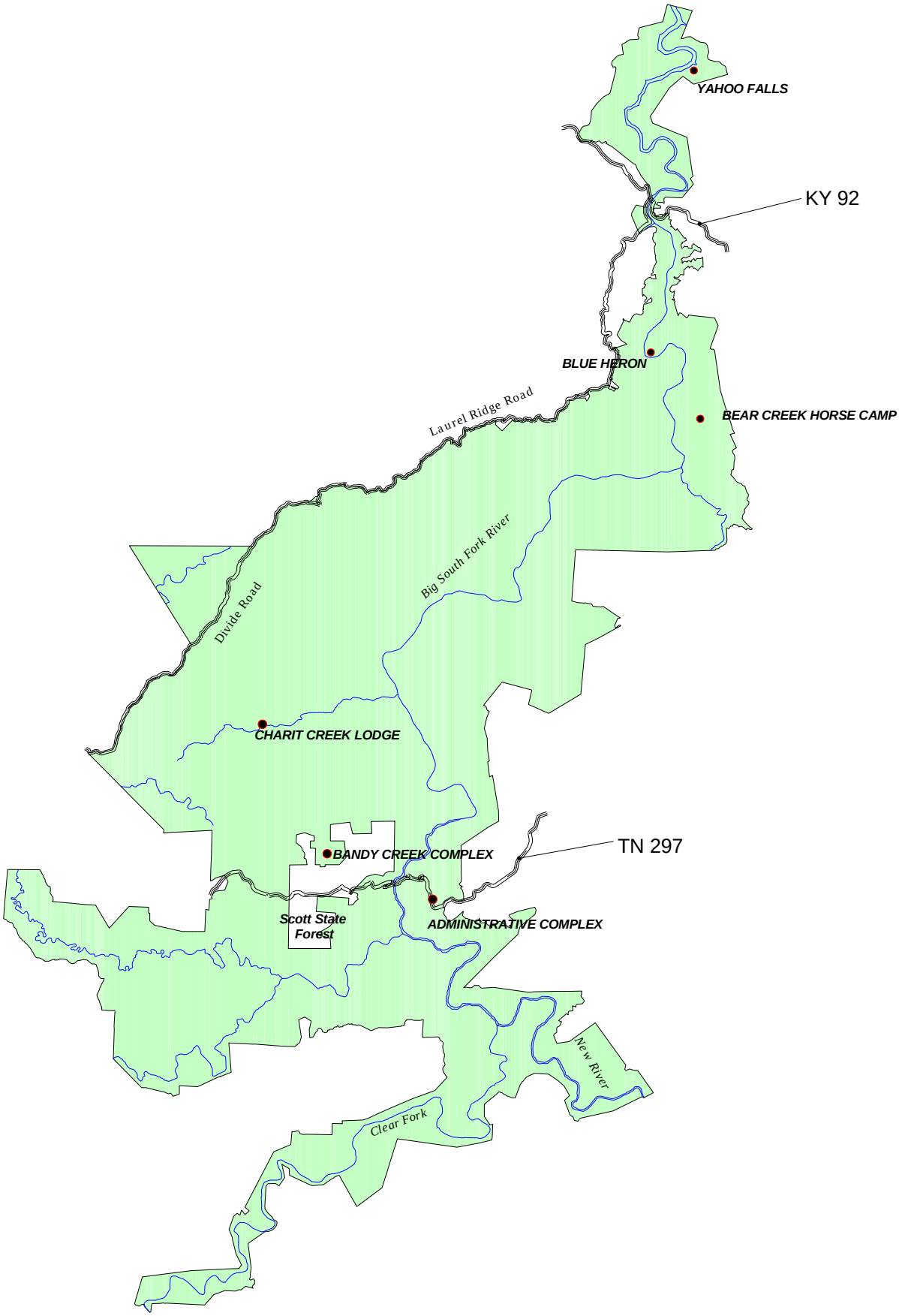


Figure 2: Big South Fork National River and Recreation Area Map



Snowfall averages about 17 inches annually and seldom remains on the ground for more than a few days at a time. The average relative humidity is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The prevailing wind is from the south. The average windspeed is highest, on average, about 10 miles per hour, in March. The average growing season is about 185 days (Hamilton & Turrini-Smith 1997).

3.4 Soils

The Cumberland Plateau is underlain by roughly horizontal sedimentary rock strata, which is primarily sandstone, and shale (Campbell & Newton 1995). As would be expected, most of the soils on the plateau are formed from these weathered materials. The depth of the soil to bedrock ranges from about one foot on steep hillsides to about four-to-five feet on broad, smooth interstream divides (Campbell & Newton 1995). Generally, the soils are well-drained, silty clay loam. Although low in natural fertility, plants grown on these soils generally were higher in nutritive value than plants grown on other soils and had the best potential for supporting wildlife of any in the McCreary-Whitley County, Kentucky area (Byrne, et al. 1964).

Removal of vegetation and the underlying forest floor (duff) by fire decreases the amount of rainfall that is absorbed by the soil, thereby increasing the potential for runoff (Tiedemann 1979). Erosional responses to burning are a function of several factors such as the degree of elimination of protective cover, steepness of slope, degree the affected soil sheds water, climatic characteristics, and how quickly the vegetation recovers (Tidemann 1979, Wade 1989). Few studies have been conducted in the Eastern United States to assess fire effects on the soils. However, conventional wisdom has shown if the burn is under a timber stand and some duff remains, soil movement will be minor on slopes up to 25 percent (Wade 1989).

3.5 Hydrology

One of the primary reasons the National Area was established was to preserve as a natural, free-flowing stream, the Big South Fork of the Cumberland River for the benefit and enjoyment of present and future generations. The Big South Fork River is formed by the New River and the Clear Fork River, and drains the northern portion of the Cumberland Plateau in Tennessee. As the Big South Fork flows from south to north it is fed by a variety of sources ranging from perennial streams, such as North White Oak Creek, to many creeks that are intermittent in nature. Flooding is common during the winter months (December – March) when the soils are saturated, frozen or covered with snow. Springs and ponds can be found scattered throughout the National Area. Preserving the water quality of the Big South Fork is an important management concern for the National Area.

The aquatic environment of the Big South Fork gorge and adjacent plateau supports a wide variety of plant and animal life which depends upon the water for drinking, food, living space, and cover (Corps of Engineers 1976). The river and its floodplain are habitat for fifteen (15) federally endangered, threatened, or candidate species (four plant species, nine aquatic species and two animal species[U.S. Fish and Wildlife letter 02/04]). Therefore, due care and caution must be exercised while carrying out fire management operations to prevent impacting this special resource. A complete overview of the management of the water

resources is contained in the Water Resources Management Plan (Hamilton & Turrini-Smith 1997) on file at the National Area Headquarters.

3.6 Vegetation

The vegetation of the National Area is very diverse as the result of soil, available moisture, aspect, and previous land use (Safley 1970, Hinkle 1989) (Figure 3). The majority of the landscape is forested. Upland communities range from red maple (*Acer rubrum*) dominated stands on poorly drained flats to Virginia pine (*Pinus virginiana*) dominated stands on dry ridges and cliff edges. Forests of mixed oaks (*Quercus spp*) with a limited hickory (*Carya spp*) element characterize the broad flats and the gentle slopes of the upland. In Tennessee, the same oaks are present, but pines are not a dominant overstory component, although White *pine (Pinus strobus*) is becoming established in some areas (personal observation). Hickories (*Carya spp*), including pignut (*C. glabra*), mockernut (*C. tomentosa*), shagbark (*C. ovata*), and bitternut (*C. cordiformis*), form a widespread but minor component.

Ravine communities are generally dominated by more mesic species with a rich oak (*Quercus spp*) element on the middle to lower slopes. Mixed Mesophytic vegetation is found on protected sites with richer soils, and is restricted to escarpment slopes, coves, and deeper ravines (Hinkle 1989). Hemlock (*Tsuga canadensis*) is prominent in narrow gorges in North facing coves and along streams (Hinkle 1989). Examples of dominant tree species in the mixed mesophytic vegetation type include oaks (*Quercus spp*). On the drier sites post oak (*Q stellata*), southern red oak (*Q falcata)* scarlet oak (*Q coccinea*), and blackjack oak (*Q marilandica*); on moister sites, white oak (*Q alba*) and black oak (*Q velutina*) predominate. In this zone, between the river bottoms and the moist upper reaches of the gorge, are also found sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), and tulip poplar (*Liriodendron tulipifera*).

In many locations, the gorge rises steeply from the river. The river, when in flood stage, scours the land, allowing little vegetation to take hold. On the level floodplain where floodwaters periodically inundate the vegetation but do not destroy it, a well-established forest has developed (Corps of Engineers 1976). The alluvial forest consists of river birch (*Betula nigra*), sycamore (*Platanus occidentalis*), green ash (*Fraxinus pennsylvanica*), sweetgum (*Liquidambar styraciflua*), cucumber tree (*Magnolia acuminata*), and other mesic species. In the understory, ironwood (*Carpinus caroliniana*), bigleaf magnolia (*Magnolia macrophylla*), box elder (*Acer negundo*), basswood (*Tilia americana*), and saplings of the canopy species are prominent. The ground cover is patchy. A few stands of cane (*Arundinaria gigantea*) are present (Corps of Engineers 1976).

Figure 3: Vegetative Types of Big South Fork NR&RA

Forests of the type found in the National Area are characterized by high biodiversity and are among the most biologically rich systems of the temperate regions of the world, certainly in the United States (Hinkle et al. 1993). An excellent overview of the vegetation present when the National Area was created, and the inter-relationships of the flora with fauna can be found in Final Environmental Impact Statement: Establishment, Administration, and Maintenance of the Big South Fork National River and Recreation Area, Tennessee and Kentucky (Corps of Engineers 1976). This document is on file at the National Area Headquarters.

The Environmental Protection Agency (EPA) Region IV Land Cover Dataset (EPA 1988-1993) identifies three primary habitat types and four other minor, though important, ground cover types in the National Area (Table 1).

Table 1: Habitat Types – Big South Fork NR&RA

Habitat Type	Acres	Percent
Deciduous Forest	53,343.5	43.6
Evergreen Forest	29,508.0	24.1
Mixed Forest	37,976.0	31.0
Woody Wetlands	131.1	00.1
Pasture/Hay/Row Crops	352.0	00.3
Herbaceous Wetlands	12.6	00.0
Transitional	4.2	00.0
Open Water	873.3	00.7
Other (Development)	121.3	00.1

Source: EPA Region IV Land Cover Dataset[2]

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 over the past two decades of specific species and their habitats 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

[2] The percentages of cover do not equal 100% due to rounding.

paragraph, as even more knowledge becomes available, the knowledge generated will be used to improve the fire management program.

Periodic fire tends to favor understory species that require more open habitat. Deer and turkey are game species that benefit from fire (Lyon et al. 1978, Wade 1989). Wildlife benefits from burning are substantial. For example fruit and seed production is stimulated in some species. Yield and quality increases occur in some herbs, legumes, and hardwood sprouts. Openings are created for feeding, travel, and dusting (Wade 1989). Conversely, Lyon et al. (1978) noted that fire in old growth forest create habit for cavity nesting birds, while at the same time destroying snags that may be favored by the same species. The loss of a specific post-fire or post-logging successional stage may correlate with the decline of those species dependent on the particular vegetation represented. 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).

The primary mammals of the National Area are the white-tailed deer (*Odocoileus virginianus*), gray fox (*Urocyon cinereoargenteus*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), mink (*Mustela vison*), striped skunk (*mephitis mephitis*), muskrat (*Ondatra zibethicus*), and eastern gray squirrel (*Sciurus carolinensis*). Some common small mammals include the smoky shrew (*Sorex fumeus*), pygmy shrew (*Sorex hoyi*), white-footed mouse (*Peromyscus leucopus*), and woodland (pine) vole *(Microtus pinetorum*). The little brown bat (*Myotis lucifus*) and Rafinesques's big-eared bat (*Plecotus rafinesquii*) are present. Discussions to reintroduce the Black bear (*Ursus americanus*) into the National Area, once found through out the region, are currently underway.

The National Area provides a variety of habitats for several species of birds. The wild turkey (*Meleagris gallopavo*) and ruffed grouse (*Bonasa umbellus*), both which benefit from fire (Lyon et al. 1978), are the two principal game birds that can be found in the hardwood and mixed hardwood-pine habitat type.

Although there are several species of birds that inhabit the National Area, Partners In Flight (Anderson et al. 1999) have identified certain species that indicate the over-all health of the ecosystem. The cerulean warbler (*Dendroica cerulea*) and the American redstart (*Setaphaga ruticilla*) which also are found in the hardwood and mixed hardwood-pine habitat type have been identified by Partners in Flight (Anderson et al. 1999) as a species of high concern. The riparian woodlands provide habitat for the Acadian flycatcher (*Empidonax virescens*), Swainson's warbler (*Limnothlypis swainsonii*), summer tanager (*Piranga rubra*), and the ruby-throated hummingbird (*Archilochus colubris*). Birds that favor open grasslands or forest edge habitat include the field sparrow (*Spizella puscilla*), and the grasshopper sparrow (*Ammodramus savannarum*). The yellow-breasted chat (*Icteria virens*), Eastern towhee (*Pipilo erythropthalma*), and the gray catbird (*Dumetella carolinensis*) inhabit scrub-shrub vegetation that is often found on reclaimed mines. The Bewick's wren (*Thryomanes bewickii*) was identified as a species that occur in slash piles and clumps of low brush (Anderson et al. 1999). It is the contention of Partners In Flight that when these habitats disappear, so will the species (Anderson et al. 1999). Fire can be a useful tool in the management or maintenance of each of these habitat types.

Reptiles, like other species, require a variety of sites, ranging from xeric to very moist. 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 present include the northern copperhead (*Agkistrodon contortrix*), eastern garter snake (*Thamnopus sirtalis*), northern ringneck snake (*Diadophis punctatus*), black rat snake (*Elaphe obsoleta*), five-lined skink (*Eumeces fascianatus*), and eastern box turtle (*Terrapene carolina*). Common amphibian species are the green salamander (*Aneides aeneus*), Northern spring salamander (*Gyrinophilus porphyriticus*), Black Mountain dusky salamander (*Desmognathus welteri*), seal salamander (*Desmognathus monticola*), slimy salamander (*Plethodon glutinosus*), spotted salamander (*Ambystoma maculatum*), American toad (*Bufo americanus*), mountain chorus frog (*Pseudacris brachyphona*), green frog (*Rana clamitans*), pickerel frog (*Rana palustris*), and wood frog (*Rana sylvatica*).

Comiskey and Etnier (1972) confirmed the presence of 67 species of fishes in Big South Fork of the Cumberland River and its tributaries. Fish species range from the rainbow trout (*Salmo gairdneri*) an introduced species, to the duskytail darter (*Etheostoma percnurum*), a federally-listed species. The National Area supports 27 documented species of freshwater mussels, six of which are federally endangered. In the southeast only the Clinch and Green Rivers contain this level of diversity, and only two other National Park Service units in the country have greater diversity (NPS 2000). A number of state and federally listed aquatic species are found in the National Area (See following section).

A complete listing of wildlife species found in the National Area is on file at the National Area Headquarters.

3.8 Threatened and Endangered Species

Federally and state-listed endangered, threatened, and rare flora and fauna have been inventoried by the state Natural Heritage Programs (1997) and by law and NPS policy require special consideration and protection. The stretch of the Big South Fork from Leatherwood Ford to Bear Creek is noteworthy because its water quality and streambed characteristics combine to provide important habitat for federally listed plant and animal species (NPS 2000). Six federally endangered freshwater mussels and two federally endangered fish species occur in the Big South Fork and its major tributaries. The River Otter (*Lutra canadensis*), which was re-introduced in the National Area, is a state-listed threatened mammal.

Three federally listed plant species occur in the National Area: Cumberland sandwort (*Arenaria cumberlandensis*), Cumberland rosemary (*Conradina verticillata*), and Virginia spiraea (*Spiraea virginiana*). The white fringeless orchid (*Platanthera integrilabia)* is listed as a candidate species and occurs near, but not within, the National Area. There are historic records of green pitcher plant (*Sarracenia oreophila*) and the American chaffseed (*Schwalbea americana*) within the Big South Fork region. In addition to the federally-listed species, fifty-one state-listed threatened or endangered plants occur in the National Area.

The National Area is located in the northern range of the federally listed red-cockaded woodpecker *(Picoides borealis*), a fire adapted species. Two previously active colonies are located in the vicinity of the National Area (USDA Forest Service 1995). In addition, the Indiana Bat (*Myotis sodalist)* is found near the Area, but at this time it is not known if there is a resident population.(Leter from the U.S. Fish and Wildlife Service 02/04) The effect of wildland fire on the rare and endangered flora and fauna is not fully known. Additional research and study will have to be conducted to fully determine proper management protocols. A complete listing of federally and state-listed threatened and endangered species can be found in Appendix D.

3.9 Air Quality

Air quality in the National Area 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 National Area value (Ross 1990). Under this program, the National Area is classified as a Class II area. 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).

Despite this protection, air quality and visibility are affected by air pollution in the area. Visibility is often reduced by fine particulate pollution, as it is throughout the East. In its 1993 report on visibility in national parks and wilderness areas, the National Research Council concluded that in most of the East, the average visual range is less than 20 miles (about 30 km), or about one-fifth of the natural range (National Research Council 1993). The visual range in the National Area is approximately 10-15 miles (17-25 km) (EPA 1998).

3.10 Cultural Resources

When the National Area was created, numerous cultural sites were acquired within the legislative boundary. These sites include settlements, mining sites and towns, logging sites, prehistoric and historic archeological sites, and farmsteads with associated agricultural fields. Currently (January 2000), five sites have been determined to meet criteria for listing on the National Register of Historic Places. Cultural landscapes in the National Area include farmsteads, cemeteries, openings for sawmill sites, and coal mines. A large number of old farm fields in the National Area are remnants of the agricultural lifestyle of the inhabitants of the upper Cumberland Plateau. Some of these fields have been preserved as cultural landscapes. Numerous (over 2,000) archeological sites, ranging from lithic scatters to rockshelters, document human activity from several hundred to over 11,000 years ago.

A complete listing of cultural resources is contained in the List of Classified Structures on file at National Area Headquarters.

3.11 Improvements

Improvements made by the NPS are located throughout the National Area and include the Headquarters Area Complex which consists of the Headquarters Building, Ranger Station, Resource Management Building, the Maintenance Area, Fire-Rescue Cache, and other associated outbuildings; the Bandy Creek Development consisting of a campground, visitor center, concession buildings, and associated structures; the Charit Creek Lodge; State Park and Forest Complex; the Blue Heron Mine development; and visitor use facilities including campgrounds, bridges, trails, canoe – raft landings; and interpretive facilities. A complete listing of NPS improvements can be found in Appendix E.

In addition to public use developments, there are approximately 300 oil and gas wells and associated storage tanks and pipelines scattered throughout the National Area.

3.12 Socio-Economic Considerations

3.12.1 Local Area Economy

The history of the Cumberland Plateau reflects man's attempts to make a living from the land or to remove valuable minerals, primarily coal and oil, from the ground. Underground coal mining operations have closed for the most part, but strip mining is still occurring in the watershed. Gas and oil exploration continues and existing wells and associated distribution systems are being maintained. Logging is still a contributor to the local economy. Several small sawmills are scattered about the locale. Industries that use logs for homes and other commodities are in operation and in some cases, expanding. Oneida and Jamestown in Tennessee, Whitley City, Kentucky, and other communities in the region support small manufacturing operations, hospitals and other health care facilities, and retail centers, and are the centers of local government. Transportation corridors include a major north-south railroad route, federal, state, and county highways, and Interstate 75.

3.12.2 National Area Visitor Use

The National Area draws approximately 850,000 visitors to the area annually (NPS 2003). As a result, recreation is expected to play an ever-increasing role in the local economy. The primary recreational pursuits are hunting, horseback riding, rafting and canoeing, camping, hiking, sightseeing, and related activities. School groups come to the area to study the environment. The nearby land is being subdivided into second-home developments, complicating the wildland – urban interface issue.

3.13 Values to be Protected

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 and prehistoric archeological sites
- Developments within and adjacent to the National Area, including private homes

- Tree improvement plantations at Scott State Forest
- Utility lines, bridges, and other similar improvements outside the developed zones
- Industrial sites (oil and gas wells, and associated pipelines and storage tanks)
- Recreational opportunities

4.0 HISTORICAL ROLE OF FIRE

Wildland fire is an evolutionary force that has helped shape many terrestrial ecosystems (Buckner and Turrill, date unknown). In his study of the Daniel Boone National Forest fire history, Martin observed the role of natural fire in the environments has been obscured over the past several centuries due to the intervention of Native Americans and Europeans (Martin 1989). Ecological and meteorological evidence suggests that lightning-caused fires were a major environmental force shaping the vegetation of the Southeastern United States for millions of years before Native-Americans arrived in America (Van Lear 1989). Lightning served as an agent of change and forced species to adapt or perish. Komarek (1974) writes lightning strikes in the Appalachians were frequent enough to cause the development of species dependent upon fire for most of their reproduction.

Of the 145 endangered and threatened rare plant species in the United States, 134 benefits from fire or are found in ecosystems adapted to fire (EPA 1999). The federally endangered chaffseed (*Schwalbea americana*), for example, is a species that exists on sandstone knobs and inland plains where frequent, naturally occurring fires maintained these sub-climax communities (USDA Forest Service 1995). There were several historical collections of the plant in Tennessee and Kentucky, including a 1935 collection by Braun from a "sandstone knob" along the Alum Creek Road (KY 700) within the immediate vicinity of the National Area (Campbell 1990b). Repeated searches for this species have been unsuccessful. Fire maintained grassland communities (barrens) having a relatively high diversity of native species, once more common in size and extent, are now restricted to a few patches along old backcountry road margins, and will soon be extirpated (Campbell, et al. 1990a). The loss of the native barrens vegetation has had an adverse impact on birds and other species that depend on this type of habitat (Campbell, et al. 1990a).

Forests of the Southern Appalachians probably did not burn as frequently as the pine-grasslands of the adjacent Piedmont. However, there can be no doubt that they did burn periodically (Van Lear 1989). Depending on the frequency of summer fires, Appalachian forests along this broad ecotone could have been much more open than present (Van Lear 1989). Prior to human settlement, the fire mosaic of the southern Appalachian region was likely a pattern of light burns interspersed over the landscape at irregular intervals with occasional large fires (Komarek 1974). The composition of forest has changed dramatically through the past 9,500 years in response to a combination of factors including climate change and both prehistoric and historic human activities (Delcourt and Delcourt 1997).

The role of fire was dramatically changed with the advent of aboriginal man in America (Van Lear 1989). Van Lear (1989) went on to quote Keel (1976), "The frequency of fires increased dramatically upon the arrival of Native Americans in the Southern Appalachians about 10,000 years ago". The Delcourts (1997) suggested there was a strong coincidence in

the timing of prehistoric human occupation of rockshelters, domestication of native plants, and increases in local fires evident in the charcoal record from Cliff Palace Pond (KY) that argues for a cause-and-effect relationship between Native American activities and changes in forest vegetation during the past 3000 years. For the most part, Native Americans were hunters and gatherers. It wasn't until approximately 800 to 1,000 AD, when corn and beans were first cultivated in the Southeastern United States (Van Lear 1989). Native Americans continued to hunt and often used fire to drive game. They also burned to reduce threats of dangerous wildland fires, clear underbrush to keep forests open, improve habitat for game, and make gathering of acorns and chestnuts easier (Pyne 1982).

In the early 1800's, the region came under the influence of European man. As settlers moved into the woods from the coastal plain and Piedmont, they brought the practice of using fire with them (Pyne 1982). The settlement pattern in the Southern Appalachians was erratic and clustered. More remote areas away from settlements were probably burned infrequently. Eventually, however, settlements penetrated into even the more remote sections of the Southern Appalachian region, and annual burning was the standard practice where ever grazing animals were kept (Van Lear 1989).

It is surmised that settlers to the region had an even larger impact on the environment than did Native Americans. It is highly probable that they burned frequently, during times natural fire would not have occurred, and in locations where fires would rarely be sustained (Martin 1989). Additional agents for change include logging and past agricultural practices over the past century and a half that resulted in an area covered almost entirely with second-growth forests less than 100 years old (Byrne 1964, Campbell and Newton 1995).

In the southern Appalachian region there are several fire associated and/or fire-dependent pine (*Pinus spp*) and oak (*Quercus spp*) species that require fire to maintain their "natural" community structures (Buckner and Turrill, date unknown). Fire suppression is bound to bring major changes to vegetative communities and alter the composition of the species present over time (Ladd 1991). In the 1920's, the USDA Forest Service was opposed to the use of fire in forests. This carried over to local state governments (Pyne 1982). As a result, light under-burning was prohibited on recently established National Forests in Kentucky, Virginia, and elsewhere. However, after a series of disastrous wildland fires in the 1930's and 1950's, the role of prescribed fire in reducing the possibility of large disastrous wildland fires was recognized, and fire was once again reintroduced to the forests (Van Lear 1989) as part of the natural process.

To more fully understand the fire history of the area, the National Area has initiated a study of the fire ecology of the Big South Fork area and will use the results to better refine the fire management program.

5.0 GOALS AND OBJECTIVES

5.1 Resource Management Goals and Objectives

The National Area's Resource Management Plan (1996) identifies four specific projects dealing with fire management.

- BISO-N-052 Develop Fire Management Plan
- BISO-N-024 Fire Ecology (and History) of the Big South Fork Region
- BISO-N-025 Develop Fire Prescriptions
- BISO-N-037 Develop Alternative Strategies To Protect Historic Landscapes

These four projects identify fire as a tool to achieve the following resource management goals:

- Restore native wildlife and plant communities;
- Restore habitat for rare wildlife and plant species;
- Determine the role and impact of fire on the ecosystems at the National Area;
- Manage National Area resources using prescribed fire;
- Maintain historic landscapes through prescribed burning.

5.2 Fire Management Goals and Objectives

The National Area requires a fire management program for the following reasons:

- To ensure firefighter safety;
- To ensure the protection of natural and cultural resources and the safety of the visiting public;
- To restore, conserve or enhance the natural role of fire within the National Area in sustaining ecological and cultural resources.

The goals and objectives of the fire management program are outlined below:

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

Objectives:

- 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.
- Qualified individuals who are familiar with the fuels and expected fire behavior, and who promote the safe and skillful application of fire management strategies and techniques appropriate for the situation will carry out fire management operations.
- National Area neighbors, visitors and local residents will be notified of all planned and unplanned fire management activities that has the potential to impact them.

- Impose temporary closures during prescribe fire and wildland fire suppression operations at the discretion of the Superintendent.
- 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 Area.**

Objectives:

- Suppress fires at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
- Employ minimum impact tactics.
- Avoid adverse impacts to the natural and cultural resources.
- Limit off road vehicle use unless approved by the Superintendent.
- Limit heavy equipment use unless approved by the Superintendent.
- Avoid adverse impact to water resources.
- Prevent wildland fires from igniting old coal mining operations.
- Prevent wildland fires from igniting oil and gas facilities.

Goal 3: Use prescribed fire where and when appropriate as a tool to manage vegetation within the National Area boundaries, and where acceptable, across NPS boundaries to attain resource management objectives.

Objectives:

- Complete a Fire Ecology Study within two years to identify pre-settlement vegetation communities and the role fire played in shaping the ecosystem.
- Conduct all fire management operations in accordance with approved plans.
- Achieve resource management goals such as creating habitat for Threatened and Endangered species or to restore the historic scene.
- Restore native plant and animal communities and reduce exotic species.
- Employ hazard fuel reduction burns around suppression zones to reduce fire intensity and severity.
- Allow fire to assume its natural ecological role.
- Monitor the effects of fire on representative units.
- 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.

Goal 4: Modify fuel complexes around developed areas, along interface boundary areas and in proximity of cultural sites to reduce fire behavior and intensity to a manageable level in order to protect these sites.

Objectives:

- Use mechanical means to reduce hazard fuel accumulations around suppression zones to reduce fire intensity and severity.

- Use mechanical means, in combination with fire, to reduce hazard fuel accumulations around developed areas and oil and gas well facilities in order to reduce fire intensity and severity to aid in fire suppression activities.

Goal 5: 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:
  - USDA Forest Service, Daniel Boone National Forest
  - State of Kentucky
  - State of Tennessee
  - Local Volunteer Fire Departments (VFD's)
- Training will be conducted on an interagency basis to the fullest extent possible.

Goal 6: 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 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:

- Implement the fire prevention program that was developed for the National Area (Appendix M).
- Work with other agencies to reduce the frequency of human-caused ignitions.
- Balance prevention patrols and public education during period of high fire danger.

Goal 8: Promote public understanding of fire management programs and objectives.

Objectives:

- Develop a series of formal and informal interpretive programs that explain the role of fire in a positive light and will convey the various aspects of the fire program to the public.

- 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.

6.0 WILDLAND FIRE MANAGEMENT SITUATION

6.1 Prescribed Fire Use at the National Area

A limited prescribed fire program was instituted in the National Area in 1991. Between 1991 and 1996, the National Area conducted 12 prescribed burns for a total of 658 acres. The purposes of the burns were to enhance habitat for the red-cockaded woodpecker, reduce accumulations of hazard fuels, and to maintain cultural landscapes (Appendix F). Although no monitoring was completed at the time, the locations of the units were documented. It may be possible to gain limited knowledge of the effectiveness of fire by comparing the areas burned with lands immediately outside the burn units. The park staff gained experience by conducting the burns and learned that much more needed to be done before implementing a prescribed fire program at the National Area. The need to write a new fire management plan, develop a fire effects monitoring program, and study the fire ecology and fire history of the area were important outcomes of these burns.

6.2 Historical Weather Analysis

Until spring 1998, the National Area maintained a fire weather station (# 400902) at the Headquarters Area, and weather data have been archived in the Wildland Fire Information Management System (WIMS). An additional year of partial data collected has yet to be entered. The existing manual station was replaced in 2001, with a fully automated station capable of automatically transferring the data to WIMS. The USDA Forest Service maintains a fire weather station (#157001) in Somerset, Kentucky, approximately 40 miles north of the National Area's Headquarters. (Latitude: 37:03:30, Longitude: 84:36:00, The NFDRS Slope Class code is: 2, NFDRS Climate Class code is: 3, Elevation 1445).

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 National Area because it was developed initially for the Southeastern United Stated (Keetch et al. 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 NFDRS when calculated by WIMS. The KDBI 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. The highest KBDI reading for the geographical area in 1999 was 719, recorded in September 1999 (Kennedy, personal communication). The KBDI is currently available from the Area's RAWS unit..

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).

The fuels found in the National Area generally conform to those found in similar areas and fuel models selected can be expected to accurately predict fire behavior. Currently, dead and down fuel representing all size classes, the result of a 1998 winter storm, for example, have created concentrations of fuel in scattered locations, primarily along ridges. Road clearing activities following the 1998 storm also resulted in windrows of debris and fuels immediately adjacent to several roads near the boundary and in the oil and gas fields in the southern end of the National Area. Concentrations of fuel of this nature may demonstrate fire behavior that exceeds the norm and may make fire suppression operations difficult due to increased fire intensity and spotting.

There is good fuel continuity in the National Area. The fine fuels, which will carry the fire, are continuous throughout large sections of the Area. The fuel beds are broken by roads and trails that run primarily along ridges. Cliffs or bluffs, the Big South Fork River and its major tributaries, and changes in topography and vegetation also create fuel breaks.

For fire prediction purposes, the dominant vegetation type in the National Area is mixed hardwood forest. The primary carrier of a fire in this vegetation type is litter beneath the timber stand. Depending on the time of year, this fuel type is broken down into two National Fire Danger Rating System (NFDRS) fuel models that 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.

- NFFL Fire Behavior Fuel Model 8 (NFDRS Fuel Model R) describes a deciduous broadleaf forest with an overstory in full leaf and a compact litter layer. The litter layer is primarily compressed leaves and twigs. Little undergrowth is present in the stand. This fuel model best describes National Area fuel conditions found in the summer.
- During the fall and early winter this vegetative type is best described as NFFL Fire Behavior Fuel Model 9 (NFDRS Fuel Model E). Long-needle pine stands and hardwood stands with loosely compacted needle and leaf litter are typical. This is the primary fuel model present in the National Area during the fall fire season and during periods of late summer drought.

Other fuel models are present and are described below. Only the Fire Behavior Prediction Model will be identified because the NFDRS models used to predict fire danger are identified above.

- The area is susceptible to storm damage during the winter months. Ice storms, high winds, and heavy snows often strip the trees of branches and snapped the tops off pines. The resulting debris is best described as NFFL Model 10.

- NFFL model 11 describes hardwood stands within the National Area from which all merchantable timber was removed before the NPS purchased the land and is also characteristic of a significant portion of the land in the urban-wildland interface outside the National Area boundary.

- Eastern hardwood forests with a thick, almost an impenetrable understory of Rhododendron or Mountain Laurel up to 6 feet high is typical on the steep sloped portions of the gorges and along interior drainages. Fire behavior can be computed using NFFL Fire Behavior Model 5.

- Perennial grasses which are about a foot tall and associated with scattered meadows and cultural sites are typically found through out the National Area near old farmsteads and reclaimed strip mines, and as pasturelands in the adjacent urban-wildland interface. This fuel type is best described as NFFL Fire Behavior Model 1.

- NFFL Fire Behavior Model 6 can be used to predict expected fire behavior for the vegetation found on abandoned, unreclaimed strip or underground mine areas or other areas of extremely disturbed soils and vegetation. Growing over thin strata of soil, this fuel type may overlay ignitable deposits of coal.

Fires are typically of low intensity, especially in fuel models 8 and 9. However, they can burn actively in all fuel models and even dramatically in fuel models 6 and 11 when the KDBI exceeds 450. Slope and aspect play a large role in over-all fire behavior. Dead and down fuel can contribute to an increase in expected fire behavior and intensity, which can lead to torching and spotting. This also holds true for periods of drought, which are fairly common in the region, especially during the fall.

6.5 Fire Season

The fire season in the National Area corresponds with that of other mixed hardwood forests. The spring season runs from February 15 to May 15, and is usually the more severe of the two. Fuels are dried by the wind and are exposed directly to the sun. The spring season continues until green-up, when new plant growth becomes established. The fall season occurs between October 1 and December 15, coinciding with deciduous leaf fall. The fall season also coincides with hunting season that brings increased visitation and human activity in the woodlands. During the summer, abnormally dry periods coupled with high temperatures can produce conditions that can lead to periods of high fire danger.

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

6.6 Fuel Characteristics/Historic Observations

After a century of study and research, there is overwhelming evidence that the forest and their species have migrated southward and northward with the global climate changes that led to initiation and termination of ice ages. Because of this, the mixed forest of the Cumberland Plateau may be thousands of years old (Martin 1989). The pollen record from Cliff Palace Pond (Jackson County, Kentucky) demonstrates that a portion of the Daniel Boone National Forest immediately north of the National Area has been forested continuously since at least the early Holocene (which corresponds to the Early Archaic Cultural period – 10,000 to 8,000 years ago). Highly seasonal climates of the early Holocene would have promoted a disturbance regime that included frequent fire, wind-gap formation, and geomorphically unstable landscapes in which landslides may have been frequent (Delcourt and Delcourt 1997).

It may be beneficial to look further into recent research that has documented past environmental conditions and human activity that may have affected the over-all species composition of the area. The composition of forests has changed dramatically through the past 9500 years in response to a combination of factors including climate change and both prehistoric and historic human activities (Delcourt and Delcourt 1997). The period from 3500 to 7500 years Before Present was a relatively warm, dry period in eastern North America which saw the establishment of the grassy prairies in the mid-continent. Core samplings from Cliff Palace Pond have shown grass pollens were less in this region while the tree composition remained similar (Campbell 1999).

Core samples taken from the Cliff Palace Pond indicate an increase in mean annual precipitation and more equable distribution of precipitation throughout the year existed Between 3000 and 200 years Before Present. The forests in the study area during that time were dominated by fire-adapted taxa. As a result, forests became dominated by fire-tolerant trees including oaks, chestnut, and, for the first time, pines. The increased presence of human activity was documented in the charcoal record showing a major increase of large charcoal particles that indicate local fires were occurring on the ridge top surrounding the pond (Delcourt and Delcourt. 1997).

The interaction of prehistoric human activities and forest dynamics on the landscape surrounding Cliff Palace Pond took place by way of the interrelationship between use of fire by Native Americans, cultivation of plants, and forest succession. The strong coincidence in time of prehistoric human occupation of rockshelters, domestication of native plants, and increases in local fires evident in the charcoal record from Cliff Palace Pond argues for a cause-and-effect relationship between Native American activities and changes in forest vegetation during the past 3000 years. Prior to 3000 years BP, pines were of negligible importance in the vegetation of the ridge top surrounding the pond. After 3000 years BP, the increased use of fire by aboriginal peoples locally resulted in a fine-grained patchwork of vegetation that included fire-adapted and fire-tolerant species (Delcourt and Delcourt 1997).

During the last 200 years, a series of changes in forest composition occurred following Euro-American settlement of eastern Kentucky. In the first years of the 20th Century, Foley

recognized the history of human ignited wildland fire, logging, and grazing as being a major factor in the development of the plateau forest types present at that time (Hinkle, et al. 1993). Even though fire and misuse of the land have reduced the number of plants, most of the original plant species can be found in out-of-the-way or sheltered places (Byrne 1964, Hinkle 1989).

Today, about 85 % of the area is still forested but many changes have occurred. The American chestnut, once an important commercial tree has been severely impacted by the chestnut blight and is no longer a primary component of the overstory. The forest in the National Area is predominately second growth because most of the primary forest was harvested in the early 20th century (US Army Corps of Engineers 1974). As a result of these and other impacts, the area is covered mainly by a young, second-growth forest of which less than 5 % of the stand is 100 years old (ibid.). The present forest consists of about 20 percent southern yellow pine; 60 percent, mixed oak and hickory; and the remaining 20 percent, mixed tulip popular, maple, elm, ash, beech, and hemlock. Of the latter group, tulip-popular is the most common (Byrne, 1964). To restore the sites to a pre-Columbian vegetation composition, the Delcourt's (1997) suggest the reintroduction of local fires on upper slopes and ridge tops is essential. They also concluded it is necessary to suppress wildland fires on lower slopes to protect the rich and diverse mixed mesophytic forest communities.

6.7 Control Problems

Based on local fire records, generally fires occurring in the National Area are relatively small and are easy to control. Fires starting at the bottom of a slope can be expected to make relatively rapid runs to the top of the hill or ridge depending on aspect, fuel loading and arrangements, fuel moistures, and other environmental factors affecting fire behavior.

Damage to standing trees from storm events may result in heavy concentrations of surface fuels, as well as boles and snags 15-20 feet off the ground. When the roads are opened following a storm, down trees and other debris may be pushed to the side, forming a windrow of boles, limbs, and other debris. The downed trees, predominately Virginia pine, lose their needles, but a large amount of 10, 100, and 1000- hour time-lag fuels generally remain. Depending on the environmental factors present, these fuels may lead to increased fire behavior and make suppression difficult. This is especially true of the windrows adjacent to roads. It can be difficult to hold these sections of fireline using indirect attack. The piles may also increase the possibility of spotting across the road into private or public lands outside the National Area boundary. It may be necessary to pre-treat the area using mechanical means before using prescribed fire to remove the smaller fuels.

There are over 300 recorded gas and oil well sites within the National Area. Many of the sites are active. Pipelines at or just below the surface transport the crude oil from the wellhead to holding tanks, and gas collection lines are also prevalent in the National Area. Gas may be vented at the well head and storage tanks may have wildland fuels that impinge on them. Depending on conditions, the tanks may ignite or possibly rupture or explode, placing firefighters at risk. Plowing firelines, especially at night in these areas is risky at best

and may impact the ability of suppression forces to quickly control a fire threatening these complexes.

7.0 SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

7.1 Wildland Fire Management Strategies to be Applied

7.1.1 Wildland Fire Suppression

All wildland fires 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 2.

Table 2: Appropriate Management Response

SITUATION	STRATEGY	TACTIC
1. Wildland fire which does not threaten life, natural or cultural resources, or property.	Restrict the fire within determined 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.

The use of this strategy for achieving resource management objectives will not be employed at the present time at the National Area. This strategy may be initiated only after adequate data are present to make an informed decision concerning the appropriateness of this option, and NEPA requirements are met. (See the Environmental Assessment included as Appendix B of this document for a more thorough discussion of this strategy.)

7.1.3 Prescribed Fire

Prescribed fire will be implemented in the National Area in order to reintroduce fire as a natural ecological process and meet specific resource objectives, while ensuring fire fighter and public safety, and protecting park and privately owned resources. Specific objectives include reducing hazard fuels, enhancing natural communities, controlling exotic plants, and maintaining cultural landscapes.

Hazard fuel reduction will take place primarily in areas adjacent to development, the urban-wildland interface, and along roads and trails near National Area boundaries 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, oil and gas operations, and other public and private property (values to be protected)[3]. Prescribed fire will be used in combination with mechanical and other means to accomplish the objectives established for the projects.

Prescribed fire will be used to enhance natural plant communities and achieve specific ecological endpoints. The specific objectives and desired future vegetation condition of each proposed prescribed fire treatment area is beyond the scope of this document. Instead, these considerations will be addressed in individual treatment area burn plans. The proposed prescribed fire treatment areas are predominantly in old agricultural fields, native grasslands, subxeric mixed-hardwood forests, and xeric pine woodlands. Mixed-mesophytic forests are a subcomponent of some proposed prescribed fire treatment areas. Generally, fire prescriptions will be designed to mimic understory fire regimes and mixed-severity fire regimes (as described in Brown and Smith 2000), depending on vegetation type. Understory fire regimes are appropriate for mixed-mesophytic communities where substantial changes in vegetation composition and structure are not desired. Over 80 percent of dominant plants typically survive these types of fires. Subxeric mixed-hardwood stands may be treated with

[3] A general list of values to be protected can be found in Section 7.2.1.8. Appendix D and Appendix E contain complete listings of Threatened and Endangered species and National Area improvements.

understory fires or mixed severity fires. In the case of mixed-severity fires, selective mortality of fire susceptible plants will occur. Fire-resistant species will generally survive; however, patches of high intensity fire may kill a majority of plant species. Changes in species composition and structure will be apparent. Understory or mixed severity regimes are desired in xeric pine woodands; however, meeting prescription parameters in this community type may be difficult due to accumulated fuel following southern pine beetle infestation. Where Virginia pine is dominant, complete stand replacement could occur. Shortleaf-pine or pine-oak woodlands will exhibit less severe changes in composition and structure. Grasslands and old fields will generally be treated with the intent to burn all standing vegetation. Below-ground plant parts will not be affected for most species. A transition from exotic cool-season grasses to native warm season grasses is desired. More specific descriptions of fire regimes and desired effects on vegetation will be provided in each treatment area burn plan.

Prescribed fire will also be used to protect and enhance historic 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 (FMUs)

The National area has been divided into two fire management units that have been created to better administer the fire management program. The units were created taking such factors as firefighter and public safety, values to be protected, and response time into consideration (Figure 4).

7.2.1 Fire Management Unit 1 – Development Unit

7.2.1.1 Description of Unit

This unit is composed of various areas located throughout the National Area. It includes two large areas, one around the Blue Heron Mine and the second is the portion of the National Area along New River. Also included in the unit are the Headquarters development area, developed campgrounds, and certain cultural and historic areas within the National Area. The unit is approximately 7,700 acres in size.

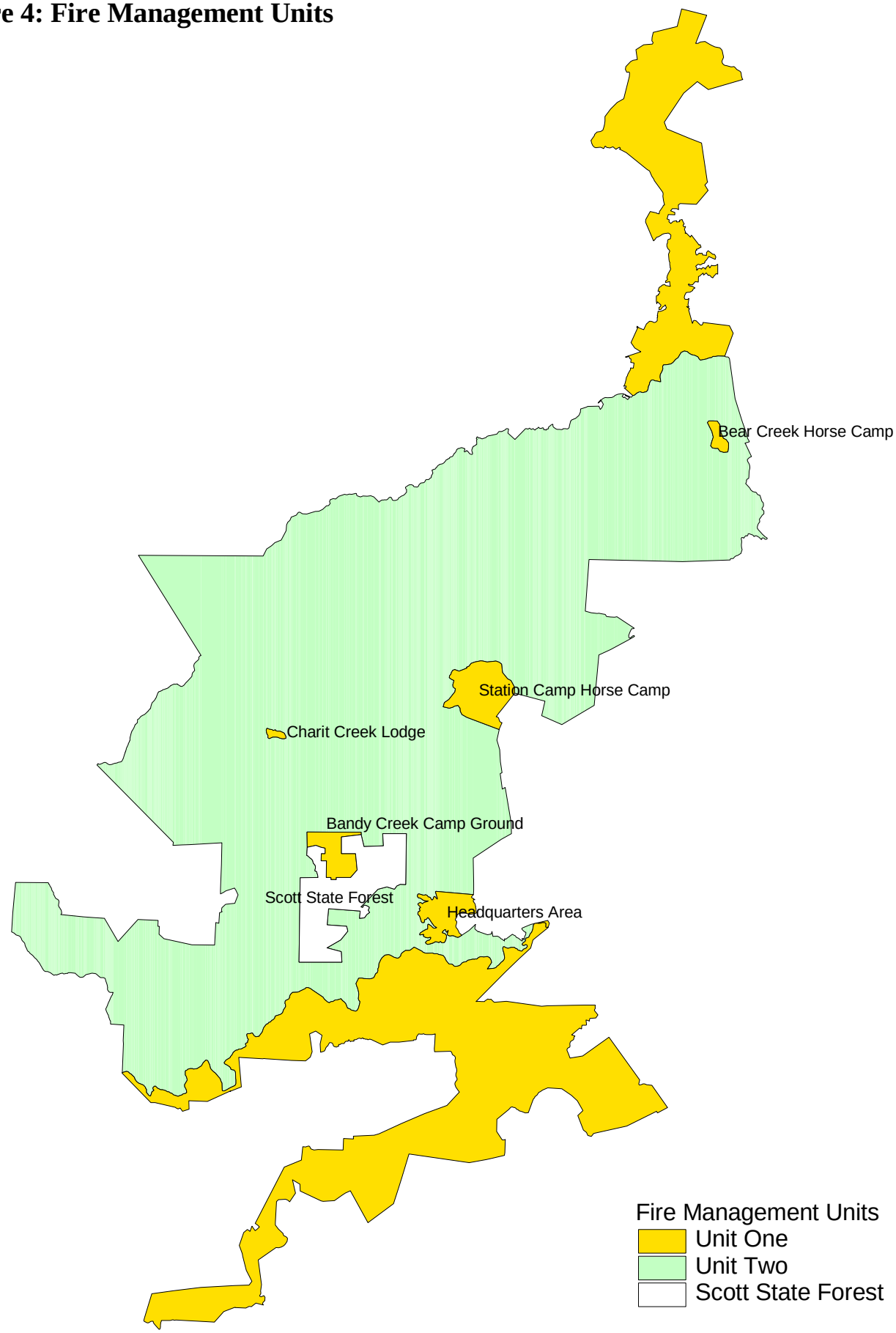
This unit was created to address the limited suppression options available to firefighters for fires starting in the gorge bottom and burning to the rim or top of a canyon which is close to private land or the Daniel Boone National Forest. The high concentration of gas and oil wells in this unit and their associated infrastructure present a significant safety hazard to fire fighters. Large commercial pine plantations are immediately adjacent to the southern boundary of the unit. In 2000, many of these plantations experienced an invasion of the Southern Pine Beetle, resulting in stands of dead timber that have impacted fuel loading and composition.

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 using engines or hand crews. Prescribed fire will be used primarily to manage hazard fuels.

7.2.1.2 Specific FMU Management Objectives

1. Ensure that the safety of personnel and the public receive the highest priority during all fire management activities.
2. Reduce heavy concentrations of hazard fuels.
3. Maintain historic landscapes through prescribed burning.
4. Using the appropriate management response, confine all wildland fires starting on NPS lands to NPS lands.
5. Utilize direct attack strategies when suppressing fires that threaten life and/or significant values to be protected.
6. Use natural or existing man-made barriers to the greatest extent possible for control lines. (Minimum Impact Suppression Tactics [MIST] concept).
7. Initiate an initial attack response within 30 minutes of receiving a report of a fire.
8. Monitor and document results of fire management activities.

Figure 4: Fire Management Units



7.2.1.3 Relationship of FMU Management to FMP Objectives

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

- All fire management activities will have firefighter and public safety as highest priority.
- Use 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 historic 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.
- Pending the results of the Fire Ecology Study, 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.
- National Areas neighbors, visitors and local residents will be notified of all fire management activities that may effect them.
- Response time is 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

- Air quality standards for the airshed will be adhered to during all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- Measures designed to protect cultural and historic sites will be implemented prior to conducting a prescribed burn.
- Fire management actions for all aspects of wildland and prescribed fire that may impact Threatened and Endangered species will comply with the Endangered Species Act.
- Off-road use by vehicles during fire management operations will not be permitted without the approval of the Superintendent.
- The use of motorized equipment is prohibited in the gorge except in emergencies, or for certain administrative purposes.

- The use of dozers and other ground disturbing equipment will not be permitted without the approval of the Superintendent, unless life or private property is immediately threatened.
- Water quality must be protected. Possible impacts will be identified and mitigation measures identified prior to conducting a prescribed burn.
- The use of aerial retardant will only be considered upon immediate threat to life or developments. Every effort will be made to maintain a 300 foot buffer around streams and the River in concert with the threat to life and property.
- Due care and caution will be exercised to lessen the likelihood of coal fires or fires that may adversely impact oil and gas facilities.

7.2.1.6 Physical Description of Fire Management Unit

This unit includes an area containing the highest concentrations of oil and gas wells located in the National Area. Also included in the area are developed areas, certain cultural and historic sites, and NPS lands located in the river gorges that have little buffer between the rim of the gorge and private lands or developments located on or near the rim. The National Area has identified a "Safety Zone" that excludes hunting from certain areas. The Safety Zone will over-lay the developed areas incorporated into the unit so that the boundaries of the two management units are consistent.

Table 3: Listing of Developed Areas in FMU 1

DEVELOPMENT	UTM
Blue Heron	719156E 406090N
Bear Creek Horse Campground	721345E 405772N
Station Camp Horse Campground	711735E 4046860N
National Area Headquarters	710424E 4038503N
Charit Creek Lodge	703417E 4045693N
Parch Corn Farmstead	707791E 4048206N
Bandy Creek Developed Area	706119E 4040371N
Scott State Forest (Inholding)	707418E 4039657N

7.2.1.7 FMU Fire History, Effects, and Behavior Characteristics

The recorded fire history of this area is indicative of that described for the entire National Area. The majority of the fires occurring in this unit are human caused. Although National Area records indicate an average human caused wildland fire occurrence frequency of nearly 7 fires annually, the number of wildland fires in the past ten years has declined as compared to the previous ten year period (11.1 fires/year during the period 1979-1998, compared to 2.9 human caused fires/year 1989-1998) (SACS 2000). There are two primary reasons for this change: There was a period of drought in mid to late 80's and records indicate there has been a reduction in the number of arson fires.

Fires are typically of low intensity and are usually contained to an area of less than 20 acres (SACS 2000)[4]. However, fires can be expected to burn actively under a wide variety of fuel and environmental conditions. The peak burning period is 1500 to 1600 Hrs EDT. Slope and aspect play a large role in over-all fire behavior. Heavy concentrations of dead and down fuel can contribute to an increase in expected fire behavior, as well as can periods of drought, which are fairly common in the region, especially during the fall. Based on data provided by the USDA Forest Service, the historical mean for 1-hour dead fuel moisture in August and September is 10.6%, 10-hour is 10.6%, 100-hour 17.8%, and 1000-hour is 20.3%. This compares to values recorded in 1999, a drought year, where the 1-hour value was 5%, the 10-hour value was 6.5%, the 100-hour value was11% and the 1000-hour value was 15%.

Almost all of the area has been logged or farmed in the past 100 years. As a result, the past fire history recorded as fire scars and other information important to fire planning is difficult to find. Until the Fire Ecology Study is completed, the normal fire regime and the role fire played in the area cannot be completely understood. Studies completed in similar fuel types indicate that fire played an important role in species composition and distribution.

All the fuel types indicated in Section 6.0 - Wildland Fire Management Situation are present in this unit. NFFL Fire Behavior Fuel Model 8 is the predominate fuel type found during the late spring and summer months. Drought can have an adverse impact on fire behavior and can increase fire-induced mortality in this fuel type. NFFL Fire Behavior Fuel Model 9 is the predominate fuel type found during the fall, winter, and early spring months. Fuel Model 9 also can be used to describe the fuels found in pine plantations. The expected fire spread characteristics for fuel models under normal and extreme conditions are outlined in Table 4.

[4] Based on 124 wildland fires that were reported as suppressed between 1979 and 1998, the mean fire size was 4 acres. The average size was 35 acres. Discounting the largest fire which appears to have been an anomaly (1854 acres), the average size was 20 acres. Over three-quarters of the fires were 20 acres or smaller (SACS 2000).

Figure 5: Wildland Fire Occurence by Year 1979-1999

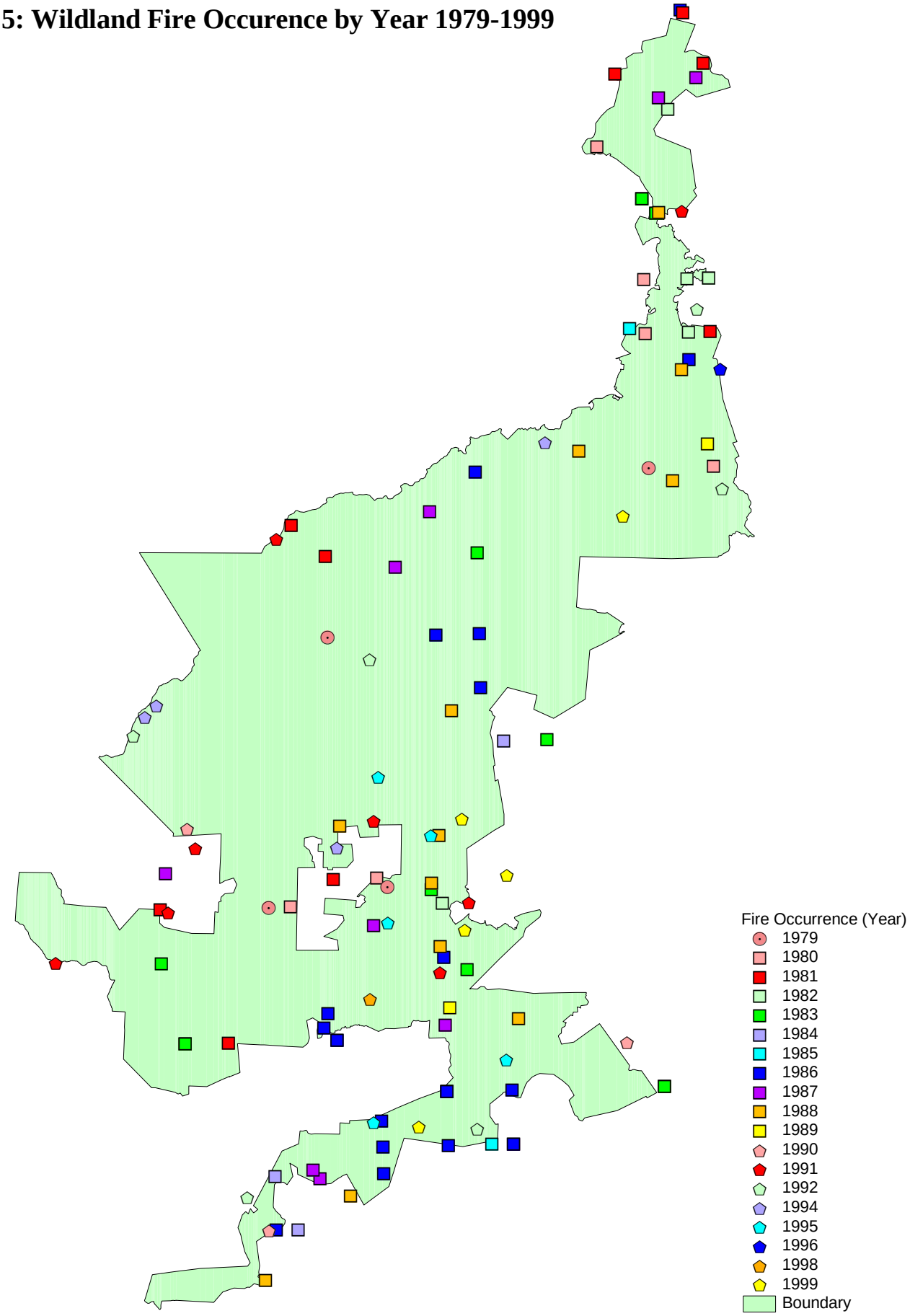


Figure 6: Wildland Fires by Size 1979-1999

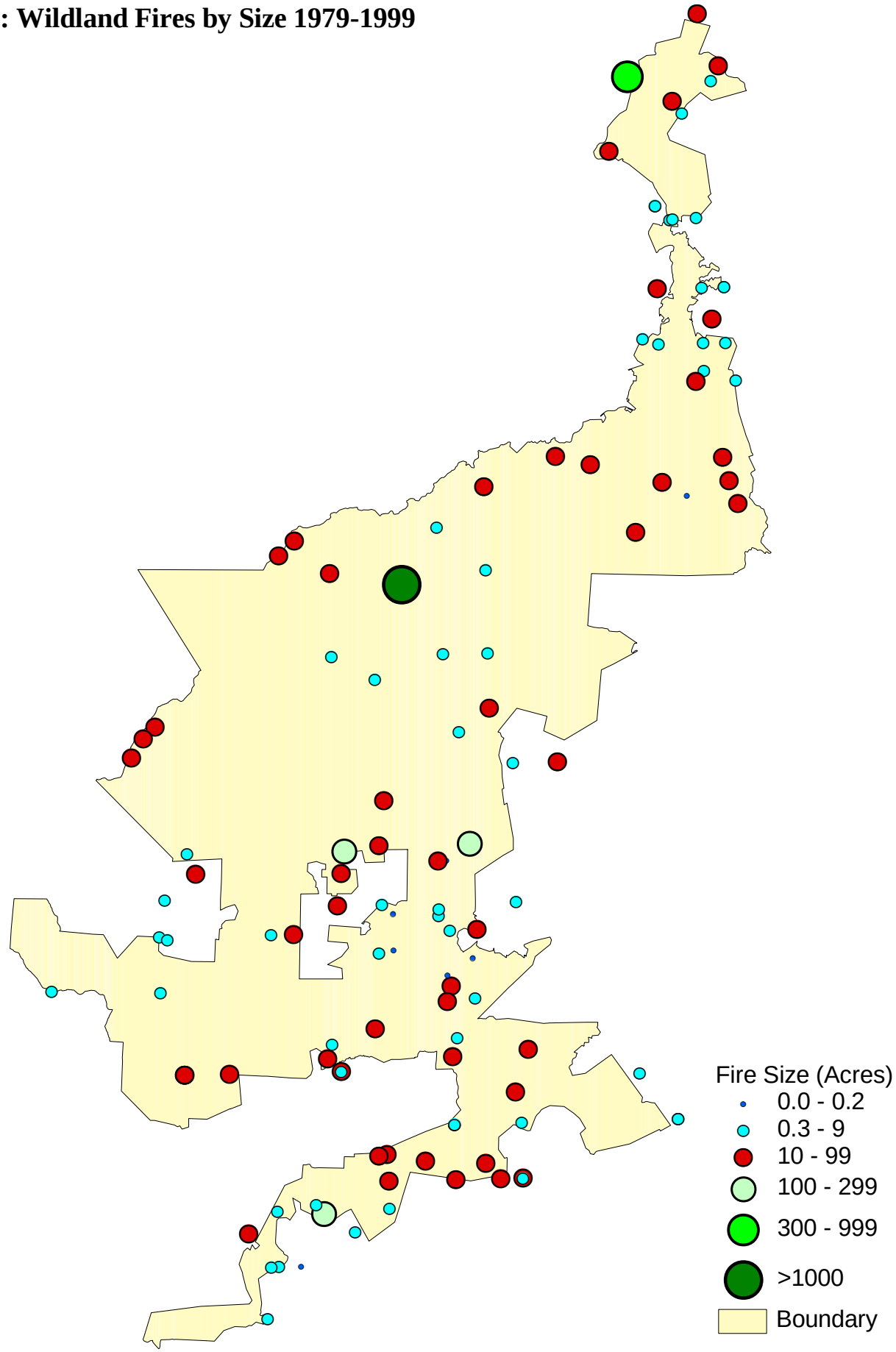


Table 4: Expected Fire Behavior – FMU 1

Condition	Fuel Model	Flame Length *feet*	Rate of Spread *Ch/hr*	Characteristics
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 fuels 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 blowing leaves. Torching out, spotting, and crowning may be encountered during drought conditions.
Normal	10	4.8	7.9	Fires are at the upper limit of control by direct attack. Fire intensities can lead to spotting and torching of individual trees.
Extreme	10	8.4	25	Fires exceed the upper limit of control by direct attack. Windy or drier conditions can lead to spotting, torching, and crown fires that can further lead to escaped fires.
Normal	11	3.5	6.0	Fires are fairly active in the slash and herbaceous material intermixed with the slash. Fires are at the upper limit of control by direct attack.
Extreme	11	5.9	14	Fires exceed the ability to control by direct attack. Under windy, dry conditions spotting can lead to escaped fires.
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.
Normal	5	4.0	18	Fires occurring under normal conditions are not too intense because the highly flammable foliage does not contribute to fire intensity and they tend to remain surface fires.
Extreme	5	10.1	72	Fuels with flammable foliage such as mature laurel will exhibit torching and increase intensities that may make direct attack difficult, if not impossible.
Normal	6	6.0	32	Fires being pushed by moderate winds (8mph) carry through the shrub layer where the foliage is more flammable than fuel model 5. Will drop to the ground at low wind speeds or at openings in the stands.
Extreme	6	10.6	111	Fires exceed the ability to control by direct attack. Under windy, dry conditions spotting can lead to escaped fires.

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

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 National Area;
- National Area Headquarters developed area;
- Developed areas within the Unit (Table 3);
- Oil and gas wells and associated facilities;
- Threatened and endangered species;
- Former coal mining sites and spoil piles;
- The Zenith and Rugby townsites.

7.2.1.9 Annual Fire Weather Cycles

Annual fire weather cycles are similar throughout the National Area and are described in Section 3.3 Climate. Rainfall is greater in the southern portions of the National Area than the north, but the difference is not significant and should not be a factor when estimating fire danger or behavior. Of more 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. The last noted drought was during the middle to late 1980's and lasted approximately five years. During periods of drought, wildland fires exhibiting extreme fire behavior can occur during the summer, a period considered to be outside the normal fire season. Under normal conditions, the fire season in the National Area is split between a Spring Fire Season (February 15 – May 15) and a Fall Fire Season (October 1 – December 15).

7.2.2 Fire Management Unit 2 – Natural Unit

7.2.2.1 Description of Unit

The unit lies primarily within the interior of the National Area and includes the steeply sloped portions of Big South Fork gorge and the undeveloped portions of the plateau. The unit **specifically excludes** all cultural or historic sites indicated in Table 3.

As was the case for the Development Unit, the various habitats of this unit have been severely impacted by farming and logging which are believed to have altered the species composition and distribution. Due to the known presence in the National Area as recently as the 1980's of a fire dependent, federally endangered species, the red-cockaded woodpecker, it is important that the effects of fire on this particular unit be fully understood. The Fire Ecology Study, when completed, will provide additional guidance to managers so that they can use wildland fire, as appropriate, to achieve resource management goals and objectives. Until such time all wildland fires will be suppressed using the appropriate management response.

7.2.2.2 Specific FMU Management Objectives

1. Ensure that the safety of personnel and the public receive the highest priority during all fire management activities.
2. Enhance the protection of natural and cultural resources.
3. Create and maintain habitat for Threatened and Endangered species.
4. Maintain historic landscapes through prescribed burning.
5. Enhance natural processes to restore native floral and faunal diversity through fire use.
6. Using the appropriate management response, confine all fires starting on NPS lands within the National Area boundaries.
7. Utilize direct attack strategies when suppressing fires that threaten life and/or significant values to be protected.
8. Use natural or existing man-made barriers to the greatest extent possible for control lines (Minimum Impact Suppression Tactics [MIST] concept).
9. Initiate an initial attack response within 30 minutes of receiving a report of a fire.
10. Monitor and document results of fire management activities.

7.2.2.3 Relationship of FMU Management to FMP Objectives

Management of the Natural Unit is designed to meet the following Fire Management Plan Objectives.

- All fire management activities will have firefighter and public safety as highest priority.
- Use prescribed fire when appropriate as a tool to manage and enhance natural resources.
- Use prescribed fire when appropriate as a tool to manage historic landscapes.
- All unwanted and undesirable 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.
- Pending the outcome of the Fire Ecology Study, wildland fire will be restored as an ecological process.

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.
- National Area neighbors, visitors and local residents will be notified of all fire management activities that may effect them.
- Response time is appropriate to the values to be protected.
- Minimum impact suppression tactics will be used when appropriate.
- Fire behavior and short-term fire effects will be monitored and documented.
- Interested publics will be informed of fire management activities and the role of fire in the natural process.

- Temporary area closures during fire management operations will be implemented at the discretion of the Superintendent.

7.2.2.5 Management Constraints

- Air quality standards for the airshed will be adhered to during all prescribed fire operations. The suppression response selected to manage a wildland fire will consider air quality standards.
- Measures designed to protect cultural and historic sites will be implemented prior to conducting a prescribed burn.
- Fire management actions for all aspects of wildland and prescribed fire that may impact Threatened and Endangered species will comply with the Endangered Species Act.
- Off-road use by vehicles during fire management operations will not be permitted without the approval of the Superintendent.
- The use of mechanized equipment is prohibited in the Gorge, except in emergencies, or for certain administrative purposes.
- The use of dozers and other ground disturbing equipment will not be permitted without the approval of the Superintendent, except to protect life and significant values to be protected.
- Water quality must be protected. Possible impacts will be identified and mitigation measures identified prior to utilizing retardant or conducting a prescribed burn.
- The use of aerial retardant will only be considered upon immediate threat to life or developments. Every effort will be made to maintain a 300 foot buffer around streams and the River in concert with the threat to life and property.
- Due care and caution will be exercised to lessen the likelihood of coal fires or adverse impacts to oil and gas facilities.

7.2.2.6 Physical Description of Fire Management Unit

This 90,486 acre FMU consists of a primary canyon created by the Big South Fork River and its many tributaries along entire length of the unit. A series of ridges divide the drainages, which are often described as resembling many limbed trees. The unit borders the Daniel Boone National Forest, private land, Pickett State Park and Forest, and developed areas within the National Area. The unit contains roads and trails that follow ridge tops or descend into drainages. Habitat suitable to support the red-cockaded woodpecker has been present near or within the unit as recently as the early 1980's. Open meadows and former farm fields are scattered primarily on tablelands throughout the western section of the unit.

7.2.2.7 FMU Fire History, Effects, and Behavior Characteristics

The recorded fire history of this area is indicative of that described for the entire National Area and is discussed in Section 7.2.1.7. It is important to note, however, that the largest reported fire occurring in the National Area was located on a ridge within this unit. Fires tend to be larger in this unit because of the topography, limited access, and distance for control forces to travel. (For example, boats were used to transport firefighters to a 200-acre fire that occurred in 1999).

All the fuel types indicated in Section 6.0 - Wildland Fire Management Situation are present in this unit. NFFL Fire Behavior Fuel Model 8 is the predominant fuel type found during the late spring and summer months. Drought can have an adverse impact on fire behavior and can increase fire-induced mortality in this fuel type. NFFL Fire Behavior Fuel Model 9 is the predominant fuel type found during the fall, winter, and early spring months. The expected fire spread characteristics for all fuel models under normal and extreme conditions are outlined in Table 4.

7.2.2.8 Values to be Protected and Special Concerns

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

- Cultural and historic sites;
- Threatened and endangered species;
- Air and water quality;
- Former coal mining sites and spoil piles;
- Visitor use developments including over-look platforms and bridges;
- Adjacent private lands and the lands administered by the State of Tennessee and Daniel Boone National Forest;
- Oil and gas wells and associated infrastructure.

7.2.2.9 Annual Fire Weather Cycles

Annual fire weather cycles are similar throughout the National Area and are described in Section 3.3 - Climate, and discussed further in Section 7.2.1.9. Rainfall is greater in the southern portions of the National Area than the north, but the difference is not significant and should not be a factor when estimating fire danger or behavior.

8.0 FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

The National Area does not have a fire management organization. The Fire Management Officer at Great Smoky Mountains National Park, as well as the Fire Use Module and Fire Effects Team stationed there are available to assist the Area. The Regional Fire Management Officer, Prescribed Fire Specialist, Wildland Fire Specialist, and GIS Specialist are also available to assist the Area. A team composed of division chiefs and the Superintendent manages the National Area. Individual responsibilities have been assigned each division chief who reports to the Superintendent. The fire management organization will mirror the existing management structure (Appendix G).

8.1 Staff Responsibilities

Individual responsibilities that relate to fire management are identified in Table 5.

Table 5: Staff Responsibilities

Position	Primary Fire Management Related Responsibilities
Superintendent	• Responsible for the overall management of the National Area including fire management. • Responsible for signing the periodic assessment certifying that continued management of wildland fire use actions is acceptable (not currently an option). • Appoints Agency Administrator's Representative. • Ensures that both a briefing statement and delegation of authority are prepared for each incoming Incident Management Team, as required. • Declares National Area closures when necessary. • Approves prescribed burn plans • Ensures that fire information is managed in accordance with the National Area's FMP. • Approves the use of mechanized equipment when necessary.
Assistant 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 at the National Area is adequately planned and implemented and that the Fire Management Plan is reviewed annually and revised as necessary. • 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. • Ensures an adequate, effective fire prevention program is implemented. • Serves as a collateral duty firefighter, as qualified.
Fire Program Manager **Duties delegated by the Superintendent in writing to an existing staff member until the Fire Management Officer position is filled. At that time the Fire Program Manager will assume**	• Implements the operational aspects of the Fire Management Plan, including fire prevention, wildland fire suppression, prescribed fire operations, aviation, and dispatching and mobilization. • Ensures that the fire program is managed within NPS guidelines as defined in RM-18 and DO-18. • Represents the National Area and coordinates fire related activities with other NPS areas, regional and national fire staff, and local, state, and federal fire organizations. • Prepares and revises cooperative agreements.

these duties.	• 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 National Area 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 National Area 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 National Area. • Serves as Agency Administrator Representative, when assigned, and drafts the Limited Delegation of Authority and briefing statement for approval by the Superintendent. • Ensures Individual Fire Reports (DI-1202) are entered in to SACS. • Serves as a collateral duty firefighter, as qualified. • Serves as point of contact for Fire Use Modules and Fire Effects Teams
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. • Serves 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. • Initiates or reviews fire management plans and other planning documents. • 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. • 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 National Area'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 the Area. • Maintains the National Area's fire weather stations. Collects and inputs fire weather observations into WIMS. At Staffing Level III or higher, broadcasts a daily fire weather brief and informs Chief Ranger and Fire Program Manager of the situation. • Conducts preparedness patrols. Gathers fire intelligence and reports situation to Chief Ranger and Fire Program Manager. • Assists with the coordination and presentation of National Area-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 Fire Program Manager maintain accurate fire records.
Ranger(s)	• Supervises Fire Technicians, when delegated the responsibility. • Conducts fire prevention patrols. • 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 Fire Coordinator maintain accurate fire records. • Performs fire management duties, as qualified.
Incident Commander Type IV (ICT4) **Designated by Fire Program Manager** **An Initial Attack wildland fire is defined as a fire reported to be under 10 acres that can be controlled by a few resources in one burning period, without the use of air attack resources.**	• 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 Program Manager 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) **Designated by the Fire Program Manager** **An Extended Attack wildland fire is defined as a fire that can not be controlled by initial attack forces in a reasonable period of time. The fire can usually be controlled within three days of initiating action.**	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.

Prescribed Fire Burn Boss **Designated by the Fire Program Manager**	• Reviews prescribed burn plans prior to implementation. • Implements prescribed burn plans in accordance with prescription. • Assists with the administration, monitoring, and evaluation of prescribed burns. 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.

8.2 Firefighter Qualifications

The fire management program currently (CY 2003) 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 several 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 6.

Table 6: Minimum Staffing Targets

POSITION	WILDLAND/PRESCIBED FIRE
Incident Commander Type 3 (ICT3)	1
Incident Commander Type 4 (ICT4)	4 (2 KY – 2 TN)
Incident Commander Type 5 (ICT5)	4
Task Force Leader (TFLD)	2
Engine Boss (ENGB)	6
Crew Boss (CRWB)	4
Firefighter Type 1 (FFT1)	9
Firefighter Type 2 (FFT2)	20
Burn Boss 2 (RXB2)	2
Ignition Specialist (RXI2)	2
Fire Monitor (FEMO)	4
Dispatchers (2@ each level)	6
Situation Unit Leader (SIUL)	1
Field Observer (FOBS)	2
Training Specialist (TNSP)	1
Helicopter Manager (HEMG)	2
Helicopter Crewperson (HECM)	6
Information Officer 3 (IOF3)	1
Personnel Time Recorder (PTRC)	2
Equipment Time Recorder (EQTR)	2
Supply Unit Leader (SPUL)	1
Resource Unit Leader (REUL)	1

Note: One firefighter may fill more than one position.

8.3 Interagency Coordination

Fire related agreements exist with the states of Kentucky and Tennessee and the Daniel Boone National Forest (Appendix H).

Table 7: Fire Related Agreements

Cooperator	Type of Agreement
Tennessee Division of Forestry	Memorandum of Understanding
Commonwealth of Kentucky	Memorandum of Understanding
USDA FS Daniel Boone National Forest	Annual Action Plan

A ½ mile wide mutual response zone is designated on either side of the National Area boundary in Kentucky and Tennessee. National Area fire suppression forces will respond to reports of wildland fires within this zone, regardless of jurisdiction. The state agency having responsibility for wildland fire suppression in the area of the reported fire will also respond. Wildland fires occurring on private lands adjacent to the National Area in Tennessee are managed by the Tennessee DOF. Wildland fires occurring on private lands in Kentucky are managed by the Kentucky DOF. Wildland fires occurring on NPS lands are managed by the National Area. In addition to responsibility for wildland fire suppression on private lands, Tennessee DOF personnel in Picket County have fire suppression responsibilities for Pickett State Park and Pickett State Forest, and DOF personnel in Scott County have responsibility for Scott State Forest.

The National Area can directly request assistance for support from the State of Tennessee Department of Forestry by contacting the appropriate Area Fire Tower or by contacting the Dispatch Center in Knoxville. Support from the Kentucky DOF can be obtained by contacting the District Forester. The National Area can be contacted through the Scott County, Tennessee, Sheriff Dispatch Center.

The agreement between the Daniel Boone National Forest and the National Area also identifies a mutual response zone. Fires involving the Daniel Boone National Forest are managed by agreement under a unified command. Requests for assistance from the Daniel Boone National Forest are made through the Kentucky Interagency Coordination Center.

Table 8: Key Interagency Contacts

Contact	Title	Phone Number
Scott County Sheriff Office	Dispatcher	423-663-2245
TDOF-Campbell County	Area Forester	865-906-9695 P# 202
TDOF-Knox County	Fire Prevention Forester	865-906-9695 P# 205
TDOF-Scott County	Forestry Technician	1-800-841-7243 - 33166
TDOF-Knox County	Dispatcher	1-888-643-7380
TDOF-Oneida Tower		423-569-4175
TDOF-Pickett County	Area Forester	931-879-7173
TDOF-Pickett County	Fire Prevention Forester	931-526-9502
Kentucky IACC	Dispatcher	606-745-3171
KDOF	District Forester	606-337-3011

Currently, the National Area does not have qualified staff to fully implement the plan. There are two fire staff shortcomings that can be addressed with help from the National Area's cooperators.

- The present staff has an adequate level of experience to manage the majority of the fires occurring on NPS lands. However, their level of qualifications does not reflect their level of experience. There is a need to work primarily with personnel from the Daniel Boone National Forest so that performance based taskbooks can be completed for individuals ready to become Single Resource Boss or Incident Commander qualified.
- The National Area currently lacks experienced personnel to implement the prescribed burn program. Burn Bosses and other experienced prescribed fire personnel must be requested to assist the National Area until its personnel can become qualified.

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 National Wildland fire Coordination Group (NWCG) Personal Protective Equipment (PPE) standards.

9.0 WILDLAND FIRE MANAGEMENT

9.1 Wildland Fire Use

Until the Fire Ecology Study is completed, all wildland fires regardless of origin will be suppressed using the appropriate management response. Following the completion of the study, 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.

Until Wildland Fire Use is expressly approved in the National Area's Fire Management Plan, in keeping with the Federal Wildland Fire Policy, resource benefits **will not** be used as one of the considerations when determining the appropriate management response. The appropriate

response will be determined after evaluating factors such as firefighter and public safety, values to be protected, estimated cost of suppression, external concerns, and land use.

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 and qualified 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 or effected by steep terrain 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 National Area have been identified.

- Slope reversal
- Rolling rocks and burning materials
- Oil and Gas wells and their associated pipelines and storage tanks
- Snags and dead trees with weak root systems
- Heavy concentrations of fuels that can block escape routes
- Steep/sheer cliffs
- Loose rock which can contribute to poor footing
- Narrow roads with sharp curves and blind corners
- Stinging insects and poisonous snakes
- Abandoned mine shafts and open pit mines
- Burning coal seams and concentrations of coal spoils on slopes and floodplains

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.

There are approximately 300 oil and gas wells and their associated infrastructure located in the National Area. In the past, wildland fires have threatened wells, collection and distribution lines and storage tanks. In July 2002 a private oil production facility near the Obed W & SR did suffer a structural fault and the subsequent wildland fire was partially handled by BISO firefighters. In light of this event, it is important to note that National Area wildland firefighters were not equipped or trained to suppress petroleum fires. In keeping with NPS policy, they only initiated initial attack and contained the wildland fire, but requested the assistance of the Tennessee Emergency Management Agency and structural fire departments having jurisdiction, to suppress the portion of the fire involving a petroleum product. In addition to exercising due care and caution when taking suppression action on wildland fires in the vicinity of these potential hazards, wildland firefighters **must** avoid exposure to the smoke from a petroleum fire. National Area staff will work with the petroleum producers to develop and maintain defensible space around well heads and storage tanks and mark feeder and other pipe lines at or below the surface.

9.2.2 Range of Potential Fire Behavior

Fire behavior in and adjacent to the National Area can range from fast moving surface fires or crown fires on southerly facing steep slopes to creeping duff fires in sheltered areas. For a more detailed discussion refer to the fire behavior descriptions in Fire Management Unit 1.

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 National Area. A fire prevention analysis has been completed and a plan developed to reduce the number of human-caused wildland fires. The objective of the program will be to minimize preventable fires. The following general actions will be taken to achieve this objective:

- Aggressively investigate all wildland fires;
- Conduct prevention patrols during periods of very high fire danger;
- Conduct prevention patrols during the fall when arson fires are most common;
- Post appropriate signing during periods of high fire danger;
- Participate in fire prevention and safety programs at public schools;
- 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;
- Reduce activity fuels in visitor use developed areas, such as campgrounds, to lower the likelihood of wildland fire.

The Fire Prevention Analysis and Plan is included as part of this plan (Appendix M).

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, if possible, **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.

Individual development plans should be created for each firefighter. There is a need to develop ICT4's and RXB2's to adequately manage the fire program at the National Area (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 National Area 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 Chief Ranger 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 9: Annual Preparedness Activities

ACTIVITY	1	2	3	4	5	6	7	8	9	10	11	12
Inventory Fire Engines and Cache		x							x			
Pre-season Engine Preparation		x							x			
Weigh Engines to verify GVW Compliance		x							x			
Complete Training Analysis	x											
Annual Refresher Training			x									
Annual Fitness Testing			x									
Prescribed Fire Plan Preparation							x					
Review and Update Fire Mgt. Plan												x
Prepare Pre-season Risk Analysis			x									
Live Fuel Moisture Sampling		x	x	x	x	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

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, fuels, 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 fuels 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 National Area'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 36) is reached, funds can be expended as outlined in the approved Step-up Plan.

The Kentucky Interagency Coordinating Center publishes a standardized chart of staffing classes which all agencies in the zone have agreed to use. NFDRS Fuel Model E (Hardwood Litter-Fall) has been selected as the most representative fuel type for the periods of highest fire danger which have been defined as February 15 to May 15 and October 15 to December 15. For the period May 16 to October 14, NFDRS Fuel Model R (Hardwood Litter-Summer) is used.

Table 10: Burning Indices and Staffing Classes

BURNING INDEX	IGNITION COMPONENT				
	0-20	21-45	46-65	66-80	81-100
0-7	L	L	L	M	M
8-15	L	M	M	M	H
16-18	M	M	H	H	V
19-22	M	M	H	H	V
23-25	M	M	H	H	V
26-29	M	M	H	H	V
30-32	M	H	V	V	E
33-35	H	V	V	E	E
36-42	H	V	V	E	E
43-50	H	V	V	E	E

L	M	H	V	E
Low	Moderate	High	Very High	Extreme
Staffing Class 1	Staffing Class 2	Staffing Class 3	Staffing Class 4	Staffing Class 5

Table 11: Step-up Plan – Big South Fork National River and National Area

Staffing Class	Description of Conditions	Actions
1	Surface fuels and duff generally moist. Fires will present a low level of control difficulty	Confirm that available and qualified initial attack firefighters are outfitted with personal protective equipment and one engine is ready to respond.
2	Surface fuels are drying and fuels will burn at mid-day. Slow rate of spread but fires on south aspects may exhibit increased fire behavior	Specify normal tours of duty and determine number of IA personnel available. Available and qualified initial attack firefighters are outfitted with personal protective equipment and engines are ready to respond.
3	Fine fuels are dry. Heavy fuels are drying. Fire may spread more rapidly, especially with increased winds and on southern aspects	Specify normal tours of duty and determine number of IA personnel available. Available and qualified initial attack firefighters are outfitted with personal protective equipment immediately available (with them) and engines are ready to respond.
4	All fuels are dry. Fires ignite easily, spread quickly, and are difficult to control. Fires on southern aspects may exhibit extreme fire behavior. Duff fires are difficult to extinguish.	Authorization to use emergency funds may be requested by the Chief Ranger. Consider canceling Annual Leave for key fire personnel. Consider extending tours of duty to include extended coverage after 1700 hrs and on weekends. Increase detection patrols. Post notices.
5	All fuels dry. Multiple fires may be reported in zone. Chance of torching and spot fires high. Duff fires resist control	Authorization to use emergency funds may be requested by the Chief Ranger. Engines staffed and response ready. Canceling Annual Leave for key fire personnel. Extend tours of duty to include extended coverage after 1700 hrs and on weekends. Increase detection patrols. Post notices. Consider prohibition on campfires.

9.2.4 Pre-attack Plan

Due to the scope of the fire program at the National Area, no formal pre-attack plan has been written. Certain preparations and procedures are established by the Fire Program Coordinator prior to and during the fire season and communicated to the National Area staff. Certain topics addressed in a pre-attack plan are mentioned in the Annual Preparedness Activities section. The value of a written pre-attack plan, or a checklist is recognized. One may be prepared as the fire program evolves into a more complex and operationally committed program.

9.2.5 Detection

There are many ways wildland fires occurring in or near the National Area can be reported to National Area officials. Several fire towers are located in Tennessee. They are staffed during periods of high fire danger by employees of the Tennessee DOF. The Daniel Boone National Forest routinely flies detection patrols during periods of high fire danger. The Kentucky portion of the National Area is routinely covered during these patrols. The section of the National Area in Tennessee north of Highway 297 may be checked by request.

In Tennessee, fires that are reported by visitors, local residents, or other counties are usually reported to the Scott County, Tennessee, Sheriff Office. Scott County dispatchers contact the National Area if the reported fire appears to be on NPS lands. Scott County has an employee contact list and the National Area's radio frequencies, making contact fairly easily. In Kentucky, depending on location, wildland fires are generally reported to the local fire department, the Kentucky Department of Forestry, or the Daniel Boone National Forest. They in turn contact the National Area.

During periods of high fire danger and when burn bans are in effect, the National Area conducts fire prevention patrols. All fires observed by National Area employees are reported to the Ranger Division.

9.2.6 Mobilization

9.2.6.1 In-Park Assignments

A pre-approved roster of firefighters available to respond to wildland fires reported in the National Area or Mutual Response Zone is maintained by the Fire Program Manager. When a report of a fire is received, the Fire Program Manager designates an Incident Commander and contacts firefighters based on type and number needed. Personnel are selected from the list in priority order. The Fire Program Manager can contact employees from all divisions directly for in-area dispatches. Mutual aid responses from the Daniel Boone National Forest and the states of Tennessee and Kentucky for fires occurring near or adjacent to the National Area boundary are handled in the same manner. Firefighters contacted that refuse an assignment are moved to the bottom of the list.

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

9.2.6.2 Out-of-Area Assignments

The Fire Program Manager is contacted by the Kentucky Interagency Coordination Center with the Resource Order information. The Fire Program Manager maintains an availability list during periods of high fire danger in the zone or nation. The Fire Program Manager contacts the appropriate Division Chief to gain permission to commit the firefighter if the firefighter is available. Once the Division Chief grants permission, the firefighter is contacted, and if available, committed to the assignment. Normally there is a 1-hour "Fill or Kill" time specified by the Kentucky Interagency Coordination Center.

The National Area has committed three to four Type-2 firefighters (FFT2) to the Lexington (KY) Module. These firefighters are pre identified but the request is handled as outlined above.

9.2.7 Initial Attack

When multiple fires are reported, fires occurring in Fire Management Unit 1 will be of higher priority than fires occurring in Fire Management Unit 2. 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 cultural and historic sites;
- Threat to threatened and endangered species, and sensitive habitats;
- Threat to National Area developments.

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

- Public and firefighter safety;
- Protection and improvements and private property;
- Protection of cultural, historic, and natural resources;
- Minimum fireline construction;
- Availability of suppression resources and response times;
- Fire behavior based on fuels, weather, and topography;
- Minimizing the use of mechanized equipment and aircraft 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.

9.2.8 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 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.

9.2.9 Minimum Impact Suppression Tactics (MIST)

Fire management activities within the National Area 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 to be used when suppressing fires in the National Area include:

- The approval of the Superintendent is needed for off-road use of vehicles and the use of plows and other mechanized equipment, unless significant values to be protected are threatened. When mechanized equipment is used for line construction, a para-archeologist or staff person from the Resource Management Division will be assigned, if possible, to clear the route ahead of the equipment.
- When firelines are constructed in areas identified as likely locations of archeological resources (e.g. ridgelines), a para-archeologist or staff person from the Resource Management Division will be assigned, if available, to clear the route ahead of the fire suppression crew.
- Minimum use of retardant. Retardant use will be discussed in the delegation of authority and occur in consultation with the Incident Commander, Superintendent and Resource management. See section 9.2.9.1 or more details on retardant use.
- 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.
- Water bars will be placed on steep slopes.

9.2.9.1 Aerial Retardant

SUPPRESSION CHEMICALS & DELIVERY SYSTEMS

A. Policy For Use Of Fire Chemicals

1. Retardant Policy – Using approved long-term retardants in wildland fire suppression efforts is standard in fire management and planning. The retardants are most often delivered in fixed or rotor-wing aircraft.

2. Foam Policy - Standard operating procedures for fire management and suppression activities involving water as the suppression or protection agent delivered by engines and portable pumps, shall include the use of Class A fire suppressant to improve the efficiency of water – except near watercourses where accidental spillage or over spray of the chemical could be harmful to the aquatic ecosystem .

B. General Safety Criteria

Foam concentrates and solutions must meet minimum requirements with regard to aquatic and mammalian toxicity, which includes acute oral toxicity, acute dermal toxicity, primary skin irritation, and primary eye irritation

Human health risk from accidental drench with retardant can be mitigated by removing any residue from exposed skin by washing with water.

Containers of foam concentrate or solutions, including backpack pumps and engine tanks, should be labeled to alert personnel that they do not contain plain water, and that the contents must not be used for drinking purposes.

All safety precautions associated with ground crews near retardant drops also apply to aerial foam drops.

C. Aerial Application Safety

Persons downrange, but in the flight path of intended retardant drops, should move to a location that will decrease the possibility of being hit with a drop.

Persons near retardant drops should be alert for objects (tree limbs, rocks, etc.) that the drop could dislodge.

During training or briefings, inform field personnel of environmental guidelines and requirements for fire chemicals application.
Locate foam and retardant mixing and loading areas and dip-tank sites to eliminate contact with natural bodies of water.
Notify incident or host authorities promptly of any accidental foam or retardant drop within 300 feet of or spill into a water body. The incident or host authorities must immediately contact appropriate regulatory agencies and specialists within the local jurisdiction.
Avoid dipping from river or lakes with a helicopter bucket containing residual foam or retardant. Set up an adjacent reload site and manage the foam and retardant in portable tanks, or terminate the use of chemicals for that application.
Quality control maintenance and safety requirements dictate that mixing or blending of retardants be accomplished by standard approved methods. Powdered or liquid retardants must be blended or mixed at the proper ratio prior to being loaded into the aircraft.

D. Environmental Guidelines for Delivery of Retardant or Foam Near Waterways

1. Definition
Waterway - Any body of water including lakes, rivers, seeps, intermittent streams and ponds whether or not they contain aquatic life.

2. Aerial Application Guidelines
Avoid aerial or ground application of retardant or foam within 300 feet of waterways.
These guidelines do not require the pilot-in-command to fly in such a way as to endanger his or her aircraft, other aircraft, structures, or compromise ground personnel safety.

3. Exceptions
When alternative line construction tactics are not available due to terrain constraints, congested area, life and property concerns, or lack of ground personnel, it is acceptable to anchor the foam or retardant application to the waterway. When anchoring a retardant or foam line to a waterway, use the most accurate method of delivery in order to minimize placement of retardant or foam in the waterway.
Deviations from these guidelines are acceptable when life or property is threatened and the use of retardant or foam can be reasonably expected to alleviate the threat. When potential damage to natural resources outweighs possible loss of aquatic life, the agency administrator may approve a deviation from these guidelines.

E. Environmental Procedures for Application of Fire Chemicals

Threatened and Endangered (T&E) Species

The following provisions are guidance for complying with the emergency Section 7 consultation procedures of the Endangered Species Act (ESA) with respect to aquatic species. These provisions do not alter or diminish the Big South Fork's responsibilities under ESA. Where aquatic T&E species or their habitats are potentially affected by aerial application of retardant or foam, the following additional procedures apply:

As soon as practical after the aerial application of retardant or foam near waterways, we will determine whether the aerial application has caused any adverse effect on T&E species or their habitat using the following criteria:

1) Aerial application of retardant or foam outside 300 feet of a waterway is presumed to avoid adverse effects to aquatic species and no further consultation for aquatic species is necessary.

2) Aerial application of retardant or foam within 300 feet of a waterway requires that the unit administrator or designee determine whether there have been any adverse effects to T&E species within the waterway.

3) If the action agency determines that there were adverse effects on T&E species or their habitats, then the agency must consult with Fish and Wildlife Service (FWS) as required by 50 CFR 402.05 (Emergencies). Procedures for emergency consultation are described in the *Interagency Consultation Handbook,* Chapter 8 (March 1998). In the case of a long duration incident, emergency consultation should be initiated as soon as practical during the event. Otherwise, post-event consultation is appropriate. The initiation of the consultation is the responsibility of the unit administrator. These procedures shall be documented in a Biological Assessment (BA). All occurrences of adverse effects will be immediately reported to Wildland Fire Chemicals Systems in Missoula, Montana at phone 406-329-3900.

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F. Ground Application of Fire Suppressant Foams

1. Proportioners

Proportioners are designed to provide an appropriate mix of foam concentrate and water during pumping operations, rather than relying

on batch mixing to prepare foam solutions. Both manual and automatic proportioner systems are available.
Proportioners should be flushed after every operational period of use.
Agency standards for foam proportioners on engines are an automatically regulated pressure bladder system
These devices are available as a foam kit for use with portable pumps.
Automatic proportioners are required for compressed air foam systems to prevent slug flow.

2. Wet Water – Using foam concentrates at a mix ratio of 0.1 percent will produce a wet water solution.
a. **Conventional Nozzles and Backpack Pumps –** Mix ratio is 0.1 – 0.3%. Hydraulic considerations are the same as water.
b. **Aspirating Nozzles –** Mix ratio is 0.2 – 1.0%, but generally 0.5%, depending on nozzle, "foaminess" of concentrate used, and type of application. Adjust the ratio to best meet needs and objectives. Foam production and delivery should occur as readily as water delivery.

3. Compressed Air Foam Systems (CAFS) Operating Standards
a. Keep static air and water pressures equal.
b. Start with a 0.3% mix ratio; adjust if necessary.
c. Typical operation with 1 cfm of air for every gpm of water; adjust if necessary.
d. Employ a motionless mixer or 100 feet of hose to develop foam in the hose.
e. Foam production and delivery should occur as readily as water delivery.
f. Recommended minimum hose diameter is 1.5 inches when using foam on wildland/urban interface and vehicle fires.
1) CAFS Safety – Mandatory training for personnel operating a CAFS includes: operating the nozzle, working around charged hoselays, and how to prevent slug flow.

9.2.10 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. Stumps will be flush cut and covered with soil. Brush will be scattered and, on slopes, boles of fallen trees will be placed parallel to the hill to form erosion control devices. 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, in those instances on steep slopes where all soil cover has been removed, 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 National Area 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 fence lines, bridges, structures, etc.) These funds must come from other sources.

9.2.11 Records and Reports

9.2.11.1 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 at the National Area 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 Program Manager 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.

9.2.11.2 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 National Area resources, the coordination center should fax a copy of the Resource Order for National Area files.

9.2.11.3 Daily Situation Report

Daily Situation Reports should be submitted on those days when the National Area moves into Staffing Classes 4 and 5, or when a fire has occurred or is on going. The Fire Program Manager is responsible for preparing the report and entering it into SACS by 0930 Hrs. An ICS 209 form is completed and forwarded to the KIACC when fires exceed 100 acres for timber or brush or 300 acres for grass fuels.

9.2.11.4 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 Program Manager 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.

9.2.11.5 Year-end Accomplishment Report

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

10.0 PRESCRIBED FIRE MANAGEMENT

10.1 Scope of Long-term Prescribed Fire Program

NPS policy recognizes or requires that:

- Natural processes are occurring that perpetuate native plant life as part of the natural ecosystem of the area;
- Succession of the native plant communities of the area is occurring through natural species interaction and removal of exotic species;
- Cultural landscapes meeting National Register of Historic Places criteria are identified and preserved;
- All federally and state listed Threatened and Endangered species within the National Area boundaries along with their critical habitats are identified and protected (National Park Service 2000).

Project statements listed in the Resource Management Plan (1996) identify fire as a tool to be used to accomplish the NPS's mission. These project statements are listed in Section 5.1. The Resource Management Plan states, "Utilizing information from the (Fire Ecology of the Big South Fork Region) study a prescribed burning program for BISO will be developed." Other project statements indicate that prescriptions have been developed and prescribed fire will be used on a limited basis to restore fire to the ecosystem to enhance or maintain selected habitats and management of cultural sites. Congress has recognized that the buildup of hazardous levels of fuels is threatening federally owned resources and developments directly and visitor and employees safety indirectly, and has provided funding to treat the problem.

As indicated in Section 5.0, fire will be used as a tool to achieve the following resource management goals:

- Restore natural ecosystems using wildland fire;
- Determine the role and impact of fire on the ecosystems of the National Area;
- Manage National Area resources using prescribed fire;
- Control exotic species in concert with the Integrated Pest Management Plan;
- Maintain historic landscapes through prescribed burning.

The scope of the prescribed fire program will focus on:

- Restoring natural ecosystem processes;
- Cultural landscapes that can be managed using prescribed fire;
- Sites throughout the National Area that can benefit from the reduction of hazardous accumulations of fuels.

The purpose of this plan is to bridge the period of time between the approval of this plan and the completion of the Fire Ecology Study that is expected to provide additional guidance to managers as they develop prescriptions and expand the program.

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 Ranger and Resource Management Divisions will develop the annual burn program. Staff will identify areas to be treated, develop burn objectives, determine who will write the various burn plans, write or review burn plans written by others, insure monitoring is conducted in accordance with established guidelines, and identify research project needs.
- A park management/inter-disciplinary team composed of the Superintendent, Chief Ranger, Chief of Resource Management, Resource Management Specialist, Cultural Management Specialist, Fire Program Manager, Technical representatives as requested/designated by the Superintendent, Chief of Interpretation, 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 AOP with the Daniel Boone National Forest reflects the National Area's prescribed fire program, and schedule burns, if possible.
- Once approved, the plans will be submitted as part of the budgeting process for consideration for funding. The Resource Management Division may also request funding from other sources for monitoring and research projects.
- Approved projects will be implemented by the Chief, Resource and Visitor Protection, with the assistance of other Division Chiefs.

10.2.2 Five Year Prescribed Fire Plan

- The average annual target acreage for the entire National Area by resource management object is identified below.

Table 12: Target Acreage

Management Objective	Annual Acres
Cultural landscape management	100
Ecological restoration & exotic species control	200
Hazard fuel reduction	500

- The existing and proposed burn units are listed in Table 13. The locations of the burn units are indicated on Figure 7. Over the next five years, the Resource Management Division will identify additional areas for treatment. Treatment can include the use of mechanical and chemical means, either independently or in combination with prescribed burning to achieve the stated objectives.

- The scheduling of the various units will depend on environmental conditions as opposed to a sequence of events. It is important that the fuels in the units and the weather combine to create the desired conditions indicated in the burn plans.
- The use of prescribed fire for the restoration of habitat for the Red Cockaded Woodpecker (RCW) is a long-term goal that will only occur upon the completion of the Fire Ecological Study and an approved Species Restoration Plan. The planning process will include the completion of a habitat suitability study and consultation with the U.S. Fish and Wildlife Service, and is contingent upon staff availability.
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Table 13: Existing and Proposed Prescribed Fire Treatment Areas

Unit	Primary Fuel Model(s)	Cond Class	Acres	Treatment Objectives
Bald Knob		3	640	Hazard fuel reduction Restore native plant communities
Bandy Creek Campground	9 (100%)	3	57	Hazard fuel reduction to protect site
Bear Creek Horse Camp (Monroe Fields)	1 (60%) 8 (35%)	3	80	Hazard fuel reduction Maintain cultural landscape Restore native biotic diversity
Burke Fields	1(100%)	3	45	Restore native biotic diversity to open fields – Reduce HF
Burnt Mill Bridge	9 (90%)	3	490	Hazard fuel reduction
Divide Road #1	8 (34%) 9 (33%) 2 (33%)	3	24	Hazard fuel reduction to protect site
Divide Road #2	9 (90%)	3	92	Hazard fuel reduction to protect site
Divide Road #3	9 (95%)	3	99	Hazard fuel reduction to protect site
Divide Road #4	9 (95%)	3	71	Hazard fuel reduction to protect site
Hicks Ridge		3	715	Hazard fuel reduction Restore native plant communities
Litton/Slavens (log cabin)	1 (75%)	3	185	Maintain cultural landscape Restore biotic diversity
Lora Blevins	1 (90%) 9 (10%)	3	36	Restore/maintain cultural landscape Restore native biotic diversity
Mitchell Fields	1 (100%)	3	35	Restore native biotic diversity to open fields – Reduce HF
Newtie King	1 (50%) 8 (30%)	3	120	Hazard fuel reduction Maintain cultural landscape Restore native plant communities
Quarters #2 (Blue Heron)	9 (100%)	3	1	Hazard fuel reduction to protect structure
Tar Kiln Ridge		3	3900	Hazard fuel reduction Restore native plant communities

Figure 7. Big South Fork NRRA Prescribed Fire Treatment Areas

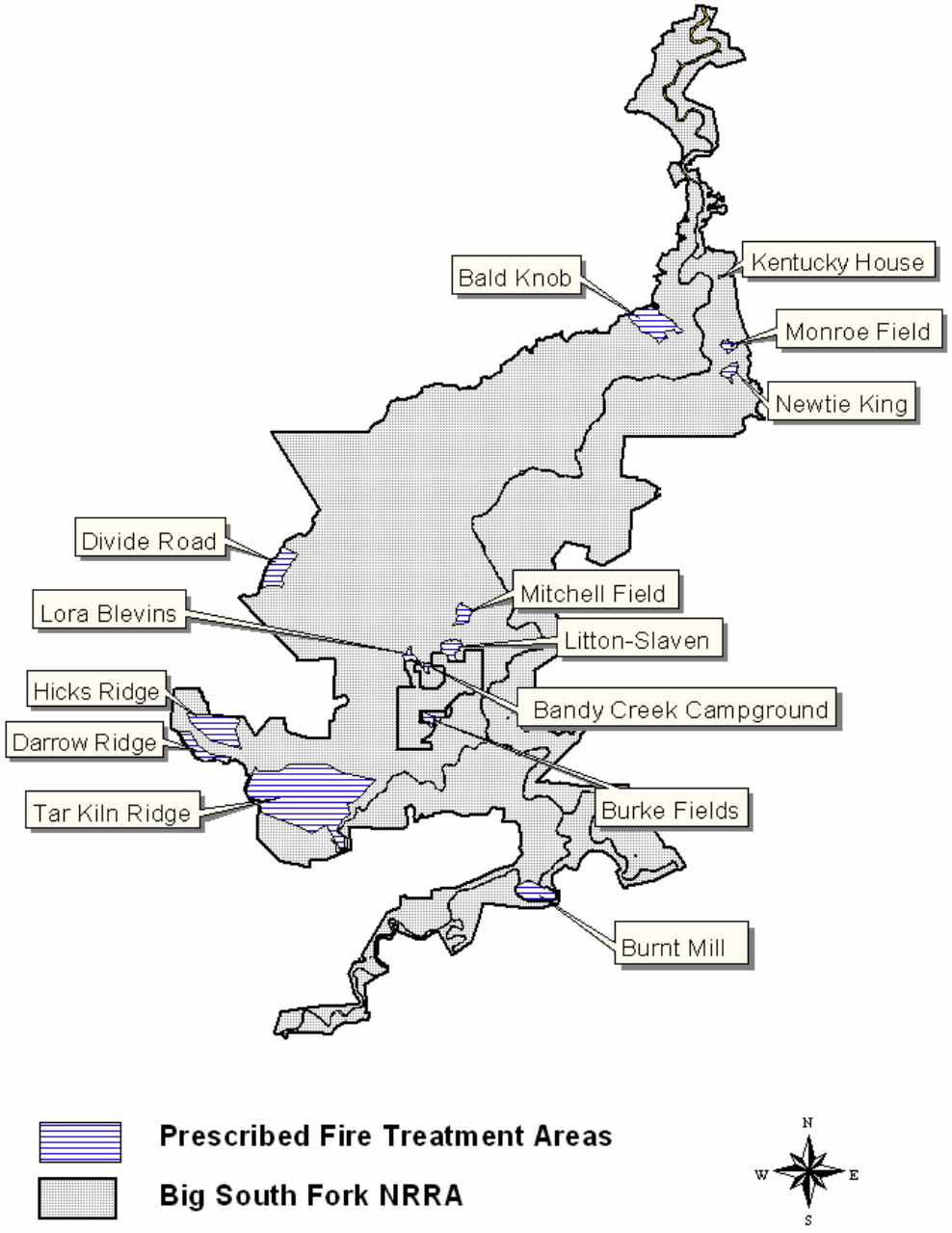

Figure 7: Existing and Proposed Prescribed Fire Treatment Areas – 10 year plan

St	Regn	Alpha	WUI HF	FY	Project Name	Activity Type	Treat Type	Fire Regime	Cond Class	NEPA	Target Acres
TN	SER	BISO	HF	FY03	Mitchell Fields	Planning	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY03	Monroe Fields	Planning	Fire	I	3	FMP NEPA	80
KY	SER	BISO	HF	FY03	Newtie King	Planning	Fire	I	3	FMP NEPA	120
TN	SER	BISO	HF	FY04	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	HF	FY04	Mitchell Fields	Treatment	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY04	Monroe Fields	Treatment	Fire	I	3	FMP NEPA	80
KY	SER	BISO	HF	FY04	Newtie King	Treatment	Fire	I	3	FMP NEPA	120
TN	SER	BISO	HF	FY05	All burns	Monitoring	Fire	I	3	FMP NEPA	
KY	SER	BISO	WUI	FY05	Bald Knob[1]	Planning	Fire			FMP NEPA	640
TN	SER	BISO	HF	FY05	Burke Fields	Planning	Fire	I	3	FMP NEPA	45
TN	SER	BISO	WUI	FY05	Hicks Ridge[1]	Planning	Fire			FMP NEPA	715
TN	SER	BISO	HF	FY05	Log Cabin	Treatment	Mechanical	I	3	FMP NEPA	10
TN	SER	BISO	HF	FY05	Lora Blevins	Planning	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY05	Quarters # 2	Treatment	Mechanical	I	3	FMP NEPA	1
TN	SER	BISO	HF	FY06	All burns	Monitoring	Fire	I	3	FMP NEPA	
KY	BISO	WUI	BISO	FY06	Bald Knob[1]	Treatment	Fire			FMP NEPA	640
TN	SER	BISO	HF	FY06	Burke Fields	Treatment	Fire	I	3	FMP NEPA	45
TN	SER	BISO	WUI	FY06	Divide Road	Planning	Fire	I	3	FMP NEPA	285
TN	SER	BISO	HF	FY06	Lora Blevins	Treatment	Fire	I	3	FMP NEPA	35
TN	SER	BISO	WUI	FY06	Tar Kiln Ridge[1]	Planning	Fire			FMP NEPA	3900
TN	SER	BISO	HF	FY07	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	WUI	FY07	Divide Road	Preparation	Fire	I	3	FMP NEPA	285
TN	SER	BISO	WUI	FY07	Hicks Ridge[1]	Treatment	Fire			FMP NEPA	715
TN	SER	BISO	HF	FY07	Mitchell Fields	Treatment	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY07	Monroe Fields	Treatment	Fire	I	3	FMP NEPA	75
KY	SER	BISO	HF	FY07	Newtie King	Treatment	Fire	I	3	FMP NEPA	120
TN	SER	BISO	HF	FY08	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	WUI	FY08	Divide Road	Treatment	Fire	I	3	FMP NEPA	285
TN/KY	SER	BISO	WUI	FY08	Gobblers Knob[1]	Planning	Fire	I	3	FMP NEPA	3400
TN	SER	BISO	HF	FY08	Log Cabin	Treatment	Fire	I	3	FMP NEPA	10

TN	SER	BISO	WUI	FY08	Tar Kiln Ridge[1]	Treatment	Fire			FMP NEPA	3900
TN	SER	BISO	HF	FY09	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	WUI	FY09	Divide Road	Planning	Fire			FMP NEPA	300
TN	SER	BISO	HF	FY10	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	HF	FY10	Burke Fields	Treatment	Fire	I	3	FMP NEPA	45
TN	SER	BISO	HF	FY10	Burnt Mill Bridge	Planning	Fire	I	3	FMP NEPA	490
TN	SER	BISO	HF	FY10	Lora Blevins	Treatment	Fire	I	3	FMP NEPA	35
TN	SER	BISO	HF	FY10	Mitchell Fields	Treatment	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY10	Newtie King	Treatment	Fire	I	3	FMP NEPA	120
TN	SER	BISO	HF	FY11	All burns	Monitoring	Fire	I	3	FMP NEPA	
KY	BISO	WUI	BISO	FY11	Bald Knob[1]	Treatment	Fire			FMP NEPA	640
TN	SER	BISO	HF	FY11	Burke Fields	Treatment	Fire	I	3	FMP NEPA	45
TN	SER	BISO	HF	FY11	Burnt Mill Bridge	Treatment	Fire	I	3	FMP NEPA	25
TN	SER	BISO	HF	FY12	All burns	Monitoring	Fire	I	3	FMP NEPA	
TN	SER	BISO	WUI	FY12	Divide Road	Treatment	Fire	I	3	FMP NEPA	285
TN	SER	BISO	WUI	FY12	Hicks Ridge[1]	Treatment	Fire			FMP NEPA	715
TN	SER	BISO	HF	FY12	Log Cabin	Treatment	Fire	I	3	FMP NEPA	10
TN	SER	BISO	WUI	FY13	Divide Road	Treatment	Fire	I	3	FMP NEPA	285
TN	SER	BISO	HF	FY13	Litton-Slaven	Treatment	Fire	I	3	FMP NEPA	10
TN	SER	BISO	WUI	FY13	Darrow Ridge	Treatment	Fire	I	3	FMP NEPA	9
KY	SER	BISO	WUI	FY13	Bald Knob	Treatment	Fire	I	3	FMP NEPA	7
TN	SER	BISO	HF	FY14	Mitchell Fields	Treatment	Fire	I	3	FMP NEPA	35
KY	SER	BISO	HF	FY14	Monroe Fields	Treatment	Fire	I	3	FMP NEPA	75
TN	SER	BISO	HF	FY14	Burnt Mill Bridge	Treatment	Fire	I	3	FMP NEPA	25
KY	SER	BISO	WUI	FY14	Newtie King	Treatment	Fire	I	3	FMP NEPA	120

[1] To be planned and treated as subunits, rather than as a single unit

10.2.3 Personnel Requirements

The National Area has a large enough fire qualified staff to meet the operational staffing needs necessary to implement the plan; however, the staff lacks the training and experience to provide key positions to conduct the program. (Table 6: Minimum Staffing Targets, contains a listing of the positions required to be fully self-sufficient.) Until National Area personnel can become trained and qualified, the Area must rely on outside staffing. Possible sources include; the Daniel Boone National Forest, Ashville Hotshots, Great Smoky Mountains National Park (including the Fire Use Module and Fire Effects Team), and other NPS and Cooperator personnel from the Southeast who are experienced in the particular fuel type(s) found in the National Area. The resources will be ordered based on the complexity of the burn as determined by the Complexity Analysis completed 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 fields from exotic grasses 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 National Area 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) or appropriate NPS approved systems.

The Burn Boss is responsible for completing the Individual Fire Report DI-1202 and submitting it to the Fire Program Manager within three (3) days for entry into SACS or other required program. The Burn Boss will also update the report, as required, and submit the additional documentation to the Fire Program Manager 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.

11.0 AIR QUALITY AND SMOKE MANAGEMENT

The fire management program will comply with all requirements of the Clean Air Act, 42 U.S.C. - 7418. The State of Tennessee in Chapter 1200-3-4 of the Rules of the Tennessee Division of Air Pollution Control exempts fires used to clear land solely of vegetation grown on that land "for forest or game management purposes". The State of Kentucky exempts from the provision of KRS 77.155 the "smoke from fires set by or permitted by any public officer if such fire is … for the purpose of weed abatement, the prevention of a fire or health hazard…". Although a permit is not required, a permit number will be requested from the State of Tennessee DOF by contacting the appropriate county official prior to the burn to inform them of the location and duration of the proposed burn. Similar contact will be made with the District Forester for the Kentucky DOF.

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 arrangements made prior to ignition to insure designated resources are available if needed to implement the mitigation measures.

12.0 FIRE RESEARCH

The National Area issued a contract to complete a fire ecology study for the area in 1999 and it was completed in 2001. When this study is combined with other work completed in the area, the staff will have a clearer picture of the role fire played in the perpetuation of the desired habitat and how fire can be better used to meet other area management objectives. In addition to the Fire Ecology Study, a fuel load study should be conducted, especially in areas containing sensitive habitats and heavy concentrations of fuel that resulted from past storm events.

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

13.0 MONITORING

The National Area will develop short and long term monitoring programs to assess the effectiveness of fire management activities on the cultural and 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 National Area 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.

14.0 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 National Area is 10 acres 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 is 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 National Area 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 backcountry hikers and campers and the public of the situation and evacuate the area, if necessary. Signs will be posted at the trailhead warning hikers and backcountry users of the situation.

When a fire threatens to escape the from the National area 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 National Area neighbors;
- Posting warning signs on roads;
- Providing for pilot cars;
- Closing backcountry areas;
- Posting signs at trailheads warning hikers and backcountry users of the situation;

15.0 WILDLAND/URBAN INTERFACE

15. 1 Defined by the National Fire Plan:

Wildland Urban Interface: The line, area or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Implementation Outcome As defined by the National Fire Plan:

Hazardous fuels are treated, using appropriate tools, to reduce the risk of unplanned and unwanted wildland fire to communities and to the environment.

Performance Measures
a) Number of acres treated that are 1) in the Wildland Urban Interface or 2) in condition classes 2 or 3 in fire regimes 1, 2, or 3 outside the wildland urban interface, and are identified as high priority through collaboration consistent with the Implementation Plan, in total, and as a percent of all acres treated.

15.2 WUI and Big South Fork NRRA

In 2000 there was an extreme fire year in the west. This extreme fire year lead to the destruction of hundreds of homes by catastrophic fires. In the review after this tremendous fire year, there was a general determination that there was too much fuel built up and that catastrophic fires could and would continue to occur. This fuel buildup was recognized as a national problem, not just a western problem. With considerable funding provided by Congress to all land management agencies, a major effort was established to reduce the fuel buildup among all land management agencies. One of the efforts resulted in the Wildland/Urban Interface (WUI) fuel reduction program. This program was aimed at reducing fuel along land management boundaries with the intent of minimizing fire destruction from large fires that spread from a land management unit onto private lands.

Big South Fork benefited from the WUI effort and in FY 2002 received approximately ½ million dollars to begin WUI projects along park boundaries. A park management team approach identified three areas that were selected for WUI projects. These areas were chosen

based on fuel loading and development along the park boundary. In FY 2003 an assessment was conducted by a BLM employee to recommend future WUI sites.

Big South Fork chose a mechanical reduction method for creating a fifty foot wide fuel break along the three areas selected and conducted these mechanical reduction efforts using a project contract to accomplish the work.
The scope of work consisted of the following.

Objectives:

1. Reduce fuel accumulation along the boundary between the Park and subdivision in order to provide adequate defensible space in order to lessen the risk of loss due to wildfire.

2. Remove heavy concentrations of storm damaged and pine beetle killed fuels from areas adjacent to subdivisions and park motor roads.

15.3 Scope of WUI Impact

The contractor shall furnish all equipment, labor, materials, transportation, etc. necessary to remove the unnaturally heavy fuels accumulations from three locations on the Big South Fork NRRA. All removed material will be chipped, hauled off site to an approved dumpsite or, large (6" or greater diameter) material can be stacked if unable to transport. All of these areas are heavily impacted by the Southern Pine Beetle and may contain hundreds of dead, standing pine trees. These will need to be removed. Density ranges from a few dozen to hundreds of dead trees per acre.

An NPS representative will be available to make determinations on any questions of tree/brush removal. Standing dead pine woody material of any DBH will be cut. Much of this will consist of dead pine trees killed by the Southern Pine Beetle. All limb wood less than 3 inches in diameter from cut material that is not removed will be chipped if the equipment can reach the site. All material cut under this contract, including logs, firewood, and merchantable pulpwood, shall become the property of the contractor. The contractor is responsible for removing all required vegetation and downed woody material, removing materials from the park, and disposing of materials by chipping or hauling off the park to an approved location. Much of the work area is not accessible by vehicle or heavy equipment. Accessibility issues will be discussed with NPS representative and a determination made as to what is accessible to equipment. For sections of the work site that can not be reached by equipment, hand removal will be required. The NPS representative will determine if roads or access routes can be built regardless of temporary nature. If the work area is not accessible, litter, slash and other small materials may be scattered into the interior of the park under NPS controlled conditions. Larger logs can be cut to manageable lengths and stacked in place. Stump removal and grinding is not included in this contract. Under this contract standing dead pine trees shall be cut and removed. Any material that is chipped will be spread to avoid piles of chips/sawdust.

All ground fuels within **fifty feet** of the Park boundary and those visible from the roadway will be removed from the woodlands, bucked, and lopped to manageable lengths and hauled from the Area. In areas where there are large accumulations of fuels, large diameter fuels will be removed from the park. All limb wood and slash will be chipped. In the event that a chipper can not reach the area, limb wood and slash will be dragged into the interior of the park and scattered.

Contract Restrictions:

1. Cutting restrictions –dead pine standing timber of any size may be cut and dead and down material of any type will be removed by chipping, cutting, hauling or, if not easily accessible, burning.
2. Equipment restrictions – equipment will be of size and durability to cut, chip and haul woody materials removed from area. Any equipment used along the woodline shall be low impact type and be used in a manner to restrict damage to the areas. NO roads or other accessibility points shall be constructed no matter how temporary in nature.
3. Scattering: If materials to be removed are not accessible by vehicle or other mechanical equipment, the materials will be scattered into the interior of the park. This will be done under very controlled conditions and monitored by park staff as outlined in Director's Order #18. The objective will be to remove the fine fuels from along the boundary so they pose less of a fire hazard. Fuels must be scattered and not piled to prevent fuel build-ups or "jackpots". They must be taken at least 100 feet into the interior of the park and then scattered.
4. Chipping: Limbwood and slash may be chipped or hauled and removed from the park by the contractor. If chipping is desired the following constraints will be followed. (1) All chipped materials will have a depth not to exceed 1 inch. (2) The chipping location will be changed frequently to achieve a uniform distribution of chips (no piles). (3) Any damage caused by the chipper, wheel ruts, etc. will be rehabilitated to the satisfaction of the COR. (4) no materials in excess of 10 inches in diameter may be chipped.
5. Dumping: The contractor will haul the materials to be removed to an appropriate site for disposal. No illegal or unauthorized dumping of the material is acceptable. The contractor will be responsible for paying all of the costs associated with the dumping and any fees or fines associated with the hauling and dumping of the removed materials. In the event that logs can not be removed due to accessibility problems (as determined by contractor and NPS), the logs may be cut to manageable lengths and stacked. Stacks must be no more than 4-5 feet tall, 6-8 feet long, and 4-5 feet wide. Stacking should be done toward the interior of the work areas away from the boundary as much as feasible.

Future WUI projects may be completed with the above specifications or, with approval of this document, a combination of mechanical and burning of fuels. Some areas may be conducive to stacking and burning the fuels removed from the defensible zone. Fuels that are stacked will either be burned during the reduction process, or, treated with coverings and burned at a later date. If weather conditions do not warrant burning the piles during the reduction operation, the piles will be covered with paper covering and burned when the weather permits.

16.0 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 National Area public information guidelines.

17.0 PROTECTION OF SENSITIVE RESOURCES

17.1 Archeological/Cultural/Historical Resources Requiring Treatment or Protection

Fire Management activities within the National Area 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.

When the National Area was created, numerous cultural sites were acquired throughout the Area. Five of the sites have been determined to meet criteria for listing on the Register of Historic Places. Cultural landscapes, including isolated farm fields and farm fields associated with farmsteads have been targeted for treatment using a variety of means, including prescribed fire. Over 2,000 archeological sites ranging from lithic scatterings to rockshelters documenting human activity thousands of years in the past have been identified. A complete listing of cultural resources is on file at National Area 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 Cultural Resources Specialist for the National Area 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 appropriate State Historic Preservation Officer (SHPO) will be contacted by the National Area's Archeologist when it is known a planned management action may impact archeological or cultural resources. By law, the SHPO has 30-days to respond. The National Area 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 National Area must be approved by the Superintendent on a fire by fire basis, and the use of these resources will be considered in the approval process for any planned management actions. When the use of equipment is authorized, a para-archeologist or member of the Resource Management Division will be assigned to the module to identify a preferred route.
- The location of sites discovered as the result of fire management activities will be protected and reported by the National Area's Cultural Resources Specialist.
- Rehabilitation plans will address cultural resources and will be reviewed by the National Area's Cultural Resources Specialist.

17.2 Natural Resources Requiring Treatment or Protection

Rare and endangered flora and fauna have been inventoried by the Kentucky and Tennessee Natural Heritage Programs (1997). Three federally listed threatened or endangered plant species may be located in the watershed: Cumberland Sandwort (*Arenaria cumberlandensis*), Cumberland Rosemary (*Conradina verticillata*), and Virginia Spiraea (*Spiraea virginiana*). Historical records indicate the green pitcher plant (*Sarracenia oreophila*) and the American chaffseed (*Schwalbea americana*) are within the vicinity of the National Area. Fifty-one state-listed threatened or endangered plants may be located in the watershed. Several federally listed endangered aquatic invertebrates and federally listed and endangered freshwater fish species may also be located in the watershed. (These and other plants and animals and their relationship to fire can be found in the supporting Environmental Assessment.)

The National Area is within the northern range of the Red-cockaded woodpecker (*Piclides borealis*), a fire adapted species. A Record of Decision – Final Environmental Impact Statement – For the Management of the Red-cockaded Woodpecker and its Habitat on National Forests in the Southern Region (USDA Forest Service 1995) has been issued. As stated previously, there are seven federally endangered aquatic species that depend on good water quality for their continued existence. The Fire Ecology Study will address these issues. Section 7 consultation as required by the Endangered Species Act, as amended, was sought for actions potentially affecting any federally listed species or critical habitat. The suppression actions implemented will be designed to protect water quality and other sensitive habitats. See section below for mitigation measures.

17.2.1 Mitigation Measures

For both wildland and prescribed fires, operational measures will be taken to minimize siltation, erosion, chemical inputs to waterways, and adverse effects on rare species and sensitive habitats. These measures include:

- Cross-country use by vehicles during fire management operations will not be permitted without the approval of the Superintendent.
- The use of motorized equipment is prohibited in the gorge except in emergencies.
- The use of dozers and other ground disturbing equipment will not be permitted without the approval of the Superintendent, unless life or private property is immediately threatened.
- The use of aerial retardant will only be considered upon immediate threat to life or developments. Retardant use will be consistent with Interagency Standards for Fire and Fire Aviation Operations (Interagency Standards for Fire and Fire Aviation Operations Task Group 2004) except where the National Area has developed more stringent requirements. Every effort will be made to maintain a minimum 300-foot retardant exclusion zone around all seeps, Clear Fork River, New River, Big South Fork River and all tributary streams, as outlined in the Standards. In the section of river bounded on the south by North White Oak Creek and bounded on the north by the confluence of Bear Creek, the retardant exclusion zone will be extended to the natural gorge boundary for the Big South Fork River and to portions of major tributaries (Troublesome Creek, Difficulty Creek, Williams Creek, No Business Creek, Parch Corn Creek, Station Camp Creek,

Laurel Fork of Station Camp, North White Oak, Laurel Fork of White Oak Creek) (Figure 1). In all zones, retardant may be used in emergency situations that involve potential loss of human life. Retardant may also be used to prevent destruction of park developments (Headquarters complex, Bandy Creek complex, Station Camp Horse Camp, Bear Creek Horse Camp, Blue Heron complex) or consumption of structures associated with identified cultural landscapes (Lara Blevins, Litton-Slaven, Oscar Blevins). However, because of the proximity to the creek, retardant will not be used on the Charit Creek cultural landscape, except when human lives are threatened.

- Mechanical fuel reduction will be used to create a fire break around Charit Creek, thereby reducing the need for retardant use in the event of wildland fire in the vicinity.
- Hazard-fuel breaks will be maintained along portions of the National Area's wildland-urban interface (WUI). These WUI buffers are intended to reduce the risk of wildland fire to private property adjacent to the National Area. Properly maintained WUI buffers will increase the potential to contain wildland fires within National Area boundaries, thereby reducing the potential need for retardant use. WUI breaks will be created and maintained using prescribed fire and mechanical means.
- Prescribed fire treatment areas will not be designated in areas of the park where there is high potential for coal fires or fires that may adversely impact oil and gas facilities.
- Natural topographic boundaries (e.g., ridge tops, streams) and existing trails/roads will be used as control lines where feasible. Leaf blowers and burn-out zones will be used to create fuel breaks, thereby reducing the need to dig hand lines.
- When available, a Resource Advisor will respond to wildland fires and report to the Incident Commander (IC). The Resource Advisor will use GIS and knowledge of the resources to advise the IC of potential impacts of the fire and proposed suppression tactics on T&E species/habitat.
- Periodic and post-treatment monitoring of T&E species and habitats will allow for more careful analysis of treatment effects. Future management actions will be adapted to reflect the better understanding of fire effects provided through monitoring.
- NPS will develop annual burn plans and will complete Section 7, Endangered Species Act consultation with USFWS to evaluate each burn plan.
- NPS will regularly provide to USFWS updated monitoring data on T&E species in or near fire treatment areas.
- Impacts to mussel populations will be further mitigated through an existing mussel augmentation plan. This plan calls for mussel populations to be augmented via culturing and propagation of gravid females from the Big South Fork River or other regional parental stock (Biggins et al. 2001). These actions would 1) increase the likelihood of recruitment in currently occupied habitat; 2) increase the expansion rate of species into suitable, unoccupied historical habitat within the Big South Fork River; 3) decrease the potential for local pollution events to impair all collective populations of mussels within or among species. Furthermore, in the event of impairment to mussel populations from wildland fire, prescribed fire, or fire suppression activities, the current augmentation plan provides a mechanism to restore affected populations.
- Because of the scarcity of mature shortleaf pine (*Pinus echinata*) in the National Area, following a recent southern pine beetle epidemic, efforts will be made to protect residual mature shortleaf pines stands from destructive crown fires. Controlled fire prescriptions

will be designed to eliminate encroaching hardwoods and white pine (*Pinus strobus*) while minimizing shortleaf pine mortality.

- To minimize impacts of wildland and prescribed fire on potential Indiana bat roosting habitat, NPS will implement these measures when feasible:
    - In each prescribed fire treatment area, snags of sufficient size (> 30 cm) to be roosting sites will be protected by raking a fireline around the snag base. The exception is when snags pose a threat to firefighter safety.
    - During and after wildland fire suppression, snags will be removed only in proximity to firelines, and then only when snag presence poses a risk to fire containment or to firefighter safety.
    - Prescribed fires in forested habitats will be conducted from November 1 to May 15, when non-flying young are less likely to be present in maternity roosts.
    - Mist net surveys are being conducted in 2004 to confirm presence/absence of Indiana bats. NPS will consult with USFWS as appropriate if survey results indicate presence of Indiana bats in the National Area.

17.3 Developments, Infrastructure, Inholdings, and other Improvements Requiring Protection

A complete listing of NPS owned development and improvements are contained in Appendix E.

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 National Area. Areas or developments requiring special consideration include Scott State Forest, Pickett State Rustic Park and Forest. Hazard fuel management projects will be initiated to create areas where fires can be suppressed more easily.

Another area of concern is the presence of oil and gas wells and their associated facilities scattered throughout the National Area. The National Area will work closely with the owners of the wells to reduce accumulations of hazard fuels around the wellhead and storage tanks and mark pipelines leading from the wells to storage tanks. Preattack plans which indicate the location of wells, pipelines, and storage tanks should be developed for installations near the boundary of the National Area so that margins of safety for fire suppression personnel from the National Area and the Tennessee Department of Forestry (DOF) will be improved.

18.0 FIRE CRITIQUES AND ANNUAL PLAN REVIEW

18.1 Critiques

All wildland and prescribed fires occurring in the National Area will receive at a minimum a review by those involved to evaluate operational aspects associated with the incident. The review will be conducted by the Incident Commander, the Chief of Resource Management, and the Chief Ranger and/or the Fire Program Manager. 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, Chief of Resource Management, 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 National Area. 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 National Area'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.

18.2 Plan Review

The Fire Program Manager 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. Depending on the outcome of the Fire Ecology Study, another Environmental Assessment may have to be completed.

19.0 CONSULTATION AND COORDINATION

The Draft Fire Management Plan and associated Environmental Assessment from Colorado National Monument were used 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 approved Fire Management Plan and associated Environmental Assessment for Great Smoky Mountains National Park were consulted to provide guidance. The Fire Management Plan for Mammoth Cave National Park: Part I Physical Environment, Terrestrial Ecosystems and Fire History was also used in the development of this Fire Management Plan and the associated Environmental Assessment.

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

Reed E. Detring	Superintendent, Big South Fork NRRA, Oneida, TN
Paul Stoehr	Assistant Superintendent, Big South Fork NRRA, Oneida, TN
Sue Jennings	Chief of Resource Management Division, Big South Fork NRRA, Oneida, TN
Tom Blount	Chief of Resource Management Division, Big South Fork NRRA, Oneida, TN
Frank Graham	Chief Ranger, Big South Fork NRRA, Oneida, TN
Tom Des Jean	Cultural Resource Specialist, Big South Fork NRRA, Oneida, TN
Robert Emmott	Resource Management Specialist, Big South Fork NRRA, Oneida,TN
Bryan Wender	Resource Management Specialist, Big South Fork NRRA, Oneida,TN
Ron Cornelius	GIS Specialist, Big South Fork NRRA, Oneida, TN
Steve Bakalatz	Wildlife Biologist, Big South Fork NRRA, Oneida, TN
Doug Wallner	Prescribed Fire Specialist, NPS, Southeast Region, Philadelphia, PA
Bob Carson	Air Quality Coordinator, NPS, Southeast Region, Mammoth Cave, KY
Daryl Rhodes	
Len Dems	Fire Management Officer, NPS, Grand Teton National Park, Jackson Hole, WY
Paul Gleason	Fire Suppression Specialist, NPS, Intermountain Region, Denver, CO
Leon Konz	Fire Management Officer, NPS, Great Smoky Mountains N.P., Gatlinburg, TN
Ellen Porter	Air Quality Specialist, U.S. Fish & Wildlife Service, Region 9, Denver, CO
Rhoda Lewis	Anthropologist, U.S. Fish & Wildlife Service, Region 6, Denver, Colorado
Betty Higgins	District Ranger, USDA Forest Service – Daniel Boone National Forest, KY
Kathleen Kennedy	Center Coordinator, USDA Forest Service – Daniel Boone National Forest, KY
Keith Hamby	Forestry Technician, Tennessee Dept of Forestry, Oneida, TN
Justin Walden	Area Forester, Tennessee Dept of Forestry, LaFollette, TN
Charles Via	Fire Resource Coordinator, Tennessee Dept of Forestry, Knoxville, TN
Nathan M. Waters	Fire Prevention Forester, Tennessee Dept of Forestry, Knoxville, TN
Buddie H. Conaster	Forestry Technician, Tennessee Dept of Forestry, Jamestown, TN
Jim Dale	Fire Prevention Forester, Tennessee Dept of Forestry, Cookeville, TN
Julian Campbell	Ecologist, The Nature Conservancy, Lexington, KY
Coleen Campbell	Air Quality Specialist, CO Dept. of Public Health & Environment, Denver, CO