

## Resource Programs

### RECREATION

#### Affected Environment

#### Introduction

##### Daniel Boone National Forest Market Area

The Daniel Boone National Forest is characterized by an outstanding variety of land features such as artificial lakes, mountains, rivers and streams, arches, cliffs, caves, a wide variety of vegetative types, and outstanding scenery that enhances and supports heavy recreational use. Because of its location along major roads such as Interstate 75, Interstate 64, the Cumberland Parkway, and the Daniel Boone Parkway, the Forest is readily accessible to people in Tennessee, Ohio, West Virginia, Indiana, and Illinois.

The recreation market has two segments:

- Local users in close proximity to the Forest. Most of these are from a predominantly rural or small town environment. In some cases local users include people from larger cities such as Lexington, Covington, and Ashland, Kentucky.
- Users from surrounding, more highly populated, areas less than one-half day's travel or one tank of gasoline away. This user segment stretches east to Charleston, West Virginia, south to Knoxville, Tennessee, north to Cincinnati and Columbus, Ohio, and west to Louisville, Kentucky, and Nashville, Tennessee.

Within the Daniel Boone National Forest market area the following recreation areas compete for recreation visitors:

**National Areas:** Big South Fork River and Recreation Area, Cumberland Gap National Historical Park, and Mammoth Cave National Park.

**Large Lakes:** Cave Run Lake, Laurel River Lake, Cumberland Lake, Dale Hollow Lake, Herrington Lake, Green River Lake, Grayson Lake, Dewey Lake, Buckhorn Lake, Fishtrap Lake, Kincaid Lake, and Paintsville Lake in Kentucky; Douglas Lake, Cherokee Lake, and Norris Lake, in Tennessee; Caesar Creek Lake, East Fork Lake, Rocky Fork Lake, and Paint Creek Lake in Ohio; Beach Fork Lake and E. Lynn Lake in West Virginia.

**State Parks:** Lake Cumberland State Resort Park, General Burnside State Park, Dale Hollow Lake State Park, Green River Lake State Park, Grayson Lake State Park, Greenbo Lake State Resort Park, Jenny Wiley State Resort Park, Buckhorn Lake State Resort Park, Kincaid Lake State park, Barren River Lake State Resort Park, Cumberland Falls State Resort Park, Levi Jackson State Park, Pine Mountain State Resort Park, Natural Bridge State Resort Park, Kentucky Horse Park, Fort Boonesborough State Park, General Butler State Resort Park, Blue Licks Battlefield State Park, Big Bone Lick State Park, Carter Caves Resort State Park, My Old Kentucky Home State Park, and Carr Creek State Park, in Kentucky; Douglas Lake, Cherokee Lake, and Norris Lake, in Tennessee; Caesar Creek Lake, East Fork Lake, Rocky Fork Lake, and Paint Creek Lake in Ohio; Beach Fork Lake and E. Lynn Lake in West Virginia.

### Recreation use trends

Several social and demographic characteristics affect outdoor recreation demand. These factors affect the type of recreation opportunities selected and time during the year or week that recreation activity will occur.

Some changing social characteristics (Cordell 1990):

- An aging population with earlier retirements
- Decline in available leisure time
- Increase in immigration
- A more ethnically diverse population
- More dual income families
- More single parent families
- Fewer extended families
- People marrying and having children later in life.

These changing social characteristics are having the following effect on leisure activities:

- Total hours of use in federal recreation areas have remained constant or increased slightly over the past 10 years, but the total number of visits has increased.
- The number of 2- or 3-week vacations is declining, but the number of day trips or long weekend trips is increasing.
- The percentage of all trips to national forests that required two hours or less in travel time increased from 43 percent in 1977 to 72 percent in 1986.
- The number of trips of greater than eight hours travel time dropped sharply from 23 percent in 1977 to six percent of all trips in 1986 for national forests; for national parks this number dropped from 41 percent in 1977 to 9 percent in 1986.
- The proportion of visits that are one day (24 hours) or less is increasing while the number of visits longer than one day is declining.

The 1993 update to the RPA Assessment of the Forest and Rangeland Situation in the United States (Report 27) considered the above changes and identified some shifts in recreation demand (USDA Forest Service 1994b).

- The total number of people participating in recreation is expected to increase across all recreational activities during the next five decades.
- The percentage of the total population participating in recreation has stabilized in recent years, as has the per capita allocation of leisure time to recreational pursuits.
- Total demand for recreation should keep in line with population growth if this pattern continues in the future.
- In addition, real per capita income is projected to more than double by 2040. This extra income will contribute to differing rates of growth in various recreation activities. For example, demands for snow-related recreation are expected to grow at a faster rate than for

most land- and water-based activities, but the latter activities will continue to dominate total recreation patterns.

- If public and private sector providers continue to expand opportunities at rates in line with recent trends, projected increases in supplies should meet most of the projected increases in demands.
- Closure of private land to *free* public access does not necessarily mean that the land is lost for recreation opportunities.
- Most of the increased demand will occur near existing population centers.
- National forests and other public lands in the north, south, and Pacific coast regions are expected to become relatively more important for all forms of recreation if access remains generally unrestricted and free.
- Wilderness use accounts for less than one percent of all outdoor recreation. Total time spent in wilderness areas has been relatively stable in recent years.

Recreation demand continues to focus on peak periods such as weekends and holidays. The ability of the private sector to provide support services and facilities may be constrained by the reduced demand of non-peak periods. This will affect the overall recreation experience and influence demands placed on the Forest.

### Recreation Supply

The Daniel Boone National Forest is one of the major providers of outdoor recreational opportunities for Kentucky, southern Ohio, West Virginia, and southeastern Indiana. Particularly important is the Forest's ability to offer the public large, unbroken tracts of forested land for recreational activities such as scenic viewing, long-distance trail use, wilderness exploration, and hunting. Classified as an "urban" forest because of its proximity to several metropolitan areas, most of the Forest's approximately 700,000 acres is available to the public for a variety of outdoor recreational pursuits. These opportunities, which generate added tourism for some neighboring communities, can be divided into two broad categories:

- Developed recreation, which offers areas with constructed facilities providing public amenities and conveniences.
- Dispersed recreation, which features primitive settings, isolation, challenge, and risk.

Developed recreational opportunities can be found at campgrounds, picnic areas, boat ramps, marinas, and interpretive sites. Trail use, rock climbing, lake and river boating, hunting and fishing in undeveloped forest settings comprise most of the dispersed-use opportunities. In both developed and dispersed recreation experiences, interpretive and environmental education activities and facilities provide an opportunity for visitors to learn more about the natural environment and the Forest Service's role in managing it.

Over the years, use-levels have been a primary basis for analyzing and evaluating Forest Service recreation program needs. In past years, use was calculated in "recreation visitor-days" (RVDs). Because this method proved statistically inaccurate, Congress has funded new statistical recreational surveys for national forests across the country. However, the new use survey and report for the

DBNF was not expected until 2003. Therefore, information on recreational use of the Forest for this Draft Environmental Statement was obtained from other readily available sources such as:

- Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends (Cordell et al. 1999), a national study that responds to direction from the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974
- Daniel Boone National Forest field observations of use trends over time
- Information gathered from occupancy data at fee sites
- Changes in observed parking use at trailheads
- Forest Service personnel's contacts with the public.

This type of information, along with Kentucky's Statewide Comprehensive Outdoor Recreation Plan data (SCORP), was used to analyze and predict the Forest's recreation program demands and trends. Details of use information, along with estimated RVD formulas and assumptions, can be found in the DBNF's Analysis of the Management Situation (USDA Forest Service 1997).

A recreation program can also be analyzed according to the types of recreation experiences available. The Recreation Opportunity Spectrum (ROS) categorizes recreational settings by physical, biological, and managerial characteristics as well as by access and facility type. The differing acreage available for the various ROS experiences can be used to compare the proposed alternatives for the 2004 Forest Plan.

Five ROS experiences can be found on the DBNF. They range from those that provide visitors with opportunities for solitude in an environment with limited evidence of human impacts to intensely social settings in highly developed environments. These ROS experiences include:

**Semi-Primitive Non-Motorized:** Predominantly natural environment with minimum evidence of human activity. High probability of isolation from sights and sounds of humans. Motorized use is prohibited.

**Semi-Primitive Motorized:** Predominantly naturally appearing environment with some evidence of human activity. Concentration of users is low. Motorized use is allowed.

**Roaded Natural:** Predominantly natural appearing environment with moderate evidence of human activity; moderate probability of experiencing affiliation with others. Motorized use is allowed.

**Rural:** Substantially modified natural environment. Probability for experiencing affiliation with others is prevalent, as is the convenience of sites and opportunities. Motorized use is allowed.

**Urban:** Substantially developed environment dominated by man-made structures. Sites and sounds of humans are predominant. Probability of experiencing others is prevalent, as is a higher level of convenience of sites and opportunities than in Rural ROS experiences. Motorized use is provided for.

The Forest Service also includes a Primitive category in its national ROS model. This category requires largely unmodified tracts of land 5,000 acres or larger and at least three miles from roads or motorized trails. No lands on the DBNF meet those criteria. However, management of the

wilderness areas and wild rivers on the DBNF currently follows the Primitive ROS model. This could change after the Limits of Acceptable Change process is completed.

### **Recreation Residences**

Recreation residences were established in the very early days of the Forest Service. Some of the residences pre-date the designation of the National Forests. These are privately owned cabins under National Forest special use permits. The addition of new recreation residences was terminated in 1968. Currently, this Forest has 13 residences found along one road on the London District. If permits are not renewed the residence is removed and not replaced.

### **Developed Recreation**

The DBNF provides a full range of developed recreation sites with a combined capacity of 15,830 people-at-one-time (PAOTs) (Table 3 - 70). These sites include campgrounds, picnic areas, swimming beaches, fishing sites, interpretive sites, boat launching ramps, and shooting ranges. The majority of the Forest's developed recreation facilities, and heaviest use, is concentrated around Cave Run and Laurel River Lakes. These lakes have modern recreation facilities such as campgrounds with municipal water, sewer plants, flush toilets, hot showers, and recreational vehicle hook ups; paved, two-lane boat ramps, private marinas under special use authorization from the Forest Service, and picnic areas with paved parking and toilets. Tourism centered on these lakes contributes significantly to the local economy of these areas.

The level of development and amenities provided at recreation facilities can be divided into five categories. "Developed" recreation sites fall into Levels 2 through 5 while "undeveloped" sites are classified as Level 1. These classifications are described below:

**Level 1:** Undeveloped recreation sites. Rustic, rudimentary improvements only for the protection of the site rather than the comfort of the user. Little active management occurs. Motorized access not permitted or provided. Found in Primitive or Semi-primitive ROS experiences.

**Level 2:** Minor site modification; mostly rustic and native materials; primitive motorized access. Found in Semi-primitive ROS experiences.

**Level 3:** Moderate site modification, some for public convenience; synthetic materials used; motorized access by higher standard roads. Found in Roaded Natural ROS experiences.

**Level 4:** Heavier site modification, many amenities for public convenience; synthetic materials are common; motorized access by high standard roads. Found in Roaded Natural ROS experiences.

**Level 5:** High degree of site modification, many amenities and some luxury facilities for public convenience, landscaping may be formal with some non-native plants, formal paved walkways in addition to highway access. Found in Rural or Urban ROS experiences.

PAOTs by development level were used to compare the developed recreation program by alternative.

**Table 3 - 70. Summary of major developed recreation facilities by development level and capacity.**

TYPE OF SITE	Development Level <sup>1</sup>	Number of Sites	Capacity (PAOT <sup>2</sup> )	Number of USFS Fee Sites	Number of Concession Fee Sites
<b>Campgrounds</b>	4/5	6	6,201		5
<b>Campgrounds</b>	3	11	1,550	1	5
<b>Campgrounds</b>	2	4	75		
<b>Picnic areas</b>	3/4	17	1,705	1	2
<b>Fishing</b>	3	4	190		
<b>Boat ramps</b>	2/3	20	1,865	11	
<b>Boat ramps</b>	4/5	6	1,930	3	
<b>Shooting ranges</b>	3	4	75	2	1
<b>Horse camps</b>	3	3	305	1	1
<b>Private marinas</b>	5	5	N/A		
<b>Visitor centers</b>	4/5	2	55		

<sup>1</sup>Development Level codes: Level 2 = Minor site modification; Level 3 = Moderate site modification; Level 4 = Heavier site modification; Level 5 = High degree of site modification.

<sup>2</sup>PAOT = Persons-at-one-time

Developed recreation facilities provide a “home base” for the public, many of whom travel up to 150 miles, to explore the Forest and enjoy dispersed recreational opportunities such as camping, boating, fishing, hunting, wildlife viewing, and hiking.

The Forest also provides more primitive, smaller campgrounds and picnic areas that are used primarily by local residents and their families. The relative lack of easy access from major highways, long distances from population centers, and no major natural features make these areas desirable to local residents but do not draw many distant visitors.

The number and size of the Forest’s developed facilities have changed little in the 30 years since the Cave Run Lake and Laurel River Lake facilities were built. Most other recreation facilities were built 40 or more years ago. There have been improvements made to the facilities that provide the higher levels of amenities increasingly desired by the recreating public.

Forest Service efforts to improve these facilities appear successful. The public has indicated in various surveys that the DBNF provides generally “good” quality recreation at the major recreation sites (Vogel 2000; Slone 1997; Payne et al. 1994; Marriott 1992).

Based on observations and camping data from the Forest, the amount of use at developed sites has not changed significantly in the last 10 years. However, patterns and types of use have changed. Demand for tent camping with few amenities at developed sites has declined while demand for recreational vehicle hook ups and tent camping at sites with more amenities, such as hot showers, has increased. Demand for single family picnicking at sites with no other activities available has declined while demand for group picnicking (e. g., reunions, businesses, churches, clubs) at facilities providing a variety of additional activities has increased.

## Dispersed Recreation

Dispersed recreation use has increased over the past two decades. This increased use follows the nation-wide trend (Cordell 1999). Unlike the stable number of developed recreation sites on the Forest, the DBNF has increased its dispersed recreation program in the past two decades to meet these increasing and changing demands. For instance, almost 100 miles of trails have been added to the Forest since the 1985 Plan took effect. At the same time, the DBNF has placed more restrictions on off-trail activities. Most Forest trails were designed in the 1970s, primarily for hiking, but off-highway vehicles (OHVs) and horses were also allowed on these trails. During the 1980s, however, the Forest saw a dramatic increase in OHV, mountain bike, and equestrian traffic, both on and off trails. The resulting user conflicts and resource impacts prompted the Forest to amend the 1985 Plan in 1998, permitting OHV use only on designated trails constructed to better accommodate such use.

Many of the environmental impacts from dispersed recreation are generated by recreational trails, i.e., hiking, mountain biking, horse, and OHV trails. Trail use is also one of the major dispersed recreational activities found on the Forest. The opportunities offered in each alternative for this type of dispersed use is one of the major recreation differences between alternatives, and thus miles and types of trails are indicators used to compare them. A few other types of dispersed recreation have also caused impacts on a localized basis. Rock climbing, which has not been addressed on a Forestwide basis, requires attention.

The Red River Gorge Geological Area (RRGGA) continues to experience increasingly heavy use and resource impacts. This changing use and the resulting impacts are a concern for this area, which is renown for its unique archeological and biological resources. As recreation use and crowding has increased, so has public exploration into remote areas of the RRGGA that had previously seen little use. Clifflines and rock shelters are particularly popular with visitors. Historically, these areas were frequently used by Native Americans and thus contain important archeological information. Recently, heavy use by campers has damaged or destroyed many important heritage resources as well as some unique biological resources. To protect these, camping in rock shelters and near the base of clifflines has been restricted. Clifflines in the RRGGA are also known internationally for their superior rock climbing experiences. The growing popularity of this activity nationwide has been reflected in a significant increase in rock climbing in the Gorge. Over the past five years, rock climbing has moved from an incidental recreational use to a major activity. This increased use has required much closer management to protect sensitive heritage and biological resources as well as quality rock climbing experiences.

Boating use on Cave Run Lake and Laurel River Lake has increased to the extent that some recreationists and Forest Service managers have expressed concerns about crowding and user conflicts. While there is some perceived over-crowding, perhaps exacerbated by boating conflicts (primarily with personal watercraft), survey responses from boaters did not register over-crowding as a widespread concern (Vogel 2000; Slone 1997; Payne et al. 1994). Regardless of opinions about lake congestion, demand for boating slips at the lakes' marinas continues to exceed supply.

The Forest continues to be a popular place for hunters, anglers, and wildlife viewers. Wildlife viewing and recreational fishing appears to be holding steady and present few management challenges while hunting near private residences adjacent to National Forest land has caused some problems.

## Environmental Effects

For the purposes of assessing the direct and indirect effects to recreation by the various alternatives, only National Forest System lands of the DBNF were considered. Cumulative effects, however, are assessed on both National Forest System lands and private land adjacent to the Forest.

### RESOURCE TABLES

How the various alternatives would differ from the current situation in both number and percentage of acres for each ROS experience can be seen in Table 3 - 71.

**Table 3 - 71. Estimated percentage of Recreation Opportunity Spectrum (ROS) setting, in acres and percent of DBNF, by alternative.**

ROS Category	Alt. A	Alt. B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
<b>Primitive *</b>	19,564	22,398	19,564	19,564	19,564	19,564
<b>Semi-Primitive Non-Motorized</b>	20,811 3%	105,897 15%	20,811 3%	20,811 3%	35,186 5%	13,875 2%
<b>Semi-Primitive Motorized</b>	13,875 2%	385,550 55%	13,875 2%	13,875 2%	70,373 10%	13,875 2%
<b>Roaded Natural</b>	617,331 89%	174,932 25%	617,331 89%	617,331 89%	546,108 78%	610,280 88%
<b>Rural</b>	41,623 6%	27,749 4%	41,623 6%	41,623 6%	41,623 6%	55,498 8%
<b>Urban</b>	88 < 1%	88 <1%	88 <1%	88 <1%	138 <1%	200 <1%

\*Social and managerial settings are managed for primitive in Wilderness and Wild Rivers until the limits of acceptable change process has been completed. No areas on the DBNF meet the current definition of Primitive ROS. Thus, these acres are also included in other ROS categories, and no percentage is shown.

Table 3 - 72 summarizes of the differences between alternatives in recreation site capacity (PAOT) by the development level of these sites.

**Table 3 - 72. Estimated developed recreation offered in PAOTs (persons-at-one-time) by facility development level and alternative**

Development Level	Alt. A	Alt. B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
<b>2</b>	990	600	900	900	900	500
<b>3</b>	6,924	6,700	6,700	6,900	6,900	6,200
<b>4</b>	940	900	900	975	975	900
<b>5</b>	6,976	6,976	7,400	7,400	7,800	8,300
<b>Totals</b>	15,830	15,176	15,900	16,175	16,575	15,900

Table 3 - 73 compares by alternative the expected total number of trail miles that would be available to the public. Estimated miles of permanent trail closures are factored into the totals. Closures would be done to provide a better recreation experience for most riders or protect the ecosystem.

**Table 3 - 73. Estimated total number of miles of trails offered by alternative.**

TRAIL TYPE	Alt. A	Alt. B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
<b>OHV only</b>	22	0	22	65	85	85
<b>All others*</b>	590	560	590	620	640	640
	(OHVs allowed on 126 miles)	(No OHVs allowed)	(OHVs allowed on 108 miles)	(OHVs allowed on 108 miles)	(OHVs allowed on 118 miles)	(OHVs allowed on 118 miles)
<b>Total</b>	612	560	612	685	725	725

\*Includes trails where hiking, mountain bike and horse use are allowed singly or in combination with each other. It also includes trails where OHV use is allowed in combination with other trail uses.

**EFFECTS COMMON TO ALL ALTERNATIVES**

**DIRECT AND INDIRECT AFFECTS**

There are no direct or indirect effects common to all alternatives.

**CUMULATIVE EFFECTS**

Private development adjacent to National Forest System land would affect recreational experiences in the affected interface. Persons desiring to get away from human influence and experience more solitude on National Forest System lands would avoid such areas.

The increasing private development adjacent to National Forest System land could lead to more illegal activities such as OHV use off of designated trails.

Restrictions could be placed on some types of recreational activities if they increased the likelihood of spreading invasive species onto or throughout National Forest System lands.

**ALTERNATIVE A**

**DIRECT AND INDIRECT EFFECTS**

**Recreation in General:** Just as this alternative would continue the current level and density of developed recreation sites, trails, roads, and other management activities (particularly wildlife development, minerals extraction, and timber management), the distribution of recreation settings and experiences that now exists on the Forest would remain. Social and managerial settings in Wilderness and Wild Rivers would be managed according to the Primitive ROS model until the Limits of Acceptable Change process was complete. No areas on the DBNF can be classified as ROS Primitive as it is currently defined. Thus, approximately five percent of the lands would fall into the Semi-primitive Motorized and Non-motorized ROS categories. These lie primarily within designated Wilderness areas or Wild and Scenic River corridors. Most of the DBNF -- 95 percent -- is classified as ROS Roaded Natural or Rural. That is reflected in the level of management activities and facility development most commonly found across the Forest. Urban ROS, highly developed settings, is found on less than one percent of the Forest. These areas are found primarily at the most highly developed recreation areas such as Twin Knobs and Holly Bay Campgrounds.

Environmental interpretation and education activities would remain at the same levels and locations.

**Developed Recreation:** The Forest's developed recreation facilities would be retained and continue their past schedules. The current capacity is 15,830 PAOTs. Eighty-eight percent of these PAOTs are concentrated in several Level 3 developed areas and a few, large Level 5 developed recreation areas. Minor changes in capacity and existing facility upgrades would continue, helping to accommodate public demand for more modern amenities. A few closures might take place at low-use sites that are uneconomical and are not needed to meet public demand. Efforts toward the development of a resort at the Caney site on Cave Run Lake would continue.

**Dispersed Recreation:** The miles and types of trails offered to the public for Forest access would remain similar to what now exists. Currently, this includes 612 total miles of trails, 126 miles of which are open to OHV use. Illegal OHV trail use could be expected to continue at current levels, as would the Forest Service's ability to enforce OHV closures.

The recreational use in the RRGGA by rock climbers and campers would continue to be managed, primarily through site closures, to protect heritage and biological resources. However, little progress would be made in providing the management required to make more sites available for these increasingly popular activities.

The potential for crowding on Cave Run Lake and Laurel River Lake would still be watched carefully by managers while public demand for more boat storage at the lake would continue to exceed the existing facilities.

## CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## ALTERNATIVE B-1

### DIRECT AND INDIRECT EFFECTS

**Recreation in General:** This alternative would favor more rustic and primitive settings and experiences. There would be less road and trail development and much less access needed for timber and wildlife management activities. Emphasis would shift from Roded Natural ROS experiences toward Semi-primitive. However, Rural and Urban ROS experiences normally associated with highly developed and well-accessed recreational sites and development on private lands would change little. The cost of removing heavily used, higher-level developments and their associated higher-level roads is usually prohibitive. Semi-primitive settings would move from the current five percent of the Forest to 70 percent as large acreages were taken out of the Roded Natural ROS experience. While Rural and Urban settings would change very little, they would decrease from seven to five percent of the Forest.

Designation of the Wolfpen Inventoried Roadless Area as a Wilderness Study Area would have little effect on recreation within Wolfpen itself since most activity there is already Non-motorized Dispersed recreation. It would, however, preclude new rock climbing routes that use fixed anchors since anchors are not allowed in a Wilderness area. Most existing fixed anchor routes would remain.

Interpretation and environmental education would continue to be emphasized but in more venues that would not involve developed facilities.

**Developed Recreation:** Uneconomical, low-use sites would be closed. Portions of recreation sites not adequately meeting public needs and not easily or economically brought up to standards to meet those needs also would be closed. There would be no expansion of existing facilities, just basic maintenance and operation. Some recreation sites might not be kept open for as long a season. Resort development at Cave Run Lake would be inconsistent with this alternative.

These changes would cause an appreciable decrease in the offered developed recreation opportunities in the development Level 2 and 3 facilities.

**Dispersed Recreation:** The overall miles of trails available for use would decline from 612 to 560. Some low-use trails would be closed, as would some trails now open to off-highway vehicles (OHVs). Restrictions would be placed on additions to the trail system. Alternative B-1 would also eliminate all OHV use on trails and somewhat diminish horse-riding opportunities when there are both fewer options for such opportunities and growing public demand. Illegal OHV use would probably increase due to a lack of trails designated for such use and the Forest Service's decreased ability to access more areas and enforce closures.

This alternative would have little impact on dispersed activities in the Red River Gorge Geological Area. Forestwide, there would be little change in non-trail recreation activities.

### CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## ALTERNATIVE C

### DIRECT AND INDIRECT EFFECTS

**Recreation in General:** There would be little change in the recreation program from what currently exists. While some recreation facilities and trails might be added, others could be eliminated to improve economic efficiency or quality in addition to limiting ecosystem impacts. Recreation sites, because of their small size in relation to all National Forest System land, have only a nominal impact on total ROS distribution. Specially designated areas, such as Wilderness areas, the Red River Gorge Geological Area, and the Wild and Scenic Rivers, comprise the greater portion of the Forest's Semi-primitive settings, and those would not change regardless of alternative. Trails have only a nominal impact on a localized area as well as total ROS distribution. Wilderness and Wild Rivers management would follow the ROS Primitive model until the Limits of Acceptable Change process was complete. No areas on the DBNF qualify as ROS primitive as currently defined, however. Thus, approximately five percent of National Forest System land would remain in the Semi-primitive Motorized and Non-motorized ROS categories. Roaded Natural and Rural ROS experiences would continue to be found on 95 percent of the Forest. Urban ROS, highly developed settings, would still be found on less than one percent of the Forest.

Emphasis in other resource areas would shift away from the 1985 Plan toward more non-commodity management. The distribution and intensity of management of these resource areas would also differ from the current situation. While these differences could cause adjustments in recreation use patterns, they would be minimal. Interpretation and environmental education would remain at the same sites and levels where they currently exist.

**Developed Recreation:** The recreation emphasis of this alternative would be similar to Alternative A. The current capacity of the Forest's developed recreation facilities would continue to be provided for and would remain open for similar periods. Capacity would remain near 15,900 PAOTs. Ninety percent of these PAOTs would be concentrated in numerous Level 3 developed areas and a few, large development Level 5 recreation areas. Minor changes in capacity and existing facility upgrades would continue, helping to accommodate public demand for more modern amenities. A few low-use sites that are uneconomical or are not needed to meet public demand could be closed.

Efforts toward the development of a resort at the Caney site on Cave Run Lake would continue.

**Dispersed Recreation:** The effects of this alternative would be similar to Alternative A, except for restrictions placed on some activities, e.g., overnight camping in ecologically sensitive locations such as the Riparian Corridor and the Cliffline Community Prescription Areas. There would still be 612 total miles of trails available, but OHV trails would be consolidated through closure of some short trails and additions that would create longer loop-trail systems. OHV trails would total about 108 miles, 18 miles less than currently exists.

## CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## ALTERNATIVE C-1

### DIRECT AND INDIRECT EFFECTS

**Recreation in General:** There would be some increased emphasis on the recreation program, including the development of recreation areas, roads, and trails compared to Alternative C. Ecosystem protection would continue to be a major consideration, however. Other resource management changes would be similar to Alternative C, with similar affects on the recreation program. Thus, while there could be minor differences in where various ROS experiences occur and some differences in recreation development within recreational sites in various existing ROS experiences, the overall distribution of these settings would not change appreciably from the current situation. Wilderness and Wild Rivers management would follow the ROS Primitive model until the Limits of Acceptable Change process was complete. No areas on the DBNF qualify as ROS primitive as currently defined, however. Approximately five percent of National Forest System lands would continue to remain in Semi-primitive ROS experiences comprised mostly of designated Wilderness areas and Wild and Scenic River corridors. Road Natural and Rural ROS experiences would make up the remaining 95 percent of the Forest with the Urban category still constituting less than one percent.

Interpretation and environmental education would be similar to Alternative C, but with a few new facilities and improvements to existing facilities.

**Developed Recreation:** Alternative C-1, while similar to Alternative C, would provide for the improvement or upgrading of certain facilities where public need has been demonstrated. For example, there would be expansion or improvements at existing horse camps, continued efforts to develop the Caney site resort at Cave Run Lake, addition of Level 2 campsites in the Red River Gorge, and additional group use facilities at existing sites. This alternative would also provide for

upgrading of facilities such as additional RV hook-ups, modern toilets, improved lighting, and accessible features for the disabled, and more boat docks. To help accomplish these goals and remain within budget, some low-use, uneconomical sites could be closed. Overall, there would be a slight increase in the number of PAOTs offered compared to Alternative C (15,900 vs. 16,175). This increase would come primarily from an increase in Level 3 developed facilities.

**Dispersed Recreation:** To improve public service and better protect the ecosystem, off-highway vehicle (OHV) trails less than 15 miles long would be considered for closure, along with a few other trails. Lack of adequate OHV and horse trails would be addressed by considering the addition of about 20 miles of OHV trails to the current OHV trail systems and construction of a new 30-40 mile OHV trail system. Where possible, current OHV trails would also be connected to provide for longer continuous trails. For horseback riders, an additional 20 miles of trail systems served by horse camps would be considered. An effort would be made to connect DBNF horse trails to those in the Big South Fork National Recreation Area. An overall increase in the Forest's total trail mileage, from 612 miles to 685 miles, would come from non-motorized trail additions. The total OHV trail miles would increase from what currently exists. The effects of this alternative would be similar to Alternative C, with the exception of some additions of trail mileage and restrictions placed on some activities, e.g., overnight camping in ecologically sensitive locations such as the Riparian Corridor and the Cliffline Community Prescription Areas. Also, some rock shelters in the Red River Gorge Geological Area (RRGGA) might be designated for camping, and additional efforts would be made to locate rock-climbing opportunities both inside and outside of the RRGGA.

## CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## ALTERNATIVE D

### DIRECT AND INDIRECT EFFECTS

**Recreation in General:** Increased development of recreation areas, roads, and trails with an overall increase in recreation development would be emphasized with less consideration for ecosystem impacts. Other resource management changes would be similar to Alternative C-1, with similar affects on the recreation program. Thus, while there may be minor differences in where various ROS experiences occur and some differences in recreation development within recreational sites in various existing ROS experiences, the overall distribution of these settings would not change appreciably from the current situation. Wilderness and Wild Rivers management would follow the ROS Primitive model until the Limits of Acceptable Change process was complete. No areas on the DBNF qualify as ROS primitive as currently defined, however. Approximately five percent of the lands would continue to remain in the semi-primitive ROS categories, comprised primarily of designated Wilderness areas and Wild and Scenic River corridors. Road Natural and Rural ROS categories would make up the remaining 95 percent of the Forest with the Urban category still less than one percent of the Forest.

Interpretation and environmental education would increase with the addition of new programs and facilities, and improved facilities at existing sites.

**Developed Recreation:** Developed recreation facilities would be upgraded and expanded to meet a majority of public expectations. Some uneconomical, low-use sites would still be closed if upgrading them would not adequately serve the public and allow priority projects to be completed. There would be similar improvements as in Alternative C-1 such as the expansion or improvements at existing horse camps, continued efforts to develop the Caney site resort at Cave Run Lake, addition of Level 2 campsites in the Red River Gorge, upgrading facility amenities with RV hook-ups, modern toilets, improved lighting, added accessible features for the disabled, and more boat docks. Additional improvements for this alternative would include the addition of established campsites with water and electrical hook ups at horse camps, as opposed to simply improving parking lots and providing potable water. Another example might be the addition of new group-use facilities in places where no recreation site currently exists. PAOTs would increase from the 16,175 offered in C-1 to 16,575. Most of this increase would be from additions to the more highly developed sites.

**Dispersed Recreation:** Off-highway vehicle (OHV) trails less than 15 miles long would be considered for closure, along with a few other trails. Lack of adequate miles of OHV and horse trails would be addressed by considering the addition of about 35 miles of OHV trails to current OHV trail systems and construction of a new 40-60 mile OHV trail system. Where possible, current OHV trails would also be connected to provide for longer continuous trails. For horseback riders, an additional 30 miles of trail systems served by horse camps would be considered. An effort would be made to connect DBNF horse trails to those in the Big South Fork National Recreation Area.

The effects of this alternative would be similar to Alternative A, with the exception of some additions to the trail mileage and restrictions placed on some activities, e.g., overnight camping, in more ecologically sensitive locations such as the Riparian Corridor Prescription Area or the Cliffline Community Prescription Area. An increase in trail mileage from the current 612 miles to 725 miles would come from non-motorized trail additions. The OHV trail miles would be approximately eight miles less than currently exists. Also, some rock shelters in the Red River Gorge Geological Area (RRGGA) might be designated for camping, and additional efforts would be made to locate rock-climbing opportunities both inside and outside of the RRGGA.

## CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## ALTERNATIVE E-1

### DIRECT AND INDIRECT EFFECTS

**Recreation in General:** The emphasis on quality and quantity of resource products that maximize benefits to local and regional communities would tend to create more developed recreation opportunities and more intensive natural resource commodity production for resources such as timber and minerals. This would increase the possibility of more human impacts on the natural landscape, reducing the area of semi-primitive ROS experiences. However, existing Wilderness areas, Wild and Scenic Rivers, and other legally designated areas, because they comprise most of the Semi-primitive ROS experiences, will limit the effects of various management on ROS experience distribution. In addition, legal requirements to provide a minimum level of resource protection for emphases such as PETS and water quality, as well as old-growth considerations, will further limit impacts on the

landscape. The fact that much of the land is unsuitable for commodity production would limit the scope of impacts from this alternative on ROS distribution. Areas with viable management opportunities are probably already well roaded. Wilderness and Wild Rivers management would follow the ROS Primitive model until the Limits of Acceptable Change process was complete. No areas on the DBNF qualify as ROS primitive as currently defined, however. Thus, while there would be little change in Semi-primitive areas, many of which are in specially designated areas, there would also be few changes in other ROS experiences. Future timber, wildlife, and minerals activities, by themselves, might change the ROS experiences in which they occur but would not move much acreage out of Roaded Natural.

Interpretation and environmental education would remain at a similar level to Alternative C-1 unless fees can be charged that will help offset some of the costs to the government.

**Developed Recreation:** The recreation program would follow a more business-oriented philosophy, especially as it relates to increasing tourism. Market-level fees might be charged at sites that are now free. Uneconomical sites, whether low-use or not, might be closed if they could not be upgraded to produce some financial returns and/or provide a demonstrated public need. Some smaller, remote sites might be closed if they do not maximize benefits to local or regional communities.

Amenities that would draw larger numbers of visitors would be added to recreation sites. Development Level 4 and 5 fee-generating recreation facilities would be expanded to accommodate more users and would be upgraded with amenities that would add revenue for the facility and local economies as well as meet market demand.

**Dispersed Recreation:** Off-highway vehicle (OHV) trails less than 15 miles long would be considered for closure, along with a few other trails. Lack of adequate miles of OHV and horse trails would be addressed by considering the addition of about 20 miles of OHV trails to current OHV trail systems and construction of a new 30-40 mile OHV trail system. Where possible, current OHV trails would also be connected to provide for longer continuous trails. For horseback riders, an additional 20 miles of trail systems served by horse camps would be considered. An effort would be made to connect DBNF horse trails to those in the Big South Fork National Recreation Area.

The effects of this alternative would be similar to Alternative A, with the exception of some additions to the trail mileage and restrictions placed on some activities, e.g., overnight camping, in more ecologically sensitive locations such as the Riparian Corridor Prescription Area or the Cliffline Community Prescription Area. An increase in trail mileage from 612 miles to 685 miles would come from non-motorized trail additions. Total OHV trail miles would be approximately 20 miles less than what currently exists due to closure of smaller, scattered trails. Also, some rock shelters in the Red River Gorge Geological Area (RRGGA) might be designated for camping, and additional efforts would be made to locate rock-climbing opportunities both inside and outside of the RRGGA.

To produce additional income and make trail operations and maintenance more economical, charging fees for high maintenance activities such as OHV and horse use would be considered.

### CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

## WILD AND SCENIC RIVERS (DESIGNATED AND PROPOSED)

### Affected Environment

#### Overview of All Rivers

The Daniel Boone National Forest has only one federally designated Wild and Scenic River—the Red River. A 19.4-mile segment of this river was added to the National Wild and Scenic Rivers System (National System) December 2, 1993 (Public Law 103-170). In addition, the Forest Service has proposed 67.8 miles of five streams on the Forest for inclusion into the National System. Based upon an EIS (USDA Forest Service 1996) a proposal that segments of the Cumberland River, Marsh Creek, Rockcastle River, Rock Creek and the War Fork part of Station Camp Creek be classified as National Wild and Scenic Rivers, has been forwarded to the Regional Forester for submission to the Secretary of Agriculture and then to Congress for legislative action. No action has yet been taken on this recommendation. Except for Marsh Creek and the recreational portion of the Red River, the Commonwealth of Kentucky has designated these streams as State Wild and Scenic Rivers.

The decision to designate a river as a National Wild and Scenic River is based in part on a determination that the river possess one or more qualities such as outstanding scenic, recreational, geological, fish, wildlife, historic, cultural or similar values, including being a free flowing river. While the Red River has already been officially designated, these qualities would need to be protected for the other rivers if they are to continue to qualify for this designation. So, in addition to protecting the free-flowing condition, water quality and outstandingly remarkable values for which the Red River was added to the National System (U.S. Forest Service 1988, Wild and Scenic River Study Report and Environmental Impact Statement on the Red River), the Forest has also attempted to protect the free-flowing condition and outstandingly remarkable values of the five eligible streams (U.S. Forest Service 1996, Final Wild and Scenic Rivers Suitability Study and Environmental Impact Statement for Six Rivers on the Daniel Boone National Forest) in spite of the fact that they are not yet designated.

Wild and Scenic Rivers are further broken down into three classes: Wild, Scenic and Recreational. Each of these classes determine the type of management and protection that particular river segment receives. Table 3 - 74 lists the designated and proposed rivers and the classes that apply to each.

The Forest has also entered into a memorandum of understanding with the Commonwealth of Kentucky to cooperate in the protective management of these rivers.

**Table 3 - 74. Status, designation, and mileage of Wild and Scenic Rivers on the DBNF.**

River	Status Federal and (State)	Wild (miles)	Scenic (miles)	Rec. (miles)	Total Miles
Red River	Designated (State W&SR-Wild Segment)	9.1	0	10.3	19.4
Cumberland	Eligible (State W&SR)	0	14.9	0	14.9
Marsh Creek	Eligible	7.0	0	8.0	15.0
Rockcastle	Eligible (State W&SR)	0	13.3	0	13.3
Rock Creek	Eligible (State W&SR)	0	0	17.5	17.5
War Fork Station Camp	Eligible (State W&SR)	0	7.1	0	7.1
<b>Total</b>		16.1	35.3	35.8	87.2

## Red River Management

The Wild and Scenic Rivers Act requires a comprehensive river management plan for designated rivers such as the Red River. That plan is to “address resource protection, development of land and facilities, user capacities and other management practices necessary or desirable to achieve the purposes of this Act.” The Forest Plan that results from the analysis in this DEIS is designed to meet the comprehensive river management requirements for the Red River. This would be accomplished in Chapter 3 of the Forest Plan (Desired Future Condition, Goals/Objectives/Standards) and its Monitoring and Implementation Appendix. In addition to the management direction in the Forest Plan, additional specific management direction will be provided from the completion of the Limits of Acceptable Change process that will be done with public input. This direction will address in more detail such things as user capacities and management activities, including monitoring and impact mitigation.

The following information details the affected environment of the Red River in support of the analysis and subsequent Plan direction for management of the Red River.

## Outstandingly Remarkable Values

The outstandingly remarkable values of the Red River are described as part of the affected environment of this river. The following information taken primarily from the Wild and Scenic River Study Report and Environmental Impact Statement on the Red River (USDA Forest Service 1998) summarizes these values:

**Scenic Value:** The Red River is a central feature of the Red River Gorge Geological Area (RRGGA). The eastern part of the RRGGA contains the Clifty Wilderness, which is bisected by the wild segment of the Red River. Because of its outstanding natural features the RRGGA is also designated as a National Natural Landmark. Towering sandstone cliffs, rock shelters, natural stone arches, and mountain streams graced by huge boulders, as well as mountain laurel and rhododendron characterizes this area.

The area has been the subject of such accolades as, “The Red River Gorge is one of the unique natural resources of the eastern United States. Its scenic beauty, geological formations, and concentrations of natural arches rival those of the canyon lands of Colorado.” (Wyss and Wyss 1977), and the Red River Gorge possesses “a marvelous collection of palisades, rock promontories, solitary pinnacles and spires, numerous natural arches, and a multitude of cascading mountain streams.” (Rucchoft 1976) The Red River has been described as “some of the most spectacular canoeing waters anywhere in the eastern United States.... The scenery is spectacular without exception.” (Sehlinger 1978) While the above are subjective observations, under the more objective Forest Service scenic classification system, the River and its corridor would have the highest scenic rating, “distinctive,” due to the steep and rugged topography, visual variety displayed by the contrasting forests of large trees towering over mountain laurel and rhododendron and large sandstone cliffs and arches.

**Recreational Value:** The Red River draws river enthusiasts from all over Kentucky as well as surrounding states. Rugged shorelines edged with steep rock cliffs and a river with abundant large boulders provides canoeists and kayakers a variety of white water from Class II and III during the winter and spring run-offs to Class I during the low water flows of summer. In addition, numerous National Recreation trails in the RRGGA provide access into the river corridor for more sedate

activities such as viewing scenery and wildlife and hiking into the forest to camp and relax. The RRGGA is internationally known as having some of the world's premier rock climbing areas, some of which are within the river corridor. There has been a steady increase in recreational visitation to the RRGGA because of the quality of its rock climbing routes, numerous trails, white water, and unique scenic qualities. However, limited access to the river has kept use here fairly low with no major changes in the past 5 years.

**Geological Value:** As described above, the RRGGA is designated as a geological area because of its unique geology, which has produced numerous natural arches, pinnacles, and prominent cliffs. The area contains unique and rugged topography. Most ridges harbor clifflines with rock shelters at their base. Perhaps the most striking feature of the RRGGA is the sandstone arches carved out by years of wind and water erosion. The most popular arch is Sky Bridge, a graceful arch over 70 feet long and 23 feet tall. Another arch is Princess arch, over 30 feet long and 8 feet tall. With over 100 known arches, the RRGGA is thought to contain the largest concentration of arches east of the Rocky Mountains.

**Historic and Cultural:** The uniqueness of the RRGGA and its river corridor is not only a draw for present day adventurers, but as long as 10,000 years ago, it drew Native Americans to its natural beauty and abundant resources. The dry microclimate of the rock shelters that were a primary abode of early Americans have preserved, to this day, woven fiber slippers, fiber bags filled with nuts, and wooden tools, as well as the remains of cultivated and uncultivated plants. Preservation of these artifacts has produced an important and unique insight into the culture of ancient Native Americans. Wyss and Wyss (1977) state, "The prehistoric archeological sites of the Red River Gorge area are well known for excellent preservation of normally perishable ethnobotanic remains, the bulk of which have been recovered from sites of the Woodland Tradition. The remains of about 50 species are present in these collections." The numerous petroglyphs in the RRGGA are an important addition to the artifacts mentioned above. The RRGGA reportedly has the highest concentrations of petroglyphs east of the Rocky Mountains.

In addition to the unique archeological features of the RRGGA, there are remnants of historical interest. Old saltpeter mine activity from as far back as the Civil War era can be found in some rockshelters. In the 1880s there was a boom in logging activity in the area. The Nada tunnel, the western portal for the RRGGA, is a narrow tunnel dug out of the rock originally for a narrow-gage rail line to haul logs out of the area.

The significance of the hundreds of archeological and historical sites, many of which are on the National Register of Historic Places, is such that the entire RRGGA is being nominated as a National Historic Landmark.

**Botanical Value:** The conjunction of several climatological, geologic, and topographic features has created a diversity of plant life in a variety of ecological niches. Of particular interest is the drip line area at the base of cliff lines where rock shelters exist. These areas provide suitable environment for the white-haired goldenrod a plant found nowhere else on earth than in the RRGGA.

**Aquatic Value:** The river environment contains three at-risk aquatic species in addition to 16 mussel species. It also provides a high quality warm-water fishery of 70 fish species, including sport fish such as rock bass, catfish, and smallmouth bass, as well as numerous types of sunfish and muskellunge. The river is one of the few free-flowing muskellunge streams in Kentucky.

The eastern sand darter, which was once common in several of Kentucky's rivers (Woolman 1892), has almost vanished in much of Kentucky because of stream channelization, dam construction (Branson 1977), and siltation (Clay 1975). This species requires clean sand in moderate to large rivers (Williams 1975). While the species can no longer be found in many of its former habitats, it is still present in the Red River.

While not considered as outstandingly remarkable values, the following provide additional information on the affected environment of the Red River:

**Red River Water Conditions:** With the exception of two state highway bridges, the Red River has no impoundments, diversions, or other modifications on the designated segments. The highest monthly flows are between February and March with the lowest from September to October. The low mean is 86 cubic feet per second and the high mean is 1,075 cubic feet per second. Peak flows are between 5,000 and 15,000 cubic feet per second (Walker 2001b). Distribution of flows, compared with rainfall, indicates that geology influences movement of rainfall into the stream. This influence is the apparent capability to store rainfall as groundwater and slowly release this water as surface streamflow (USDA Forest Service 1988).

Water quality meets or exceeds federal standards (Walker, personal communications 2002). As far back as the late 1970s, water quality has been examined on the river. In 1979 the Kentucky Nature Preserves Commission investigated biota in the Red River. From their findings at a site just down stream from the bridge over the river at State Route 746 at the upper terminus of the Wild Segment of this river the investigators concluded: "This site appears to have some of the highest quality water observed in the Kentucky River Drainage" (Harker, et al 1979). The high quality of the water in 1979 was also confirmed in Kentucky State Nature Preserves Commission studies that found the species representation of benthic macro-invertebrates "reflects the high quality of this stream" (KNPC 1979). While water quality continues to remain good, there are areas of the watershed, mostly outside the RRGGA, that could be improved (Walker 2001b). Water from tributaries outside the RRGGA contains some pollutants, primarily from roads, agricultural run-off, garbage dumping, and sewage discharge.

**Red River Classifications and Developments:** The 19.4 miles of the Red River has both Wild and Recreational River classifications. The Wild segment of the river is in the upper reach of the river and starts at the bridge that crosses the river on State Route 746. The Wild segment terminates 9.1 miles from this point at the mouth of Swift Camp Creek, approximately 600 feet upstream of the State Route 715 Bridge. This is the only segment of the river designated by the Commonwealth of Kentucky (1980) as a State Wild and Scenic River. Approximately five miles of the upper reach of the Wild segment is outside the Daniel Boone National Forest proclamation boundary and the remainder if this segment is within the Clifty Wilderness portion of the Red River Gorge Geological Area. There are no developments within the corridor inside the wilderness area other than some trails. Outside the Wilderness, beyond the proclamation boundary the steep terrain precludes most development. Most of the rest in this section of the corridor is comprised of mostly forested private land with a few areas of pasture and cropland.

The Recreational segment of the corridor is 10.3 miles long and extends from the mouth of Swift Camp Creek to the river ford below Schoolhouse Branch. This segment is entirely within the RRGGA and includes some trail segments, two canoe-launch sites, trailheads, pastureland and the Gladie Historic Site. Additionally, there are portions of three public roads and some private land more fully discussed in the following section of this document. The corridor is generally described

as a line 300 feet north and parallel to the north edge of State Routes 23, 77, and 715, except for the section between Greasy Branch and Bell Branch where the boundary is the south edge of State Route 715. On the southern side, the Recreational segment boundary is a line 800 feet from and parallel to the southern edge of the river.

**Private Land Use:** Except for the five-mile long river segment east of the DBNF proclamation boundary, most of the private land (555 acres) within the 2,678-acre Red River Wild and Scenic corridor is on the recreational segment of the river. The majority of the private land in the corridor is steep, forested land that cannot be developed. The developable land consists of small tracts, which contain private residences or are not developed, except for clearing of trees to create small (<10 acres) grassy openings or pastures. Even though no county zoning regulations exist, there are few negative impacts from these lands on the corridor within the proclamation boundary. An emphasis on land acquisition in the RRGGA has allowed the Forest Service to acquire much of the private land in the RRGGA. Since 1986, a total of 6,795 acres has been acquired from willing sellers. Several private tracts within the river corridor were acquired as part of this program.

There are also eight miles of public roads that parallel the recreational segment of the river. While the land in the state road right of way DBNF property, the state is responsible for maintenance of the right of way. Recently, nomination by the Commonwealth of Kentucky was successful in having state roads within the corridor designated as part of the National Scenic Byway system.

The five-mile long segment of the corridor that is outside of the forest proclamation boundary is primarily private land in small farms. Almost all of the land immediately adjacent to the river, which makes up the majority of this section of the corridor, is forested, steep, and undeveloped. Above the steep sides of the river, the corridor is mostly forested with some small areas of pastureland.

**Red River Recreation Use:** As stated in the introduction to the Recreation section of the Affected Environment chapter, there are no “hard” recreation-use figures for the Forest. This is also true of the Red River. Observations, by Forest Service personnel and information from the local outfitter, indicate slow growth in river use over the past five years. The outfitter reported taking 1,145 people out on the river in 2002. About 20 groups use the available shuttle service annually. However, many persons using the river do not use outfitter services.

Crowding and adverse resource impacts have not been a concern in the river corridor due to the wilderness designation along half of the river. The very rough terrain along the entire river also limits both boating access and parking. Because of its current low use and the river’s steep terrain and limited access, future recreation use is expected to grow only slightly during the planning period.

## EFFECTS COMMON TO ALL ALTERNATIVES FOR ALL RIVERS

### DIRECT AND INDIRECT AFFECTS

For purposes of assessing the direct and indirect effects to recreation of the various alternatives, the area of consideration is National Forest System land within each river corridor. Cumulative effects are assessed on National Forest System lands as well as adjacent private land.

## CUMULATIVE EFFECTS

The Forest's cooperative efforts with the Commonwealth of Kentucky to protect and manage these rivers, most of which are also designated State Wild and Scenic Rivers, would continue.

Private development adjacent to, or within, the rivers' corridors could affect the recreation opportunity setting, and thus the recreation experience, in the affected area. Persons desiring to get away from human influence and experience more solitude on National Forest lands might avoid such affected areas.

Private activities and development adjacent to the rivers' corridors could introduce more illegal activities such as OHV use off of designated trails.

The possibility of adverse environmental impacts from certain damaging insects, diseases, and invasive non-native species could require restrictions on recreational activities deemed to increase the chances of these species spreading onto and through the rivers' corridors.

Private development affecting water entering the river watersheds would affect the quality of the water in the rivers.

Increased interest in the Red River Gorge could heighten the desire of the public to acquire lands within these corridors, making increasingly difficult the acquisition of private land for protection of the corridors.

## ALTERNATIVE A

### DIRECT AND INDIRECT EFFECTS

**Red River:** Protection of the values for which the Red River was designated would continue. Additional protection would also be afforded the river because of its location within the Clifty Wilderness and the Red River Gorge Geological Area and National Natural Landmark. Land acquisition from willing sellers in the river corridor would continue. While this alternative would protect river values, it would not provide river-specific direction to protect and enhance identified values, establish a monitoring plan, or suggest future management actions. Additionally, this alternative would not provide all the direction necessary to meet the intent of the Wild and Scenic Rivers Act [Section 3 (d)(1)].

**Proposed Rivers:** Protection of the values for which these rivers were proposed would continue. However, the protection would be on an informal basis without much specific direction on how to protect these values.

## CUMULATIVE EFFECTS

None other than those documented above in Cumulative Effects Common to All Alternatives.

**ALTERNATIVES B-1, C, C-1, D, E-1****DIRECT AND INDIRECT EFFECTS**

**Red River:** The Forest would have a suite of management direction to fully protect and enhance the Red Wild and Scenic River. This direction would include, and build on, the protective direction for the Clifty Wilderness and RRGGA, adding river-specific direction by segment.

More specific, formal direction would also provide an improved basis for insuring better relationships with our partners and landowners within the corridor.

The two Prescription Areas 3.C.1 and 3.C.3 (Red River Wild segment, Red River Recreational segment) and a monitoring plan for the Red River in the 2004 Forest Plan would address the requirements for a comprehensive management plan under Section 3(d)(1) of the Wild and Scenic Rivers Act.

**Proposed Rivers:** These alternatives would fully protect and enhance the values for which these rivers were proposed based upon Prescription Areas 3.C.2 (Marsh Creek-Wild segment), 3.C.4 (Cumberland, War Fork, Rockcastle Scenic segments), and 3.C.5 (Rock Creek, Marsh Creek-Recreational segments).

More specific, formal direction would also provide an improved basis for insuring better relationships with Forest Service partners and landowners within the corridor.

**CUMULATIVE EFFECTS**

None other than those documented above in Cumulative Effects Common to All Alternatives.

## WILDERNESS (DESIGNATED AND PROPOSED)

### Affected Environment

There are two designated Wilderness areas on the Daniel Boone National Forest. Public Law 99-197 established Clifty Wilderness, part of the Red River Gorge Geological Area, on December 23, 1985. Beaver Creek Wilderness was established by the Eastern Wilderness Act of 1975 (Public Law 93-622). Each has its own Prescription Area designation.

Clifty Wilderness contains 12,646 acres and Beaver Creek contains 4,791 acres. Both acreages reflect all land, private and National Forest System land, within the boundary designated for these areas. Land and minerals acquisitions have reduced the private land within each one of these wildernesses to less than 100 acres in Clifty, from almost 600 acres in 1997, and 38 acres in Beaver Creek. Social and managerial settings in Wilderness areas are to be managed according to the Primitive Recreational Opportunity Spectrum (ROS) model until the Limits of Acceptable Change process is complete. Due to the small size of both areas and their nearness to roads and developments on surrounding lands, both areas are classed as ROS Semi-primitive Non-motorized.

Logging, farming, roading, nitre mining, and coal mining occurred in these areas in the past. Forest regeneration has erased most remnants of these activities. However, some vestiges of past human impacts and current recreation use in these areas remain, including scattered specimens of non-native invasive plant species. Plants such as multi flora rose, Nepalese brown top, Japanese honeysuckle, autumn olive, and Asiatic bittersweet are the most common of these species. These are usually found along trails, old roads, riparian areas and old home sites. A recent acquisition of private land in the Swift Camp Creek area of Clifty Wilderness includes remnants of an old campground with concrete cisterns, shower house, and an old concrete bridge. Plans were underway to remove these structures by 2003. Another, less obvious human impact is the exclusion of fire that is bringing about a shift in forest species. Of particular note is the increasing amount of white pine in the forest understory.

Because of its nearness to Lexington, Louisville, and Cincinnati and the interest of the public in the spectacular geological features and recreation opportunities in the RRGGA, Clifty Wilderness receives much more use than Beaver Creek Wilderness. The major uses in DBNF Wilderness areas are day hiking, hunting, fishing, camping, and in Clifty, rock climbing. Use in Clifty is concentrated near trails, cliffhines, and the Red River Wild and Scenic River. Because the Beaver Creek Wilderness is primarily in the steep, cliff bound drainage of Beaver Creek, use is concentrated along the trails and creeks that lie in the bottom of the steep valleys. In both areas, use is holding steady with some small growth in use noted in Clifty.

Management in these two Wilderness areas has recently focused on surveying and protecting archeological sites at the base of cliffhines. There are no major problems in Beaver Creek, but heavy recreation use in Clifty has led to some damage of heritage resources. To address such problems in Clifty, camping and fire building within 100 feet of the base of cliffhine has been prohibited, and some popular rock climbing areas have been closed. Follow-up is needed to enforce these closures.

The Wolfpen area, approximately 2,834 acres, is within the Red River Gorge Geological Area and is bounded on the east by Clifty Wilderness and the south by the Red River Wild and Scenic River corridor. It was evaluated by the Forest Service and found to meet the criteria as a Roadless Area in the East as defined in Forest Service Handbook 1909.12. The area has one small tract of rugged private land in the southwest corner that can be accessed without going through National Forest

System lands, two unimproved roads, and a portion of the Sheltopee Trace National Recreation Trail. Past human activities such as logging are fast disappearing. Most human activity is related to dispersed recreation, primarily backcountry hiking and primitive camping. There are some privately held mineral rights within the area.

## **Environmental Effects**

For purposes of assessing the direct and indirect effects to recreation of the various alternatives, the area of consideration is National Forest System and private land within the wilderness boundaries of the DBNF as well as the Wolfpen area. Cumulative effects are assessed on National Forest System lands and private land adjacent to the Wilderness and Wolfpen areas.

### **ALTERNATIVES A, C, C-1, D, E-1**

#### **DIRECT AND INDIRECT EFFECTS**

The effects within the Clifty and Beaver Creek Wilderness areas for these alternatives should be essentially the same. There would be no change in designated Wilderness areas or their existing Wilderness boundaries. Acquisition of private lands and mineral rights within the Wilderness areas would continue to be a high priority. The Wilderness experience that visitors have come to expect would continue to be provided at its current level. There would continue to be minor increases in recreational use, especially along trails.

Natural fire would continue to be allowed to play its role in the wilderness ecosystem. Over time, as trees mature and canopies close, shade will create a moister environment with little understory to fuel fire. In dry years, inaccessibility and the reduced ability to use mechanized equipment to suppress arson fires (including fires that threaten Wilderness resources or private lands) could result in fires larger than those that might occur outside the Wilderness areas.

Effects on Wilderness users from possible management activities, resulting from the implementation of the various alternatives just outside the Wilderness boundaries, would be negligible because the rugged terrain surrounding these two areas precludes many management activities.

By not designating Wolfpen as a Wilderness Study Area rock climbing and bolted rock climbing routes would increase along with the potential for more trail construction to accommodate access for the various types of recreation use found in this area. Although natural fire could be allowed, it is likely that most wildfires would be controlled. Other management activities would continue to be minimal due to the management restrictions on the Red River Gorge, of which this area is a part, and due to the rugged terrain in the Wolfpen Area.

#### **CUMULATIVE EFFECTS**

Private development adjacent to the Wildernesses would affect the Semi-primitive Non-motorized ROS experiences in that interface. Persons desiring to get away from human influence and experience solitude would avoid such affected areas near the edge of Wilderness areas.

Private development adjacent to the Wilderness areas could introduce more illegal activities such as OHV use.

The possibility of adverse environmental impacts from certain damaging insects, diseases, and non-native invasive species could require restrictions on some types of recreational activities deemed to increase the prospects of these species spreading onto and through the Wilderness areas. As the Forest matures, some shade intolerant non-native invasive plant species will decline.

Private development affecting the water entering the Wildernesses' watershed could adversely affect the quality of the water in the Wilderness areas.

Increased interest in the Red River Gorge/Clifty Wilderness could heighten the public's desire to acquire lands within the Wilderness areas and Wolfpen, making the acquisition of private land to protect the Wilderness areas increasingly difficult.

## **ALTERNATIVE B-1**

### **DIRECT AND INDIRECT EFFECTS**

This alternative would treat the Wilderness program the same as the other alternatives except that the Wolfpen area would be designated as a Wilderness Study Area. The effects within the Clifty and Beaver Creek Wilderness areas for this alternative would not change. However, Clifty Wilderness area would be enhanced by the addition of approximately 2,834 acres in Wolfpen area.. There would be no change in areas designated as Wilderness or their existing boundaries unless Wolfpen qualifies as a Wilderness, adding to this resource. The wilderness experience that visitors have come to expect would continue to be provided at its current level and could increased if Wolfpen is added to Clifty. There would continue to be minor increases in use, especially along trails however, some current recreation activities in Wolfpen, particularly rock climbing on bolted routes, would not be allowed to increase.

Natural fire would continue to be allowed to play its role in the wilderness ecosystem. Overtime, as trees mature and canopies close, shade will create a more moist environment with little understory to fuel fire. In dry years, inaccessibility and the reduced ability to use mechanized equipment to suppress arson fires as well as any fires that threaten Wilderness resources or private lands. This could result in fires larger than those that might occur outside the Wilderness areas.

Effects on Wilderness users from the potentially different activities just outside the Wilderness boundaries, resulting from the various alternatives, would be negligible because the rugged terrain surrounding these two areas precludes many of the possible management activities. However the protection afforded the western boundary of Clifty by the Wolfpen area would be enhanced.

### **CUMULATIVE EFFECTS**

Private development adjacent to the Wilderness areas as well as Wolfpen would affect setting as well as the recreation experience in the affected interface. Persons desiring to get away from human influence and experience solitude would avoid such affected areas near the edge of these areas.

Private development adjacent to these areas could introduce more illegal activities such as OHV use.

The possibility of adverse environmental impacts from certain damaging insects, diseases, and invasive non-native species could require restrictions on some types of recreational activities deemed to increase the prospects of these species spreading onto and through these areas.

Private development affecting the water entering the watersheds in these areas could adversely affect the quality of the water in the wilderness.

Increased interest in the Red River Gorge/Clifty Wilderness could heighten the public's desire to acquire lands within the Wilderness areas and Wolfpen, making the acquisition of private land to protect the Wilderness areas increasingly difficult.

## TIMBER PRODUCTS

The Multiple-Use Sustained-Yield Act of 1960 recognizes timber as one of the five major resources that are available in national forests. In general, national forest timber resources are managed to maintain the diversity of forest vegetation and to provide a sustainable flow of roundwood products for the American economy.

### Affected Environment

This section focuses on timber product outputs and values resulting from management rather than vegetation conditions. Resulting conditions are described elsewhere in this chapter (Forest Cover, Forest Health, Fragmentation, etc.).

The area considered for timber supply and demand analysis is a 22 county area centered on the DBNF, containing the market area. Otherwise the area considered for this analysis is National Forest System land within the proclamation boundary.

#### Timber Supply and Demand

Between 1982 and 1994, acreage of good quality, adequately stocked sawtimber on the Daniel Boone National Forest (DBNF) increased six percent. At the same time, acreage of suitable timberland within the sawtimber class, increased four percent. However, the relatively low demand for DBNF timber cited in the Environmental Impact Statement for the 1985 Plan continues (USFS 1985, p. III-16). As measured by the number of timber sale bids, the past decade has not seen strong demand for DBNF timber. Between 1985 and 1995, DBNF timber sales averaged only 2.5 bidders per offering. The steep slopes and rugged cliffs of the DBNF make logging difficult and more expensive. Also, timber management over the last decade has focused on restoration of sparse and damaged stands. Most offerings, thus, contained a high percentage of medium- to low-value timber. Timber sale contracts on the DBNF require more environmental protection measures than usually occur on private lands. These factors drive up logging costs and hold bids down. For more detailed information on this topic, refer to the Timber Supply and Demand Economic Report: Analysis of the Management Situation (USDA Forest Service 1997).

#### Timber Management History of the Daniel Boone National Forest

Much timber harvesting and clearing of the land occurred in Kentucky between 1890 and 1910, prior to the initiation of the Cumberland National Forest in 1930 (later renamed the Daniel Boone National Forest). Most of the lands acquired in the 1930s and later had been cut over by the former landowners, often resulting in an under-stocked and/or high-graded condition. Following acquisition and prior to the mid-1960s, the Forest was tended under custodial management that included a series of improvement cuts, although few stands were regenerated. As a result, there are a large number of 70-100 year old stands as described in the Vegetation Cover section in this chapter. In the mid-1960s, an even-aged silvicultural system (including the clearcutting regeneration method) began to be used as the primary method of timber management. During the past decade, a two-aged silvicultural system, using a shelterwood with reserves regeneration method, became the most common regeneration harvest used on the forest. This leaves some older trees to grow with the regenerating trees. Slightly over 10,000 acres is now in a two-aged condition as a result.

### Character of Timber Resources on the Daniel Boone National Forest

Timber is a renewable forest product grown from stands of trees, potentially useable for lumber. The volume and quality of wood produced during a logging operation depends on the type and condition of the stand from which such wood is taken. On the DBNF, dry-mesic oak types occupy a majority of uplands, with some dry-xeric oak on rocky sites. Yellow-poplar, eastern hemlock, and other mixed mesophytic and riparian species are often found on moist north slopes and in narrow bands along streams. Yellow pine types and mixtures of pine and oak have occurred mostly in the Cumberland River and Middle Kentucky River Management Areas (watersheds) on upland sites. Virginia pine and other early-seral tree species can be found on previously disturbed areas including mining sites. A more detailed description can be found in the Vegetation Cover section of this chapter.

The Continuous Inventory of Stand Conditions (CISC) timber resource database is updated on a 10-year cycle. One weakness of such a system is that large-scale catastrophic disturbance such as the southern pine beetle (SPB) outbreak, which killed a majority of the yellow pine on the DBNF in 2000 and 2001, cannot be quickly inventoried. For purposes of the analysis done for this section, inclusion of the SPB event was accomplished by replacing most yellow pine stands with hardwood stands in the database. This update left pine in stands having a 30-50 percent pine component (Oak-pine), and in young seedling-sapling pine and young pine-hardwood stands. Based on these changes, as of June 20, 2002, the forest resource was estimated by age-class and community (Table 3 - 75).

**Table 3 - 75. Forest land by age-class and community type (acres)\*.**

Age-class (year 2001)	Community Type						Total Forest
	Pine & Pine-hardwood	Oak-pine	Xeric Oak	Mesic Oak	Mixed Mesophytic	White Pine Hemlock	
00-09	1,272	40,588	1,313	16,649	5,174	317	65,313
10-19	0	2,186	1,663	27,184	10,990	2,963	44,985
20-29	0	3,618	657	27,730	10,690	2,631	45,326
30-39	0	2,048	858	20,985	12,631	2,961	39,482
40-49	0	1,124	486	10,269	11,658	1,271	24,809
50-59	0	1,498	906	10,248	16,703	626	29,980
60-69	0	5,775	2,689	29,065	19,049	1,035	57,613
70-79	0	11,831	3,984	53,432	22,287	2,365	93,900
80-89	0	10,994	4,452	50,484	22,033	3,407	91,370
90-99	0	9,537	5,903	45,905	15,099	2,598	79,043
100-109	0	6,413	3,228	28,778	9,094	3,784	51,297
110-119	0	2,162	1,405	14,858	5,256	2,567	26,247
120-129	0	661	392	3,059	1,862	1,420	7,393
130+	0	212	169	852	1,220	2,597	5,048
<b>Total</b>	1,272	98,647	28,105	339,498	163,746	30,542	661,806

\*Acreage based on March 1997 CISC database, adjusted for Southern pine beetle mortality in 1999-2001.

### Timberland Suitability Analysis (Stage 1)

Timberland is defined as forestland considered of commercial value, or commercial forestland. As stated in CFR 219.14: “During the Forest planning process, lands which are not suited for timber production shall be identified.” Conversely, lands suitable for timber production are also identified. In the following timberland suitability analysis, the final result identifies each acre of land for timber production suitability by alternative.

Stage 1 of this analysis determines lands that are “tentatively suitable” for timber production. Non-forest lands such as lakes, treeless recreation areas and administrative sites, major roads, and transmission line clearings are removed. Lands that have been administratively removed from the timber base such as designated Wilderness areas, Wild and Scenic Rivers, and Research Natural Areas are removed. Also, all lands that are incapable of producing at least 20 cubic feet of industrial wood per acre per average year are removed from the suitable timber base. Table 3 - 76 displays the results of the first stage of this analysis.

**Table 3 - 76. Determination of tentatively suitable timberland.**

Land Use <sup>1</sup>	Acres
<b>Non-forest</b>	
<b>Water</b>	17,916
<b>Roads</b>	8,704
<b>Railroads</b>	66
<b>Admin &amp; misc. non-forest</b>	2,081
<b>Grassy openings</b>	1,922
<b>Utilities</b>	1,231
<b>Total Non-forest</b>	31,920
<b>Unsuitable Forest (Stage 1)</b>	
<b>Wilderness (Clifty and Beaver Creek)</b>	16,692
<b>RNA (Rock Creek)</b>	189
<b>Wild and Scenic River - Wild</b>	76
<b>Wild and Scenic River – Except Wild</b>	1,181
<b>Scenic Area (Natural Arch)</b>	1,052
<b>Geological Area (Red River Gorge)</b>	15,725
<b>Forestland Not Capable of Adequate Growth<sup>2</sup></b>	275
<b>Forestland Where Technology Is Lacking<sup>3</sup></b>	1,246
<b>Total Unsuitable Forest (Stage 1)</b>	36,465
<b>Total National Forest System Lands (1998)</b>	693,726
<b>- Total Non-forest</b>	-31,920
<b>Total forest land</b>	661,806
<b>- Total Unsuitable Forest (Stage 1)</b>	-31,920
<b>= Tentatively Suitable Timberland</b>	625,341

<sup>1</sup> This list is prioritized so that where overlapping polygons occur between land uses, the uppermost listed contains the acres.

<sup>2</sup> Lands incapable of 20 cu.ft. /acre-year of growth; formerly “unproductive” forest (CISC code 900)

<sup>3</sup> Lands where restocking can't be assured, or where response data is lacking, e.g. uninventoried (CISC code 700)

### Timberland Suitability Analysis (Stage 2)

The Stage 2 timberland suitability analysis is an economic examination of the tentatively suitable timberland identified in Stage 1 above, as required in 36 CFR 219.14(b). No decisions are made at the conclusion of the Stage 2 analysis about the management of the land. Instead, the results are used in the Stage 3 analysis, which determines land allocations for each alternative.

The Stage 2 analysis was accomplished by dividing areas of Forest that are potentially available for timber production (tentatively suitable timberland) into analysis areas based on forest community types, stand-age, slope, and accessibility. This analysis used Present Net Value (PNV) to measure of timber costs and revenues. The results of this analysis are summarized in Table 3 - 77. Unroaded acres have the highest impact on cost, then operability (slope). Mesic oak types have the highest value while the yellow pine types have the lowest. Even though yellow pine is considered to be a mid-value product, its PNV is negative since most yellow pine stands are now in young age-classes.

**Table 3 - 77. Present net value of average-age timberland, by accessibility, operability, and community type (1997 \$/acre).**

Operability/ Accessibility	Community Type					
	Yellow Pine & Pine-hwd (50+% pine)	Oak-pine (50-70% hardwood)	Xeric Oak (poor site)	Mesic Oak (good site)	Mixed Mesophytic Hardwoods	Hemlock – White Pine
<b>Gentle slope/ Roaded</b>	-\$8.67	\$81	\$133	\$204	\$138	\$99
<b>Steep slope/ Roaded</b>	*	\$108	\$124	\$133	\$124	\$74
<b>Gentle slope/ Unroaded</b>	-\$16	\$58	\$92	\$132	\$91	\$56
<b>Steep slope/ Unroaded</b>	*	\$57	\$74	\$85	\$87	\$80

\* Not enough representative stands available on these sites for reasonable analysis.

### Timberland Suitability Analysis (Stage 3)

Stage 3 was accomplished during the formulation of alternatives. According to 36 CFR 219.14(c), in this stage, “lands shall be tentatively identified as not appropriate for timber production to meet objectives of the alternative being considered if”:

- 1) Based upon a consideration of multiple-use objectives for the alternative, the land is proposed for resource uses that preclude timber production, such as Wilderness
- 2) Other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 219.27 cannot be met, or
- 3) The lands are not cost-efficient, over the planning horizon, in meeting forest objectives, which include timber production.

The results of land allocation by alternative are displayed in Table 3 - 78. Lands determined to be not cost-efficient were removed from the Tentatively Suitable Timberland classification based on criteria such as accessibility, operability, and soil sensitivity. This information was gathered during field observations over the past decade and recorded in the CISC database. The amount of this acreage is included in the table as Economically Unsuitable Lands.

## RESOURCE TABLES

The tables and figures in this section are discussed in the Environmental Effects section.

**Table 3 - 78. Allocation of land not appropriate for timber production by alternative (acres).**

Land Allocated as Not Appropriate for Timber Production <sup>1</sup>	Alternative			
	A	B-1	C, C-1, and D	E-1
2.C. Proposed Wilderness	0	*0	0	0
1.A. Proposed Research Natural Areas <sup>2</sup>	161	161	161	161
3.C.2. Proposed Wild & Scenic River- Wild	1,194	1,194	1,194	1,194
3.C.4. Proposed Wild & Scenic River- other	11,042	11,042	11,042	11,042
1.G. Rare Community	0	858	858	858
I.J. Significant Bat Caves	0	5,260	5,260	5,260
1.C. Cliffline Community	0	95,538	95,538	95,538
1.I. Designated Old-Growth	0	0	12,141	315
Red-cockaded woodpecker Mgt. Area	3,552	0	0	0
3.A. Recreation Areas (forested area)	2,414	2,136	2,091	2,136
3.B. Lake Zone (300' forested area)	12,830	10,657	10,319	10,657
1.E. Riparian Corridor (98% unsuitable)	0	95,971	93,269	95,955
Wooded Grassland (long-term objective)	0	750	18,375	750
1.M. Custodial (81% unsuitable)	0	330,752	0	0
Grassy openings Reverting to Unsuitable	0	1,022	0	0
Economically Unsuitable Lands	15,265	0	7,010	7081
<b>Total Not Appropriate</b>	<b>46,458</b>	<b>555,341</b>	<b>257,258</b>	<b>230,947</b>
Tentatively Suitable Timberland (Table 3 - 76)	625,341	625,341	625,341	625,341
+/- Grassy openings to revert / (to clear)	-778	0	-278	1,022
- Total Not Appropriate	<u>-46,458</u>	<u>-555,341</u>	<u>-257,258</u>	<u>-230,947</u>
= Total Suitable Timberland	<b>578,105</b>	<b>70,000</b>	<b>367,805</b>	<b>395,416</b>

<sup>1</sup> This list is prioritized so that where overlapping polygons occur between land types, the uppermost listed contains the acres.

<sup>2</sup> Includes Elisha Creek, but excludes Tigh Hollow since it is within the Red River Gorge Geological Area, already classified as unsuitable.

\* The proposed Clifty Wilderness addition (2,834 acres) is all within the Red River Gorge Geological Area, already classified as unsuitable.

**Table 3 - 79. Silvicultural activities by alternative for the first decade (average annual acres).**

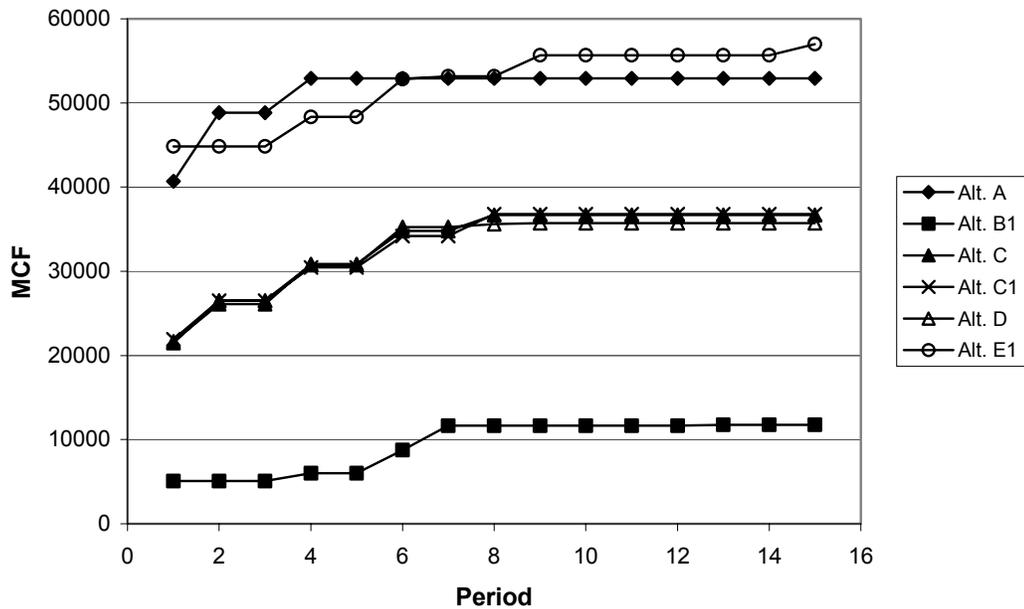
Alternative	Silvicultural Activity						
	Shelterwood with ~15 BA reserves	Thinning to ~60-80 BA residual	Wooded Grassland Restoration ~15 BA residual	Woodland Restoration ~40 BA residual	Uneven- aged Selection (Riparian forest)	Pine Restoration (Site Prep & Release)	Natural Regen. (Site Prep)
<b>A</b>	3,000	1,500	0	0	0	2,083	2,917
<b>B-1</b>	296	183	72	323	164	436	264
<b>C</b>	1,428	900	77	567	164	822	1,406
<b>C-1</b>	1,428	900	77	567	164	822	1,406
<b>D</b>	1,428	900	77	567	164	822	1,406
<b>E-1</b>	3,225	2,399	72	323	164	436	3,200

**Table 3 - 80. Timber program quantity (MMCF) for first decade, by alternative and product.**

Product	Alt. A	Alt B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
Sawtimber - Softwood	3.7	0.5	2.0	2.0	1.9	4.0
Sawtimber - Hardwood	32.1	4.0	17.1	17.3	17.0	35.4
Small Roundwood - Sfld.	.6	0.1	.3	.3	.3	.7
Small Roundwood - Hdwd.	6.1	0.8	3.3	3.3	3.2	6.7
<b>Total</b>	<b>42.5</b>	<b>5.3</b>	<b>22.7</b>	<b>22.9</b>	<b>22.5</b>	<b>46.9</b>

**Table 3 - 81. Allowable Sale Quantity (MMCF) per decade by alternative.**

Alternative	Decade						
	1st	2nd	3rd	4th	5th	10th	15th
<b>A</b>	40.7	48.9	48.9	52.9	52.9	52.9	52.9
<b>B-1</b>	5.1	5.1	5.1	6.0	6.0	11.7	11.8
<b>C</b>	21.7	26.1	26.1	30.9	30.9	36.7	36.7
<b>C-1</b>	21.9	26.5	26.5	30.5	30.5	36.8	36.8
<b>D</b>	21.5	26.5	26.5	30.7	30.7	35.7	35.7
<b>E-1</b>	44.9	44.9	44.9	48.4	48.4	55.7	57.0



**Figure 3 - 45. Allowable Sale Quantity Per Decade (Period).**

## Environmental Effects

This section describes the factors within each alternative that would affect the Forest's output of timber products. As a result of management for various objectives, the Forest would produce industrial roundwood for delivery to mills that produce rough and dimension lumber, pallet wood, veneer, posts, poles, oriented strand board, bark mulch, and other timber products. Such timber products are an important economic resource within the human environment.

The following indicators measured the effects of the alternatives on timber production:

- Area of timberland available for timber production (suitable timberland)
- Area and types of treatment planned
- Allowable sale quantity (ASQ) of timber that could be produced on suitable timberland
- Program quantity/decade of timber that is estimated to be produced on all forestland
- Relative changes from existing trend in quality (value) of timber.

### EFFECTS COMMON TO ALL ALTERNATIVES

#### DIRECT AND INDIRECT EFFECTS

##### Economic Factors - All Alternatives

Regardless of the reason for the timber harvest, all alternatives would attempt to produce timber at regular intervals. In general, timber sales would be offered regardless of market conditions to maintain desired conditions on a regular basis. Additionally, supply from the DBNF is somewhat "inelastic." Holding back prepared sales for months or years waiting for better prices is impractical. This focus on production could be seen as depressing market prices to the disadvantage of the Forest's timber supply competitors (private timberland owners in the Forest's economic zone). Conversely, any local mills that might be operating at margin could benefit from timber sales offered on a regular basis. However, demand within the Forest's entire market area should not be significantly affected by any alternative since the DBNF timber program has minimal influence on overall market prices (USDA Forest Service 1996).

Revenue from timber sales is affected by several factors that influence bidding on timber sale contracts. Such factors include the type of harvest methods required in the contract, the quality and quantity of various types of timber products offered for sale, varying land characteristics where the harvest takes place, and the non-traditional Forest Service contract requirements that are seldom imposed on private lands. Costs of reforestation vary based on ground conditions and the reforestation methods prescribed.

Thinning (commercial, non-commercial, and/or pre-commercial) is planned in all alternatives. Although revenues from commercial thinning rarely exceed costs, the long-term benefits of increased stand vigor and resulting resistance to insect and disease outbreaks is often justified. Long-term timber value is increased as the risk of stand collapse is reduced and growth is concentrated on higher value trees. Generally, when thinning occurs, once habitat needs are met, trees are selected for cutting for the purpose of increasing stand diversity, capturing future mortality, and improving overall vigor and quality of timber within the residual stand.

Economic impacts of the timber program are presented in the socio-economic section of this chapter. The Forest Service is required to stay within an annual budget for each program. Cost efficiency is considered in program management and project implementation. Otherwise, no economic goals have been established for the timber program, since the program is considered a tool to achieve desired conditions in all alternatives considered in detail. An alternative that emphasized only economics (Alternative E) was eliminated from detailed study (see Chapter 2).

### **Effect of the Long Term Sustained Yield Goal – All Alternatives**

One of the Forest's mandates, regardless of alternative, is to provide renewable products on a sustainable basis, when such provision is compatible with desired future conditions (Table 3 - 81). A sustained flow of wood (at any desired level) requires a forest where growth equals or exceeds mortality plus removals. Timely and adequate regeneration of stands of trees is a factor in timber growth.

For each alternative, an allowable sale quantity (ASQ) has been estimated through the use of the Spectrum model through 15 decades (Appendix B). The model has built-in constraints that ensure a non-declining even flow and that ensure harvest levels will not exceed the long-term sustained yield. Therefore, all alternatives should leave at least as much standing timber after 10 years as exists today. A sustained yield would also be tracked through the use of continuous Forest Inventory and Analysis (FIA) plot data. This estimate would be monitored through time regardless of alternative.

To help meet desired future conditions in all alternatives, timber could occasionally be harvested from lands classified as unsuitable, including locations such as the Geological Area or portions of the Wild and Scenic River corridors. Such volume would not be counted in the allowable sale quantity (ASQ) estimate because a scheduled harvest cannot be planned for these areas. The total timber program quantity, which includes the ASQ plus the amount harvested from lands unsuitable for timber production, is not expected to be more than 10 percent above the ASQ figures shown in Table 3 - 81 for any alternative.

### **Effect of Esthetic Considerations – All Alternatives**

Occasionally, timber harvest operations would need to be modified when such activities occur near high-use or visually sensitive areas not specifically allocated to a prescription area. Such areas might include certain road corridors, trail corridors, or viewsheds identified in the Scenery Management System. Such modifications could influence location of temporary access roads, increased number of leave trees, special design of harvest edge, and/or treatment of slash. Although a few projects could be highly affected, such modifications would have an overall insignificant negative effect on timber production in all alternatives Forestwide. Most visually sensitive areas are found in prescription areas with low levels of vegetation management.

### **Effect of Prescribed Burning – All Alternatives**

Under any alternatives, regeneration areas may be burned during site preparation. Since site-preparation burning has a higher intensity (hotter) than understory burning. The trees remaining in these areas as seed trees or shelterwood would be expected to succumb or receive varying amounts of fire damage. Depending on adjacent fuels, many could over time develop basal cavities decreasing tree and log grades. However, with careful preparation of fuels prior to burning, this

effect can be minimized (Brose 1999). Even if some damage occurs, the positive effects of site preparation would outweigh any loss of quality in the residuals.

Prescribed understory burning would occur under all alternatives. Where this activity occurs in older stands of oak, there would be little impact on quality of timber in the existing stand. In such stands, fire often favors advanced oak regeneration. In younger, pole-sized timber stands containing a mixture of oak and other hardwoods, a species-selective thinning effect often occurs. Trees with thicker bark and higher value such as oak are favored over thin bark, lower value trees such as red maple and beech (Abrams 2000). In seedling/sapling stands, tree species that sprout and have well-developed root systems such as oak, are favored over other lower value hardwoods, where fire has occurred (Van Lear 2000). Natural pine regeneration often occurs where fire has reduced duff and a seed source is present.

Although prescribed understory burning would typically be low in intensity, small pockets of higher intensity fire could occasionally occur and cause scars on the lower bole of trees, especially where fuels accumulate on the uphill sides. Such fire scars may not always callous over or compartmentalize effectively and can be entry points for rot-causing fungi and other disease. The small fire-damaged pockets would typically develop more live and/or dead trees containing cavities and associated rot. Such effects are common where wildland fire occurs in uncontrolled conditions. However, when within prescribed conditions, such pockets would normally not occur or make up only a small amount of area.

Therefore, under all alternatives, where burning is applied under prescribed conditions, the overall long-term effect would be increased timber quality.

## CUMULATIVE EFFECTS

### **External Economic Factors - All Alternatives**

Market activities outside of the National Forest System lands can affect the quantity of timber products sold and removed from the DBNF. When markets have an ample supply, purchasers may be unable to meet the minimum required bid, resulting in “no-bid” sales.

### **Effect of Land Use Change – All Alternatives**

Between 1974 and 1987 forested land in the three eastern Kentucky Forest Inventory units that contain the DBNF decreased by 0.6 percent (USDA Forest Service 1978, Alerich 1990). Although no more-recent forest survey data are available, this trend will likely continue or level off. Although not yet a significant factor in eastern Kentucky, the Southern Forest Resource Assessment (USDA Forest Service 2002b) has concluded that during the next 20 years in the South, “Urbanization will continue to consume forest land and agricultural land, while rising timber prices will push some agricultural land toward forest uses.” As human population increases in the urban centers within the region and farmlands are developed for urban and suburban uses, people are expected to continue to move from rural into suburban and urban settings. Increasingly, urban users are expecting the National Forest to supply a greater amount of non-timber values, relative to traditional timber values. As a result, lands classified as being suitable for regulated timber harvest are expected over time to take up a smaller proportion of DBNF lands regardless of alternative. Thus, timber production from the Forest would be expected to decline as a result of this trend.

### **Effect of Special Uses and Mineral Use – All Alternatives**

Some land clearing for non-forest uses may occur on the DBNF as a result of special use authorizations to private interests for utility, road right-of-way access, or mineral extraction projects (see Lands and Special Uses section). Other lands may be cleared as a result of new federal or state highways, utility corridors, or reservoirs. Since these activities occur on a site-specific, request and approval basis, they are not decisions based on the results of this assessment. However, the clearing of land would have a small cumulative negative effect on long-term timber production, generally regardless of alternative. When such activity occurs, a small amount of federal timber would be harvested and sold as the land is converted to non-forest use.

## **ALTERNATIVE A**

### **DIRECT AND INDIRECT EFFECTS**

#### **Effect of Timberland Suitability Classification**

Allocation of tentatively suitable timberland is among the decisions made in the forest planning process. For this alternative, the timberland that is tentatively suitable for timber production from Table 3 - 76 was further classified by subtracting forestland where scheduled timber production would be “not appropriate.” The remaining lands would be suitable for scheduled timber production as shown in Table 3 - 78.

With this alternative, several areas of the Forest would be managed for a minimum level of timber products, although still classified as suitable for timber production. A decision was previously made within Plan Amendment No. 11 (USDA Forest Service 2000, ROD) to apply management direction to a zone along clifflines (including significant bat cave buffer zones), which includes restrictions on timber harvest. Lands being considered for classification as Wild and Scenic Rivers and most riparian areas that are often difficult to access would also continue to be classified as suitable. Harvests would continue to be concentrated in areas outside of these restricted areas, although the amount of harvest area would be based on the total suitable acres.

Of tentatively suitable timberland, 92 percent (578,105 acres) would be allocated as suitable for timber production. Eight percent (47,236 acres) of tentatively suitable timberland would be allocated as not appropriate, or cleared for grassy openings (Table 3 - 78). Much of this area (15,265 acres) would be unsuitable due to economic constraints. In the absence of major disturbance, the unsuitable area would continue to increase in value until maturity at an approximate age of 100-150 years and then begin to develop old-growth characteristics. Such characteristics would include a greater proportion of rotten and/or sound culls and increased tree mortality, resulting in lower timber value per acre.

#### **Effect of Ecosystem Management**

In a two-aged stand, stand age is currently recorded as the age of the youngest cohort. With two-aged rotation of 80/160 years, approximately 12 percent of suitable timberland would be in age-class 0-10 each decade. When a more even age-class distribution is achieved after approximately two decades, much of the forest cover on suitable timberland would consist of immature trees, based on

culmination of mean annual increment of stand volume. This growth would occur even though two-aged stands would contain both immature and mature trees.

Thinning could take place to meet “fully stocked” stocking levels in support of a high level of timber growth. In 1988 the Forest Inventory and Analysis survey estimated that 40 percent of DBNF timberland was overstocked (USDA Forest Service 1988). However, this estimate must be verified on a site-specific basis. Furthermore, very little thinning was accomplished in the past decade since purchasers have had little interest in the small, low-value timber offered in such sales. If not accomplished commercially, non-commercial thinning would not likely occur in this alternative.

**Harvest Acreage:** Pine restoration in a short period would be a priority since management for red-cockaded woodpecker habitat would continue to be a major goal under this alternative. This alternative includes rotation lengths between 70 and 100 years to eventually create a balanced age-class distribution within each forest type grouping. Harvest of areas to create woodland, wooded grassland, and unique riparian habitats would not occur in this alternative. During the first decade, this alternative would include a thinning objective of 15,000 acres, a final harvest of approximately 30,000 acres and regeneration of about 50,000 acres, including restoration of pine stands as shown in Table 3 - 79.

**Harvest Volume:** Based on new yield tables developed for this analysis, Alternative A would support the development of a somewhat less than optimum yield of high quality timber, since rotation length appears to have been set shorter than optimum for the 1985 Plan. However, with shorter rotations, risk of loss from insects and disease could be less than for longer rotations. In this alternative, the development and maintenance of various desired wildlife and plant habitat conditions would often result in some volume being removed and some residual live timber left standing for various reasons. This residual volume would reduce the amount of timber potentially available for harvest from each sale unit. The intensity and amount of vegetation management in Alternative A would result in an estimated 42.5 million cubic feet of timber produced from the Forest during the first decade, of which 40.7 would be from suitable timberland as shown in Table 3 - 80 and Table 3 - 81.

### **Effect of Prescribed Burning**

In this alternative during the first decade, prescribed site-preparation burning would be concentrated in 20,830 acres in pine regeneration areas.

An average of 12,917 acres of prescribed understory burning per year would occur in upland hardwood and hardwood-pine stands for fuel reduction and control of understory composition. At this level, a continued reduction in oak and pine regeneration would be expected.

## **CUMULATIVE EFFECTS**

There would be no additional cumulative effects beyond those previously described as common to all alternatives.

**ALTERNATIVE B-1****DIRECT AND INDIRECT EFFECTS****Effect of Timberland Suitability Classification**

Allocation of tentatively suitable timberland is among the decisions made in the forest planning process. For this alternative, timberland tentatively suitable for production was further classified by subtracting forestland where scheduled timber production would be “not appropriate.” (Table 3 - 76) The remaining lands would be suitable for scheduled timber production. (Table 3 - 78)

Of tentatively suitable timberland, 11 percent (70,000 acres) would be allocated as suitable for timber production. Eighty-nine percent (555,341) of tentatively suitable timberland would be allocated as not appropriate. Most of this would be unsuitable due as a result of allocation of the 1.M Custodial Prescription Area. In the absence of major disturbance, this unsuitable timberland would continue to increase in value until maturity at an approximate age of 100-150 years and then begin to develop old-growth characteristics. Such characteristics would include a greater proportion of rotten and/or sound culls and increased tree mortality, resulting in lower timber value/acre.

**Effects of Ecosystem Management**

Regular timber harvest under this alternative would occur only to support minimum habitat needs for species viability, safety public, or legal requirements. Such harvesting would include that needed to create a minimum amount of woodland, wooded grassland/shrubland, grassy openings, thinned forest, and some riparian habitats. The amount and type of habitats that would be created and maintained through the first decade under this alternative are displayed in (Table 3 - 79).

**Harvest Acreage:** Implementation of this alternative would result in approximately one percent of the forest in regeneration each decade. Alternative B-1 prescribes a first decade thinning of 1830 acres and a final harvest of approximately 2,960 acres and regeneration of about 7,000 acres on suitable timberland, including restoration of some pine stands. Yellow pine-dominated stands would be regenerated on 4,363 acres to create a minimum of habitat for species requiring this condition.

**Harvest Volume:** A relatively low level of timber would be produced as compared to the average level during the previous planning period. The intensity and amount of vegetation management in Alternative B-1 would result in an estimated 5.3 million cubic feet of timber produced from the Forest during the first decade, of which 5.1 would be from suitable timberland as shown in Table 3 - 80 and Table 3 - 81.

**Effect of Prescribed Burning**

In this Alternative during the first decade, prescribed site-preparation burning would be concentrated on 4,360 acres in pine regeneration areas as shown in Table 3 - 79.

An average of 1,546 acres of prescribed understory burning per year would occur in upland hardwood and hardwood-pine stands for fuel reduction and control of understory composition. At this level, a continued reduction in oak and pine regeneration would be expected. The loss of the oak component would reduce the long-term value of timber Forestwide. Lack of prescribed burning

could lead to fuel buildup that would allow the forest to be more heavily damaged by wildland fire (e.g., due to arson), negatively affecting timber quality.

### **CUMULATIVE EFFECTS**

There would be no additional cumulative effects beyond those previously described as common to all alternatives.

### **ALTERNATIVE C, C-1, D**

#### **DIRECT AND INDIRECT EFFECTS**

Since these alternatives prescribe only minor variations in intensities of vegetation management and outputs, they have been grouped together.

#### **Effect of Timberland Suitability Classification**

Allocation of tentatively suitable timberland is among the decisions made in the forest planning process. For this alternative, timberland tentatively suitable for production was further classified by subtracting forestland where scheduled timber production would be “not appropriate.” (Table 3 - 76) Remaining lands would be suitable for scheduled timber production. (Table 3 - 78)

Of tentatively suitable timberland, 59 percent (367,805 acres) would be allocated as suitable for timber production. Forty-one percent (257,258 acres) of tentatively suitable timberland would be allocated as not appropriate, although a small timber sale could occur infrequently in this area for public safety or legal reasons. Most of this area consists of the Riparian Corridor and the Cliffline Community prescription areas. In the absence of major natural disturbance, this area would continue to increase in value until maturing at approximately 100-150 years of age and then begin to develop old-growth characteristics. Such characteristics would include a greater proportion of rotten and/or sound culls and increased tree mortality, resulting in lower timber value per acre. Some of the tentatively suitable timberland could be cleared for permanent grassy openings (278 acres).

#### **Effect of Ecosystem Management**

Implementation of Alternatives C, C-1, or D would put approximately five percent of the Habitat Diversity Prescription Area in regeneration each decade. All three alternatives would prescribe desired conditions that would eventually result in suitable timberland having a balanced range of age-classes, with approximately one-half beyond maturity (beyond culmination of mean annual growth increment).

The expected use of a two-aged silvicultural system (average 200/400 year rotation) in these alternatives would allow much of the currently 90-year-old forest to continue to age. Those stands, with a high percentage of red oak, could experience elevated mortality beyond age 100 if oak decline or two-lined chestnut borer becomes prevalent. However, harvest would be expected to be concentrated in such areas, and many of these stands could convert to woodland or wooded grassland. Other forest community types would increase in size and, therefore value, until they

reached age 150. Beyond 150 years, quality could begin to decline from the combined effects of insect, disease, and weather damage.

Thinning could take place for two purposes: to meet a viability objective and to meet a stocking level objective in support of forest health. One forest health objective is to prepare the forest for the gypsy moth invasion by taking stands to a stocking level of less than 80 percent (Gottschalk 1993). Achieving this stocking level would generally increase stand vigor, but the amount of thinning needed to accomplish this objective is uncertain. In 1988 the Forest Inventory and Analysis survey estimated that 40 percent of DBNF timberland was overstocked (USDA Forest Service 1988). However, this estimate must be verified on a site-specific basis. Furthermore, very little thinning was accomplished over the past decade since purchasers have had little interest in the small, low-value timber offered in such sales. If not accomplished commercially, the Forest Service would have to bear the cost of thinning. For purposes of the timber analysis, only the viability thinning was considered since it is the most likely to occur.

**Harvest Acreage:** These alternatives would prescribe a first decade harvest of approximately 14,280 acres and regenerate about 22,280 acres, including restoration of some of the pine stands decimated by the bark beetle. During the decade, various mixtures of yellow-pine and hardwood would be regenerated on 8,220 acres to create a suitable habitat for a range of plant and animal species. Harvest of areas to create woodland, wooded grassland, and other special riparian habitats would also be done at levels needed to maintain optimum levels of certain species. The amount and type of habitats created and maintained through the first decade is displayed in Table 3 - 79.

**Harvest Volume:** The intensity and amount of vegetation management in these alternatives would result in an estimated average of 22.7 million cubic feet (MMCF) of timber produced from the Forest during the first decade, of which 21.7 MMCF would be from suitable timberland. The Spectrum model estimated that volume under Alternative C-1 could be 0.2 MMCF higher over the decade, while Alternative D could be 0.2 MMCF lower (less than 1 percent) as shown in Table 3 - 80 and Table 3 - 81.

### **Effect of Prescribed Burning**

In this alternative during the first decade, prescribed site-preparation burning would be concentrated in 8,220 acres in pine regeneration areas Table 3 - 79.

An average of 32,500 acres of prescribed understory burning per year would occur in upland hardwood and hardwood-pine stands for fuel reduction and control of understory composition. At this level, natural oak regeneration should improve.

## **CUMULATIVE EFFECTS**

There would be no additional cumulative effects beyond those previously described as common to all alternatives.

**ALTERNATIVE E-1****DIRECT AND INDIRECT EFFECTS****Effect of Timberland Suitability Classification**

Allocation of tentatively suitable timberland is among the decisions made in the forest planning process. For this alternative, timberland tentatively suitable for production was further classified by subtracting forestland where scheduled timber production would be “not appropriate.” (Table 3 - 76) Remaining lands would be suitable for scheduled timber production. (Table 3 - 78)

Of tentatively suitable timberland, 63 percent (395,416 acres) would be allocated as suitable for timber production. A small portion of this would be former grassy openings that are reforested (1,022 acres). Thirty-seven percent (230,947 acres) of tentatively suitable timberland would be allocated as not appropriate, although a small timber sale could occur infrequently in this area for public safety or legal reasons. Most of the unsuitable area consists of the Riparian Corridor and the Cliffline Community prescription areas. In the absence of major disturbance, the unsuitable area would continue to increase in value until maturing at approximately 100-150 years of age and then begin to develop old-growth characteristics. Such characteristics would include a greater proportion of rotten and/or sound culls and increased tree mortality, resulting in lower timber value per acre.

**Effect of Ecosystem Management**

In a two-aged stand, stand age is currently recorded as the age of the youngest cohort. With two-aged rotation of 100/200 years, approximately 10 percent of the 4.A Timber Production Emphasis Prescription Area would be in age-class 0-10 each decade. When a better age-class distribution is achieved after approximately two decades, much of the forest cover on suitable timberland would consist of immature trees, based on culmination of mean annual increment of stand volume. This growth would occur even though two-aged stands would contain both immature and mature trees.

Thinning could take place for two purposes: to meet a viability objective and to meet a stocking level objective in support of forest health. One forest health objective is to prepare the forest for the gypsy moth invasion by taking stands to a stocking level of less than 80 percent (Gottschalk 1993). Achieving this stocking level would generally increase stand vigor, but the amount of thinning needed to accomplish this objective is uncertain. In 1988 the Forest Inventory and Analysis survey estimated that 40 percent of DBNF timberland was overstocked (USDA Forest Service 1988). However, this estimate must be verified on a site-specific basis. Furthermore, very little thinning was accomplished in the past decade since purchasers have had little interest in the small, low-value timber offered in such sales. If not accomplished commercially, the Forest Service would have to bear the cost of thinning. For purposes of the timber analysis, only the viability thinning was considered since it is the most likely to occur.

**Harvest Acreage:** Alternative E-1 would prescribe a first decade harvest of approximately 32,250 acres and regenerate about 36,360 acres, including restoration of pine stands. (Table 3 - 79)

In addition to the primary management objective for timber production, some vegetation management would occur to maintain specific habitat conditions that provide at least minimum viability for certain species. Stands with at least a 50 percent yellow-pine component would be

regenerated on 4,363 acres to create at least minimum habitat for certain species. Timber harvest to create woodland, wooded grassland, and other special riparian habitat types would also be done at levels required to maintain minimum populations of certain species. The amount and type of habitats created and maintained through the first decade by this alternative are listed in Table 3 - 79.

**Harvest Volume:** Rotations would be based on eventually optimizing yield by concentrating harvests around the time when stand growth would reach the culmination of mean annual increment. An increase in value should occur as a result of more volume moving into higher-grade material due to increased size of existing trees. In this alternative, growth would exceed mortality and removals for the first few decades. However in the long-term, growth would equal mortality and removals. Development of the desired balanced age-class distribution would eventually increase the amount of timber available for harvest and increase the average volume production per acre over averages that occurred during the past decade.

As a result of implementation of this alternative, a relatively similar level of timber would be produced as compared to averages during the past decade. The intensity and amount of vegetation management in Alternative E-1 would result in an estimated 46.9 million cubic feet of timber produced from the Forest during the first decade, of which 44.9 would be from suitable timberland as shown in Table 3 - 80 and Table 3 - 81.

### **Effect of Prescribed Burning**

In this alternative during the first decade, prescribed site-preparation burning would be concentrated in 4,363 acres in pine regeneration areas, as shown in Table 3 - 79.

An average of 1,546 acres of prescribed understory burning per year would occur in upland hardwood and hardwood-pine stands for fuel reduction, and control of understory composition. At this level, a continued reduction in oak and pine regeneration is expected. Lack of prescribed burning could lead to fuel buildup that would allow the forest to be more heavily damaged by wildland fire (e.g., due to arson), negatively affecting timber quality.

## **CUMULATIVE EFFECTS**

There would be no additional cumulative effects beyond those previously described as common to all alternatives.

## HERITAGE RESOURCES

### Affected Environment

The DBNF's Heritage program is about people. It's about those who share a heritage experience while visiting the forest and about those who have left a record of our nation's rich cultural heritage over the millennia. The Forest Service strives to preserve America's historical and cultural foundations to ensure future generations a genuine opportunity to appreciate and experience our heritage. The Forest is exceedingly rich in these non-renewable resources that represent over 13,000 years of people interacting with their environment. The record of those who came before us is held in over 3,800 archaeological sites that have been documented on the DBNF with thousands more remaining to be recorded. These sites range from prehistoric camps and rock art to pioneer trails, Civil War battlefields, farmsteads, coal towns, and iron furnaces. Each one of these sites is a valuable part of the diverse mosaic that portrays the story of those who preceded us. An overview of DBNF heritage resources was prepared in 1982. Since the majority of known sites to exist have been recorded since the publication of that overview, a major update is needed.

The Forest's heritage resources are non-renewable and continue to grow in importance. They are increasingly threatened by development, public use, and vandalism. Much evidence of the past, such as artifacts and architecture, is extremely fragile and can be obliterated by relatively minor modifications of the ground surface. The damage is frequently subtle and inconspicuous and often can only be recognized by a professional or trained person. Increasing public use of the outdoors and intensified development of Forest managed lands increase the probability that heritage sites may be damaged or lost.

The primary mission of the Forest's Heritage Program is to administer the heritage resources in a spirit of stewardship for the inspiration and benefit of present and future generations. Therefore, the goals of the Heritage Program are basically threefold:

- 1) To locate the historic and prehistoric heritage resources within the Forest's boundaries,
- 2) To determine the eligibility of these resources for inclusion on the National Register of Historic Places (National Register),
- 3) To preserve and protect those resources.

Inventory is the first task required since it defines the database on which all other heritage management tasks depend. The level of inventory is primarily driven by other resource needs. By 2001, a total of 241,575 acres of the Forest had been inventoried resulting in the documentation of 3,840 heritage resource sites. Over the last 10 years, the DBNF has inventoried an average of 6,200 acres per year. Based on these figures, a complete inventory of the Forest will require approximately 75 years.

Also based on the current figures, the Forest likely contains over 11,000 heritage resource sites of which 4,500 will be considered eligible for listing on the National Register. The National Register helps record the story of our nation. It is a roster of important links to our past and a list of historic distinction that identifies properties worthy of preserving. The Forest Service is mandated to nominate historic properties (both historic and prehistoric) to the National Register. Of the 3,840 heritage resource sites that are currently documented on the DBNF, 1,549 are listed or considered potentially eligible for listing on National Register. The Forest currently evaluates an average of five

sites per year to determine whether their qualities or character qualify them as eligible for inclusion on the National Register. If this trend continues, the Forest will need approximately 900 years to evaluate all properties for National Register eligibility.

The Forest is also required to establish and maintain government-to-government relations with federally recognized tribes having an interest in the Forest's land base and resources, in accordance with the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments (1994). The DBNF must also consult with federally recognized Native American tribes having geographic or cultural ties to National Forest System land on proposed actions that may affect sites or areas of special significance to those tribes. Such consultations are required by the Archaeological Resources Protection Act, American Indian Religious Freedom Act, National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act as well as the Presidential Memorandum on Government-to-Government Relations.

Heritage resources are recognized as fragile and irreplaceable with potential public, scientific and religious uses, representing an important and integral part of our nation's heritage. The affected environment are those heritage resources that meet the criteria of eligibility for listing on the National Register of Historic Places, Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on heritage resources that are listed in or eligible for inclusion in the National Register. "Undertaking" is a term with legal definition and application (see 36 CFR 800.2) that includes any activities or programs which could have an effect on heritage properties, known or not, federal or not. An effect, whether it is beneficial or adverse, is any change in the character that would qualify the resource for the National Register. An undertaking has an adverse effect on a heritage property under conditions that include but are not limited to:

- 1) Destruction or alteration of all or part of a property
- 2) Isolation from or alteration of its surrounding environment
- 3) Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting
- 4) Transfer or sale of a Federally owned property without adequate conditions or restriction regarding preservation, maintenance or use
- 5) Neglect of a property resulting in its deterioration or restriction.

Decisions regarding planned management undertakings on the DBNF are preceded by heritage resource inventories of the proposed area of potential effect and consultation with the State Historic Preservation Officer (SHPO), as directed by Section 106 of the National Historic Preservation Act. In consultation with the SHPO, the Forest must consider the full range of impacts, both those that will be direct results and those that could be indirect consequences of the action. The results of the inventories are used to develop measures to safeguard those heritage resources listed on or eligible for listing on the National Register. Direct effects could result from both natural and human-caused events such as:

- 1) Soil disturbance to varying depths
- 2) Soil compaction or rutting
- 3) Changes in soil chemical composition
- 4) Inundation
- 5) Introduction of intrusive elements (non-compatible visual or auditory components)
- 6) Neglect
- 7) Diminished jurisdiction, as in the case of a land exchange.

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## **Environmental Effects**

### **EFFECTS COMMON TO ALL ALTERNATIVES**

#### **DIRECT AND INDIRECT EFFECTS**

Decisions about planned management undertakings on the Daniel Boone National Forest are preceded by heritage resource inventories of the proposed area of potential effect, and consultation with the State Historic Preservation Officer (SHPO) as directed by Section 106 of the National Historic Preservation Act. Regardless of alternative chosen, all projects implemented under the 2004 Forest Plan will be designed to avoid adversely affecting significant heritage resources.

Impacts on heritage resources would be similar in all alternatives as well as the impacts of cultural resource management on other resources. The difference will be the probability rate of occurrence, which is based on the amount of ground-disturbing activity that is carried out in each alternative and the number of people visiting the Forest. Road construction, utility rights-of-way construction, and fire suppression may adversely affect cultural and historical sites. Fire could expose cultural sites, which may indirectly increase vandalism of sites or may destroy historical sites. Discovery of a significant cultural resource site may delay or cancel road construction, utility rights-of-way construction, vegetation management, or land exchanges.

#### **Effects of Vegetation Management**

Vegetation management may result in beneficial as well as adverse effects to heritage resources. Adverse effects may result from undertakings such as the harvest or manipulation of timber. Unknown resources can be disturbed by heavy machinery and vehicles crossing a site, where logs are skidded across a site, when erosion is caused by removal or disruption of the vegetation cover, or due to increased soil exposure. Heritage resources may benefit from vegetation management as well. For example, protective management for the white haired goldenrod will complement the protection of heritage resources located in rockshelter settings.

#### **Effects of Wildlife Management**

Wildlife management activities may cause adverse effects to heritage resources. Direct effects may result from undertakings such as wildlife pond construction that can destroy unknown sites. Soil disturbance of grassy openings can directly affect heritage resources by damaging or breaking artifacts. Increased surface visibility may result in the unauthorized collection of surface artifacts or the excavation of subsurface material. Access corridors necessary to maintain grassy openings or to construct water sources and vernal pools may encourage site vandalism or looting due to the increased availability of easy access.

**Effects of Minerals Management**

Both minerals exploration and subsequent extraction can affect heritage sites. Exploring for minerals such as oil and gas may produce impacts within the area of a drill pad or within a transportation corridor to access the drill site. Although the impact zone is localized, the amount of ground disturbance is severe. Extraction of oil and gas would involve connecting pipeline rights-of-way and access roads over an extended area of the Forest that could impact heritage sites. While the extraction of coal is by deep mining methods, there is still the potential for heritage sites to be impacted by surface subsidence.

**Effects of Transportation Management**

Road construction may totally impact unknown heritage resources. Disturbance within a construction corridor may remove all soil containing cultural deposits. An indirect effect of road construction is the increased accessibility to remote areas that can lead to site looting. Site looting has been directly connected to increased accessibility. Although the majority of direct effects to heritage sites occur during the initial construction of a road, maintenance or reconstruction of an existing road may also impact heritage when drainage ditches are cleaned or modified or when roads are widened or straightened. Heritage sites situated on ridgetops appear to be the most vulnerable to impacts from road construction. For example, 27 of the sites documented in fiscal year 1995 had been adversely affected by road construction activities (Ison 1995).

**Effects of Land Management**

Exchange of federal land containing heritage resources to a non-federal agency or private ownership would be considered an adverse effect. This is because protection under federal law would no longer apply to the heritage resources contained within the exchange. However, the acquisition of land containing heritage resources by the Forest through exchange or purchase would be beneficial since the resource would be protected under federal law.

**Effects of Fire Management**

High-temperature wildland fire could damage surface or shallow archaeological site, standing structures, cemetery markers or rock art sites. Sites of the historic period are most subject to damage because many of these properties contain flammable artifacts such as wooden structures located at or near the surface. Other types of artifacts can also be damaged by hot fires. Glass artifacts can be melted and ceramics can be "crazed" or "pot-lidded." The construction of firelines, especially dozer-constructed firelines could severely impact or destroy heritage sites. Mop-up operations could also impact heritage sites. Erosion from water hoses or earth disturbances such as the digging out of burning roots or stumps can damage or destroy archaeological deposits contained in the soil. Under normal conditions heritage surveys do not precede emergency fire line construction or mop-up activities, thus there is high potential for damage to unknown properties. Prescribed fire could also damage heritage sites in the same manner.

Effects may include erosion loss due to burned vegetation cover or further deterioration of artifacts following damage by high temperatures.

### **Effects of Recreation Management**

Recreational activities may affect heritage resources in various ways. Some trails lead to or pass by archaeological sites. Archaeological sites are extremely vulnerable to damage from the increased number of visitors to the forest. Adverse effects can result from the uncontrolled movement of people across the archaeological deposits. Types of damage range from soil erosion and subsequent damage or loss of buried artifacts and features to artifact breakage and displacement as a result of trampling. The use of trails may negatively impact heritage sites by increasing visitor traffic to sensitive areas. Off-highway vehicle or horse traffic may increase erosion where trails pass through heritage sites. Backcountry camping can contaminate archaeological deposits with modern materials and charcoal severely limiting their scientific potential. Displacing artifacts from their context by clearing campgrounds can diminish the integrity of heritage sites. Activities associated with rock climbing can impact heritage resources in various ways. The primary impacts of this activity are from foot traffic that result in erosion and compaction on deposits within rockshelter sites. The use of chalk can cause a visual problem for other visitors to heritage sites located in rockshelters. In general, impacts from recreation and public use result from increasing human access to an area. The steadily increasing demand for outdoor recreation has resulted in increased impacts to heritage resources. For example, a recent sample survey within the Red River Gorge revealed that 62 percent of the archaeological sites visited had recognizable impacts and 84 percent of the prehistoric cultural components considered eligible or potentially eligible for listing on the National Register have been impacted.

Effects are often unnoticed by the casual observer but develop into greater problems. For example, user-developed trails lead visitors unknowingly to areas that may contain sensitive resources and the increased access could increase the threat for archaeological site damage. Studies have shown a link between ease of access and the occurrence of site looting. Site looting is considered the greatest threat to the archaeological resources located on the Forest. In 1996, 25 archaeological sites, including 5 listed on the National Register were revisited to assess their condition. Nearly one-fourth of all the sites including three of the 5 sites listed on the National Register had suffered additional damage from looting. Six of the 25 sites that were revisited showed an additional loss of between 5 and 30 percent of the remaining intact cultural deposits from continued looting.

### **CUMULATIVE EFFECTS**

Requests from private parties and governments for the use of the National Forest System lands may accelerate the number of inventoried acres for each alternative. The number and type of requests are not likely to change between alternatives.

The rate of site destruction on private land within the proclamation boundary may determine the significance level of sites within National Forest System lands.

**ALTERNATIVE A****DIRECT AND INDIRECT EFFECTS**

Because the management activities that may affect heritage resources would remain at the current levels, the effects to known heritage resources would also remain the same. The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment, and mitigation measures would be implemented prior to management action. However, protection measures for known sites would remain inadequate. A full inventory of the Forest would be completed in approximately 75 years.

**CUMULATIVE EFFECTS**

None beyond those previously described.

**ALTERNATIVE B-1****DIRECT AND INDIRECT EFFECTS**

The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment, and mitigation measures would be implemented prior to management action. The inventory of the Forest for heritage resources would take much longer under this alternative because the majority of inventories would be conducted in conjunction with other projects. A full inventory would not be accomplished for approximately 370 years. Protection measures would remain the same.

**ALTERNATIVE C****DIRECT AND INDIRECT EFFECTS**

The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment, and mitigation measures would be implemented prior to management action. A full inventory would not be accomplished for approximately 73 years.

**CUMULATIVE EFFECTS**

None beyond those previously described.

**ALTERNATIVE C-1****DIRECT AND INDIRECT EFFECTS**

The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment and mitigation measures are implemented prior to management action. However, the emphasis on recreational opportunities may create special problems resulting from more people visiting the Forest. A full inventory would not be accomplished for approximately 73 years.

**CUMULATIVE EFFECTS**

None beyond those previously described.

**ALTERNATIVE D****DIRECT AND INDIRECT EFFECTS**

The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment and mitigation measures are implemented prior to management action. However, this alternative would pose a risk to both known and unknown heritage resources as a result of the increased numbers of people visiting the Forest. A full inventory would not be accomplished for approximately 73 years.

**CUMULATIVE EFFECTS**

None beyond those previously described.

**ALTERNATIVE E-1****DIRECT AND INDIRECT EFFECTS**

The degree of effects by undertaking projects to known heritage resources should remain slight because inventory, assessment, and mitigation measures would be implemented prior to management action. A full inventory would not be accomplished for approximately 89 years.

**CUMULATIVE EFFECTS**

None beyond those previously described.

## **PRESCRIBED FIRE**

### **Affected Environment**

Daniel Boone National Forest has an active prescribed fire program, albeit small compared to the total acreage of the forest. A prescribed fire is “any fire ignited for management actions to meet specific objectives” (USDI and USDA Forest Service 1998). More specifically, it is the “controlled application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions that allows the fire to be confined to a predetermined area, and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives” (NWCG IOSWT 1996). The forest conducts burns to meet several objectives including ecosystem management. Much of the burning in the 1990s had been to restore particular fire-adapted habitats. Fire adapted communities include fire-mediated and fire-influenced communities. Fire-mediated communities are adapted to promote fire, but within community specific limits controlled in part by the nature of the vegetation within these communities and the physical position on the landscape they occupy. Fire drives both compositional and structure conditions within the community. Fire-influenced communities are adapted to limit the frequency and intensity of fires due the nature of vegetation and physical position on the landscape among other factors, but fire still occurs within them. Fire seldom if ever drives compositional and structural change in fire-influenced communities. Prescribed burning in these latter communities is often incidental to prescribed burning in fire-mediated communities.

Most of the prescribed burning conducted to date was to restore the fire-mediated, open, southern yellow pine forests and woodlands habitat for the now-extirpated red-cockaded woodpecker. In doing so, natural pine regeneration increased along with cover of native grass and herbaceous species, which had been effectively shaded out by a dense hardwood midstory following a history of fire exclusion. Prescribed fire has also been used to manage grassy openings, areas planted in grasses and/or forbs to provide habitat for a variety of animal species. A third objective has been site preparation: to remove logging slash and/or to decrease woody competition for planted seedlings or natural regeneration. Fuel reduction burns have been used to reduce logging slash, snags, dead and downed fuel resulting from insect infestations, thick litter, and overall, a preponderance of woody fuels that could increase the intensity of a wildland fire, a fourth objective. Heavy fuel loading can make suppression efforts more difficult, costly and dangerous. The 1985 Plan estimated that up to 15,000 acres would be prescribed burned annually. However, from 1992 to 2001, accomplishments ranged from 587 to 12,929 acres. Often, more than one objective is targeted during a prescribed burn.

Although lightning strikes and subsequent fires are uncommon in eastern Kentucky (Barden and Woods 1974, Ruffner and Abrams 1998), many plant communities are adapted to frequent fire resulting from thousands of years of anthropogenic burning (Abrams 1992, Buckner 1983, Denevan 1992, Van Lear and Waldrop 1989). Fire-mediated communities make up about 69 percent of the Daniel Boone National Forest, where they tend to be found on south and west slopes as well as ridge tops, in topographic positions that promote fire spread. These communities include dry-mesic oak forest; dry and xeric oak; xeric southern yellow pine and yellow pine-oak; and dry and dry-mesic oak-yellow pine forests. Rare communities such as glades and canebrakes are also fire-dependent (Brantley and Platt 2001).

Some community types, such as those described above, are more prone to burn because of topographic position, vegetation type or community structure. However, in the right season and under the right weather conditions, most if not all of the forest could burn, including mesic communities. In fact, in 1880, ten fires burned across 556,000 acres of forest across the state (Sargent 1884 in Ison 2000). Fires spread across dry-xeric fire-mediated communities; they also spread across mixed mesophytic forests. These latter forests are considered a fire-influenced: fire occasionally occurs in this type but does not play a large role in influencing the vegetation.

The fire-mediated forests of the eastern United States exist in a variety of forms and conditions. The majority of these have oak-dominated canopies, but some share dominance with southern yellow pines or hickories, and some are southern yellow pine-dominated. Except for the most extremely xeric sites on DBNF, where physiology of the species and edaphic characteristics of the sites may combine to create a relatively stable system, the presence or absence of oak and yellow pine is tied to disturbance regimes involving, in particular, fire, drought, windstorms, clearing (with subsequent regrowth), grazing and chestnut blight, all of which may act alone or in tandem with each other or with site conditions (Abrams 1992, Biocca et al. 1993, Edgin and Ebinger 1997, Stephenson and Fortney 1998, Rhoades 1999, Abrams 2000). Of these, fire appears to be the most important (Abrams 1992, Abrams 2000). Where pollen and/or charcoal records are preserved in pond or lake strata or other sites (Stephenson and Adams 1989, Abrams 1992, Delcourt and Delcourt 1997, Delcourt and Delcourt 1998, Delcourt et al. 1998), there is a strong correlation between increased burning events and the presence of oak and southern yellow pines. The increased burning is strongly correlated with known shifts in Native American culture from hunting/gathering societies to farming societies. Except for the Gulf and southern Atlantic coastal plains, lightning-set fires are limited in the eastern United States and cannot account for the evidence of fire history in old forests (Martin 1989, Abrams 1992, Delcourt and Delcourt 1998). On the other hand, in some systems, e.g., barrens and savannas<sup>11</sup>, the absence of fire has actually increased oak at the expense of grassland or pine forest (Guyette and Cutter 1991, Abrams 1992, Robertson and Heikens 1994).

Across the eastern United States, including DBNF, oaks and yellow pines appear to be losing ground. Over most of the area between the Midwestern and coastal prairies and barrens/savannas, oak forests are reduced in abundance over historical levels. To the north, the non-native gypsy moth is behind the death or serious injury to a large expanse of oak forest due to defoliation induces oak decline. To the south oak wilt and possibly strains of chestnut blight also inflict damage on hardwoods. Also the south, particularly in Kentucky and Tennessee, the recent unprecedented outbreak of native southern pine beetle has decimated square miles of southern yellow pine trees. Underneath this aging and dying forest, oak seedlings may be found, but saplings are not common. Southern yellow pine seedlings are at least as rare. More often, species such as sugar maple, red maple, beech, hemlock and white pine are dominant in the seedling and sapling layers, or even dominant in the overstory (Anderson and Schwegman 1991, Abrams 1992, Farr and Tyndall 1992, Stephenson and Fortney 1998, Keller and Hix 1999, Van Lear et al 2000). Of these replacement species, red maple is the most widespread and opportunistic, and has greatly increased in importance in eastern forests over the last century (Abrams 1998). This species effectively competes with oak throughout the eastern United States, and may replace them (Abrams 2000).

There is little doubt that historical Native American fire-setting helped to shape the oak and yellow pine forests seen today in eastern North America, and that the use and disuse of fire by European

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<sup>11</sup> Comparable in this document to wooded grasslands/shrublands

settlers (for example, Robertson and Heikens 1994) and their descendants continued the process and continues to do so today. Overall, the presence of fire in eastern forests has been reduced dramatically since the 1930s (Van Lear et al. 2000). Oaks and southern yellow pines are known to be intolerant of shade, and do not grow well even under the shade of overstory trees of the same species. In the denser shade of the competing species listed above, all of which are tolerant of shade, they fair worse. There is a real concern that present-day upland forests will be replaced by forests of more mesic and shade tolerant species, altering the character of much wildlife and plant habitat. Land managers are now struggling to maintain oak and southern yellow pine forests on the landscape. Fire appears to be the critical element missing in most cases, and it is fire that managers wish to return to these areas, thereby restoring woodlands and wooded grasslands/shrublands, as well.

Stands can be classified according to how far removed from the historical fire regime they are, and how high the risk of losing key ecosystem components is (Schmidt et al. 2002). In the southern Appalachians, changes from the historical fire regime tend to include less frequent, and possibly lower-intensity, fires than which occurred pre-settlement. Ecosystem losses include relatively gradual changes in canopy composition but also relatively rapid reduction in or losses of fire-dependent and/or shade-intolerant understory species. Rare species are the first to disappear (Stanturf et al. 2002), and “continent-wide loss or depauperization of the pyrophytic herb layer following 20th century fire suppression is one of the unrecognized ecological catastrophes of landscape history” (Frost 1998, p. 79). Packard (1993 in Wade et al. 2000) agrees that exclusion of fire from these forests should be considered “a catastrophic disturbance” (p. 74). However, on DBNF, changes to the fire regime also include more frequent fires that are set (by arsonists) under extreme weather conditions (e.g., dry, windy days) without regard to fire-inflicted injury on residual trees.

Fire Regime Condition Classes (Schmidt et al. 2002) are used by the federal land management agencies as a qualitative measure to describe the degree of departure from historical fire regimes, possibly resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, canopy closure and fuel loadings. The three classes, as defined for the conditions on DBNF are:

**Condition Class 1:** For the most part, fire regimes in this class are within historical ranges. Vegetation composition and structure are intact. Fire-dependent ecosystem components are maintained by desired fire regimes. On DBNF, this class is the smallest. It includes areas that have been within the prescribed burn program for the longest period, and which are exhibiting significant oak and southern yellow pine regeneration in the midstory plus a diversity of grasses and forbs in the understory, compared to unburned areas. It also includes mesic communities on north and east aspects, mid- to lower slope positions, coves, and concave topography, which are often fire-influenced, but none of which tend towards environmental conditions conducive to fire.

**Condition Class 2:** Fire regimes on these lands have been moderately altered from their historical range by either increased or decreased fire frequency. A moderate risk of losing key ecosystem components has been identified on these lands. On DBNF these are areas that have been introduced to the prescribed burn program most recently and/or exhibit sufficient oak and southern yellow pine regeneration, at least as seedlings. It also includes areas that may have been subjected to wildland fire but not so frequently that oak and southern yellow pine regeneration is negated.

**Condition Class 3:** Fire regimes on these lands have been significantly altered from their historical return interval. Fire frequencies have departed from historical ranges by multiple return intervals. The risk of losing key ecosystem components from wildland fire or the lack of anthropogenic fire is high. Vegetation composition, structure and diversity have been significantly altered. Consequently, these lands verge on the greatest risk of ecological collapse. Because eastern oak, and to some extent southern yellow pine, forests are so resilient, they can survive an extended period without fire (Stanturf et al. 2002): they will still produce seed that can germinate when conditions become favorable. However, once the overstory dies (e.g., from disease, repeated insect attacks or extreme weather events), only seedlings or the seed bank may exist to perpetuate the stand. Currently on DBNF, the southern yellow pine forests are the most damaged by recent ice storms and southern pine beetle infestations. Oak forests have been damaged by ice storms as well, and are in line to be influenced by gypsy moth infestations. Gypsy moth damage maybe more severe in oak stands already impacted by such factors as ice storms, low rainfall and poor soils. Because of the changes in the historic fire regime and other changes in management practices, it could be argued that a large portion of DBNF is in Condition Class 3.

The landscape that burned in previous centuries (by lightning or humans) is now greatly altered. Roads, agricultural areas and developments have created firebreaks not previously known in forest communities. Whereas historic fires tended to burn until rain or a large natural barrier was encountered, modern prescribed fires are conducted in blocks ranging from less than 100 to a few thousand acres. Also, the pattern of human development affects when and where prescribed burns can be conducted. The relative location of hospitals, nursing homes, subdivisions, cities, and highways to National Forest System lands influence the prescribed burning program. Smaller or isolated tracts, or areas with difficult terrain on which to build fireline, may not be as likely to be included in the burn schedule, either. Otherwise, virtually all of DBNF's land base could be prescribed burned under some weather pattern.

The affected environment for this analysis is National Forest System lands on the DBNF.

## **Environmental Effects**

### **EFFECTS COMMON TO ALL ALTERNATIVES**

#### **DIRECT AND INDIRECT EFFECTS**

Fire has been a driving force in this forest's ecosystem for thousands of years and as such, many species and communities are fire-adapted. They have evolved to survive fire and some even require it for successful reproduction or a competitive advantage. Fire provides habitat, directly and indirectly, that is essential to some species' viability (Komarek 1974).

Prescribed fires are fires ignited by management to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements must be met, prior to ignition (USDI and USDA Forest Service 1998). Prescribed fires have been used for decades for fuels reduction, to reduce the risk of destructive wildland fire (Van Lear and Waldrop 1987). More recently managers have used them as a tool to influence vegetation, often mimicking historic fire regimes. They are ignited under specific weather conditions and ignition methods so that impacts to vegetation and other resources are predictable.

Native Americans used fire as a primary tool to keep the grasslands, savannas and forests productive, as well as to simplify travel and to clear land for gardens. Landscapes could have burned regularly, sometimes annually, in some areas (Barden 1997; Waldrop et al. 1987, Langdon 1981 and Leyburn 1962 in Van Lear and Waldrop 1989; Pyne 1983; also see summary in Brown 2000). However, long before Euro-Americans settled Kentucky, Native American burning decreased drastically (Brown 2000, Buckner 1989, Hamel and Buckner 1988). Because of a lack of resistance to European diseases, tribes were decimated by even minimal encounters with whites. Both grasslands and wooded areas began moving toward late-successional forests with a preponderance of fire-intolerant species, until settlers arrived, resumed burning, and once again reversed succession (Van Lear and Waldrop 1989). However, since the time of, or before, land acquisition by the Forest Service, fire has been excluded once again from much of the east (Pyne 1982 in Van Lear and Waldrop 1989).

To restore fire as a positive disturbance mechanism on the forest (“restoration burns”), any area initially likely needs to be prescribed burned frequently: every three years or possibly more often. Season of burn, fire intensity, level of canopy shade, density of fire-intolerant species (Van Lear and Waldrop 1989), sprouting capabilities and tree thinning rates are all factors that will influence the rate of change in species and composition across the landscape. There has been little long-term research that has focused on all of these factors; thus, there are many unknowns with regard to restoration fire regimes, particularly within hardwood stands (Stanturf et al. 2002, Van Lear and Waldrop 1989, Frost 1998). Adaptive management will play a critical role in the prescribed burning program in this forest and other land management units across the southern Appalachians.

As the landscape moves toward the desired future condition, prescribed fire would be reapplied less often, allowing oaks, pines, hickories and other desirable species to develop. Periodic fire will continue to be necessary to maintain the species composition and structure (“maintenance burns”). Current research suggests that historic return intervals ranged from less than 10 years (Cutter and Guyette 1994 in Stanturf et al. 2002; Dellinger 2000; Frost 1998; Emmons 1860, Hoffman 1994 and Frost 1995 in Frost 1998; Stanturf et al. 2002; Wade et al. 2000; also see summary in Wade et al. 2000), to as long as 35 years, depending on community type, and therefore, eventually, this will be the maintenance return interval. As the program continues, more acreage could be burned per year because, although more burn units will have entered into the burn cycle, the fire return interval on a particular landscape eventually is lengthened.

Fire is necessary in the upland oak and southern yellow pine systems to prevent natural succession that, in the absence of disturbance, leads to overstory dominance by fire intolerant species including red maple, other hardwoods, white pine or possibly hemlock. Southern yellow pines may be succeeded first by oaks, then other species (Stanturf et al. 2002; Wade and Lunsford 1989 in Stanturf et al. 2002). Without disturbance, oaks and southern yellow pine seedlings may be shaded out, with few surviving into the overstory, to the extent that stands of these types will not be perpetuated. Additionally, fire exclusion can create overstocking by fire-intolerant species to the level that trees must compete for limited resources. Trees thus become more susceptible to insect and disease outbreaks. Understory forb and grass layers in these systems are often depauperate or non-existent due to heavy shading or competition from shade-tolerant species such as rhododendron and hemlock. Another result of fire exclusion is the decreasing inflammability of the forest overall, at least during the period during which the individuals within it remain healthy. Increased density of trees and subsequent shading corresponds to less drying of fuels and less wind penetration within the stand to carry the fire (Benson 2000, Stanturf et al. 2002). Plus, fire-intolerant hardwoods tend to resprout

many times after being top-killed, leading to the need for many burning repetitions. Therefore, restoration becomes increasingly difficult and costly.

Prescribed fire is also a tool to reduce hazardous woody fuels. Recent ice and snow storms, and southern pine beetle infestations, have greatly increased the amount of woody fuel on the ground, resulting in as much as 17-40 tons per acre in the areas most heavily impacted (USDA 2000). Tree tops and sometimes entire stands of hardwoods have been killed by the storms, and nearly all of the southern yellow pine stands on the forest have been killed or severely degraded, and are subsequently toppling. The high level of damage caused by these events may be caused partly by the stress resulting from the increased density of mid-canopy and canopy trees within today's forests compared to levels pre-fire exclusion. Until these snags and downed logs absorb moisture and decompose, wildland fire intensity in these areas could be greater than normal, and prescribed fires will be more difficult to execute.

High-intensity wildland fires result in undesirable effects. Live overstory trees can be injured or killed. Severe fires are more likely to cause temporary soil sterilization and sedimentation. They also are much more difficult to control, and fuel build-up around residences and other structures can lead to the loss of property. Management-ignited fires, with their intensity controlled by weather-, ignition-, and other parameters listed in the prescription, minimize damage to live trees, soils and structures.

Even without levels of fuels elevated over historic levels, fuel reduction burns are utilized to minimize the effects of future wildland fires -- both to the natural resources and to the human environment. Fuel reduction is a safety issue, as well. Total acres of fuel reduction burns needed over the planning period are partially dependent on weather and resultant rates of fuel decay. During wet years, wood, litter and duff will be less likely to burn and will decay more quickly.

Fire use will influence air quality. [Air quality is discussed separately.]

### CUMULATIVE EFFECTS

Currently, and in the foreseeable future, private forest landowners will rarely use prescribed burning as a management tool. Kentucky state law prohibits open burning from February 15-April 30 and October 1-December 15 in or within 150 feet of any woodland or brushland, except between the hours of 6:00 p.m. and 6:00 a.m. or when the ground is covered with snow. This law ensures that, during the seasons (spring before leaf-out and autumn after leaf-drop) and time of day (afternoon) when a fire is most likely to burn under a forest canopy, ignition is illegal.

Within the proclamation boundary, Beech Creek State Wildlife Management Area and Big South Fork National River and Recreation Area intend to conduct prescribed burns, though at minimal levels. Beech Creek State WMA might burn grasslands, while Big South Fork NRRRA plans to burn 75-100 acres (of mostly shrubland) yearly (Frank Graham 2002).

Although the Forest Service land base in eastern Kentucky is nearly 700,000 acres, the areas that are chosen for fire-mediated habitat restoration are greatly limited by location and types of development within and adjacent to the proclamation boundary. Prescribed fires can be conducted only if prevailing winds will prevent heavy smoke from traveling across or settling into "smoke-sensitive areas." These areas include major roadways, hospitals, nursing homes, subdivisions and cities. Four major highways cross DBNF: I-75, I-64, U.S. 27 and Mountain Parkway. Development around these

corridors is increasing, and as a result, more restrictions will be placed on when and where prescribed fires can be conducted.

## ALTERNATIVE A

### DIRECT AND INDIRECT EFFECTS

Under the 1985 Plan as amended, prescribed fire would be used for fuel reduction and ecosystem management. About 15,000 acres would be prescribed burned yearly, most likely within Prescription 4.A., Timber Production Management Area. Much of the ecosystem management emphasis would be within previous or existing southern yellow pine stands, restoring habitat for the currently extirpated red-cockaded woodpeckers.

Very little southern yellow pine or southern yellow pine-oak habitat exists on DBNF currently, as a result of recent widespread pine death beginning in 1999. Many species on the forest depend on this habitat in part or entirely, and at present, the likelihood of these species to remain viable is low or reduced. To restore this habitat, southern yellow pines must be planted on a large scale. The planting areas would first be subjected to a site preparation burn to minimize woody competition for the seedlings. Most likely they would not be treated with prescribed fire again during the planning period. Restoration would be a lengthy process, dependent upon the maturation of the pine stands. Pine woodlands would be considered in maintenance stage at age 70; pine grasslands and pine shrublands at age 80; and pine forest at age 90.

In Alternative A, southern yellow pine seedlings would be planted at a much more rapid rate that they would be under other alternatives. According to Spectrum, over 2,000 acres of southern yellow pine seedlings would be planted yearly during the first planning period. Eventually, at least 30,000 acres of future open, fire-mediated pine habitat would be restored.

Fire-mediated habitat would continue moving toward Condition Classes 2 and 3 unless prescribed burned regularly.

**Table 3 - 82. Acres of yearly ecosystem management and fuel reduction by prescribed burning objective during the first decade, Alternatives A, B-1 and E-1.**

Primary prescribed burning objective	Alt. A	Alt. B-1	Alt. E-1
Yellow pine reforestation (site preparation before planting)	2,083	436	436
Restoration of hardwood or mixed woodland, and wooded grassland/ wooded shrubland <sup>1</sup> (first application of fire)	0	395	395
Understory burn for maintenance of existing fire-mediated habitat (second application of fire or later) and/or fuel reduction <sup>2</sup>	12,917	1,546	1,546
Total per year	15,000	2,377	2,377

<sup>1</sup>About 81% of the restoration will be for woodlands and the remaining 19% will be for wooded grasslands/shrublands.

<sup>2</sup>Remainder of acreage after other categories is summed.

### CUMULATIVE EFFECTS

None other than those discussed above.

**ALTERNATIVE B-1****DIRECT AND INDIRECT EFFECTS**

Under this Alternative, prescribed fire would be used only to provide habitat for the viability of fire-mediated PETS species as necessary by law (Table 3 - 83), or for fuels reduction for safety purposes. During this planning period, about 2,400 acres would be prescribed burned annually for habitat restoration or maintenance (Table 3 - 82). Most of the forest's 100,000 acres of southern yellow pine forests would succeed to hardwoods, because prescribed fire would restore and maintain less than 40,000 acres of former southern yellow pine communities for viability purposes. Upland oaks would also succeed to fire-intolerant hardwoods, because fire appears to perpetuate oak advanced regeneration as well. Oak that has not been burned may also be more susceptible to oak decline, because of the crowded nature of the dense, unburned stands. These communities would continue to shift to Condition Class 2, and then Condition Class 3, unless prescribed burned on a regular basis.

**Table 3 - 83. Minimum long-term objectives, in acres, of fire-mediated habitat restoration or maintenance for viability species.**

<b>Habitat type</b>	<b>Minimum acres</b>
Yellow pine forest, mixed age <sup>1</sup>	33,000
Mature forest, open understory <sup>2</sup>	2,000
Thinned forest <sup>2</sup>	1,750
Hardwood or mixed woodland, wooded grassland/shrubland <sup>2</sup>	2,720
Minimum restored during planning period <sup>2</sup>	6470
Minimum restored within 8 decades	39,470

<sup>1</sup>Pine types will reach maintenance stage after 80 years.

<sup>2</sup>Hardwood types should be restored, and 4363 acres of yellow pine planted, during this planning period (10 years).

**ALTERNATIVE C, C-1, AND D****DIRECT AND INDIRECT EFFECTS**

These alternatives attempt to restore and maintain much more (Table 3 - 84) of the prescribed fire-maintained habitat than the approximately 40,000 acres required for viability (Table 3 - 83). The long-term objective, to be accomplished over the next 80 years, is to restore and maintain between 120,000-160,000 acres of fire-mediated habitat. More of the forest would shift to Condition Class 1 over time, in any of these three alternatives, than would shift in the remaining alternatives. Therefore, with regard to fire's historic role in maintaining healthy oak and southern yellow pine communities, Alternative C, C-1 or D would most benefit the forest.

Most of the prescribed burning would take place within Prescription 1.K., Habitat Diversity Management Area. Objectives for this area include the creation and maintenance of pine and mixed and hardwood forest, woodland, and wooded grassland/shrubland, providing a landscape reminiscent of pre-settlement times, and a fire regime similar to that installed by Native Americans, and later adopted by early settlers. Most of DBNF has been excluded from fire for 70 years or more. During this time, succession has advanced such that fire-intolerant tree species have gained a significant foothold across the landscape, even on dry slopes and ridgetops. If fire were the only tool used to restore these communities, it would take literally longer than a lifetime. Thinning would be incorporated to shorten the restoration time frame. Complete restoration of southern yellow pine and mixed pine-oak communities would still be partially dependent on the re-creation of the pine community; i.e., planting of shortleaf pines. Fifty percent or more of the 1.K Habitat Diversity Prescription Area would eventually be under a burning regime. This area would provide more than adequate habitat for species utilizing fire-mediated communities.

In any of the three alternatives, approximately 822 acres of pine would be planted per year over the next ten years, to begin restoration of the upland pine community. Southern yellow pine habitat is required for viability purposes at much higher acreage levels than fire-maintained, upland oak communities. The minimum required habitat restoration for hardwood/mixed woodland, wooded grassland/shrubland, mature forest and thinned forest (all fire-mediated) could be accomplished within this planning period. Because of the lack of mature yellow pines, these communities would be moved by default toward oak communities to meet the minimum viability acreage requirements. Once pines were re-established on DBNF, up to 700 acres in mature forest and up to 875 acres in thinned forest could be "pushed" to pine communities, and viability requirements would still be met.

Prescribed fire would be used as a primary tool to restore upland communities. Thinning could be used to expedite the restoration process. In the hardwood areas, and the remaining hardwood-pine areas, repetitive fires will open the canopy, allowing oak and pine regeneration. Thinning combined with burning will reduce midstory and/or overstory more quickly, thus restoring the upland communities more quickly. This combination of methods will be especially beneficial when re-creating low basal area oak and southern yellow pine woodlands, wooded grasslands and wooded shrublands. The removal of larger sub-canopy or canopy trees (particularly shade-tolerant species invading upland sites) by mechanical means, versus attempting to kill them with repeated fires, allows the transformation from overstocked forests to occur more quickly, thus benefiting the species requiring open upland habitat.

Over the planning period, it should be possible to increase the yearly average number of acres prescribed burned. As the vegetation structure within hardwood communities changes from a closed canopy with minimal fine fuel in the understory, to an open wood with a grassy understory, prescribed fires will take less time. Also, with time, less new firelines will need to be built, and more time can be devoted to burning. When the prescribed burn regime moves from restoration to maintenance, each location will require fire less frequently, allowing more acres to be entered into the program. Therefore, over the planning period, it is anticipated that more controlled fire can be applied every year.

**Table 3 - 84. Acres of yearly ecosystem management and fuel reduction prescribed burning per year, Alternatives C, C-1 and D.**

Type of burn	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Site preparation prior to planting for southern yellow pine reforestation	822	822	822	822	822	822	822	822	822	822
<b>Restoration of hardwood or mixed woodland, wooded grassland and wooded shrubland</b>										
Wooded grassland/shrubland	886	1,122	1,359	1,595	1,831	2,067	2,304	2,540	2,776	2,953
Hardwood or mixed woodland	3,775	4,782	5,788	6,795	7,802	8,808	9,815	10,822	11,828	12,583
Subtotal of restoration burns	4,661	5,904	7,147	8,390	9,633	10,876	12,119	13,362	14,604	15,537
Understory burn for maintenance of existing fire-mediated habitat and fuel reduction*	9,517	12,274	15,031	17,788	20,545	23,302	26,059	28,816	31,574	33,641
Objective per year	15,000	19,000	23,000	27,000	31,000	35,000	39,000	43,000	47,000	50,000
Anticipated range per year	7,500	9,500	11,500	13,500	15,500	17,500	19,500	21,500	23,500	25,000
	22,500	28,500	34,500	40,500	46,500	50,000	50,000	50,000	50,000	50,000

\*This acreage is the remainder after site preparation and restoration burn objectives.

In Alternative D, prescribed burns would be oriented such that most burn units would be some distance away from most of the developed recreation areas to minimize visitor contact with the visual effects of fire: perceived as “ugly” by some (Buckner 1989). This added constraint could eliminate from consideration some acres of fire-mediated habitat. These acres have not been mapped or calculated.

**CUMULATIVE EFFECTS**

None other than those discussed above.

**ALTERNATIVE E-1****DIRECT AND INDIRECT EFFECTS**

Under this Alternative, prescribed fire would be used minimally (Table 3 - 82) only to provide habitat for the viability of fire-mediated PETS species as necessary by law (Table 3 - 83), or for fuels reduction for safety purposes.

Nearly 350,000 acres of DBNF will be placed into the 4.A. Timber Production Emphasis Prescription Area. This area would be managed for the sustained production of high-value sawtimber. Shade-intolerant and mid-tolerant species would become dominant. Most of the forest's 100,000 acres with a southern yellow pine component would succeed to hardwoods, because prescribed fire would be minimized. Because fire appears to perpetuate upland oaks via advanced regeneration, they would also succeed to other hardwoods. Oak stands that have not been burned may be more susceptible to oak decline, because of the crowded nature of the dense, unburned stands. These communities would continue shifting to Condition Classes 2 and 3, unless prescribed burned on a regular basis. Prescribed burning would be minimized because of concerns about fire-induced damage. Much of the research which has indicated that fire damages merchantable timber has been gathered from wildland fire sites (Buckner 1989, Van Lear and Waldrop 1989); however, other research has reported bole damage caused by prescribed burning under certain conditions (Wendel and Smith 1986 in Van Lear and Waldrop 1989). Regardless of ignition source, damage to each tree varies by diameter and species-associated fire tolerance; not all trees are scarred by any single fire (Melton 2002; Kilgore and Taylor 1979, Stetnam et al. 1988 and Caprio and Swetnam 1995, all in Frost 1998; Sanders et al, 1987 in Stanturf et al. 2002). Conversely, fuels reduction burns prevent damage caused by intense or severe wildland fires.

**CUMULATIVE EFFECTS**

None other than those discussed above.

## WILDLAND FIRE

### Affected Environment

Wildland is any area with essentially no development, except for roads, railroads, power lines, and similar transportation facilities; structures, if they exist, are widely scattered (NWCG IOSWT 1996). In the eastern United States, and such areas may be relatively small. Regardless of size, any area with undeveloped vegetation is still defined as wildland. For fire management purposes, wildland is an area containing flammable natural fuels, such as leaf litter or logging slash. Fuels can be located at the line, area, or zone where structures and other human development meet or intermingle with them; this is called the wildland/urban interface (NWCG IOSWT 1996).

A wildland fire, then, is any non-structure fire, other than prescribed fire, that occurs on wildland. The term encompasses fires previously identified as “wildfires,” which require a suppression response, and “prescribed natural fires,” which are used to meet resource objectives. However, both of these terms are now obsolete (USDI and USDA Forest Service 1998) and the appropriate response to be taken by fire personnel cannot be discerned without additional information.

Wildfire was defined (by federal firefighting agencies, pre-1998), as an unwanted wildland fire (Hardy et al. 2001), or more specifically, a “fire occurring on wildland that is not meeting management objectives and thus requires a suppression response” (NWCG IOSWT 1996). They could be ignited by humans or by natural events such as lightning. It is now referred to as a wildland fire requiring a suppression response. Regardless of possible resource benefits, human-caused/non-management-ignited fire must be suppressed.

About 99 percent of wildland fires on the DBNF are human-caused (Table 3 - 85). Some are accidental starts, but by far most fires in this forest are intentional ignitions, known as arson fires. Somerset, Stearns, London and Redbird Ranger Districts in particular tend to have a high number of arson fires. Several reasons have been suggested for this behavior, including attempted eradication of ticks and snakes, boredom, anger toward or retaliation against neighbors, and hostility toward state or federal government. High arson rates weakly correlate with poverty levels (Prestemon 2002); eastern Kentucky in general is the poorest region of the state.

**Table 3 - 85. Wildland fires by cause and size on the DBNF, 1992-2001.**

Cause	Number of fires	% of fires	Acres	% by acreage
Lightning	12	1	280	<1
Arson	883	76	46,775	87
Debris burning	93	8	2,988	6
Campfires	66	6	1,029	2
Miscellaneous	64	5	2,218	4
Smoking	15	1	97	<1
Railroad	12	1	143	<1
Equipment use	10	1	144	<1
Children	9	1	31	<1
<b>Totals</b>	<b>1,164</b>	<b>100</b>	<b>53,705</b>	<b>100</b>
<b>10-year average</b>	<b>116</b>		<b>5,370</b>	

Variability in the number of ignitions and acres burned is influenced by weather patterns.

The forest is heavily laced with roads and trails, with small towns interspersed throughout. Private ownership is intermingled with federal ownership and overall, the areas are rural with low concentrations of houses surrounded by natural vegetation. Camping, hunting and ATV riding are popular both on- and off-forest. Some tracts may be more susceptible to wildland fire ignitions because of these activities.

Fires caused by lightening strikes, though uncommon in eastern Kentucky, can occur at any elevation or vegetation type. DBNF averages about one lightning fire per year (Table 3 - 85). Although human-caused wildland fires must be suppressed, National Forests have the option to use lightning-caused fires to benefit resources. The obsolete term prescribed natural fire (PNF) was used to describe “naturally-ignited [e.g., by lightning or volcanic activity] wildland fire burning under specified conditions where the fire was confined to a predetermined area and producing the fire behavior and fire characteristics to attain planned fire treatment and resource management objectives” (NWCG IOSWT 1996). A PNF did not require a suppression response, like a wildfire did. A PNF fire is now appropriately termed a wildland fire use fire<sup>12</sup>.

Wildland fire use is a management response that must be pre-approved, before ignition, in the Fire Management Plan, thus allowing Ranger Districts to manage a lightning-caused fire as a “wildland fire use fire.” This designation means that it is burning under acceptable weather conditions and in a pre-approved geographic area (USDI and USDA Forest Service 1998). Managers monitor the fire, provided that it fits the same parameters required of a (human-ignited) prescribed fire, and allow it to burn until weather or a change in fuel loading leads to its extinction. However, this action can be taken only if a plan for that location has been prepared and approved, and only for as long as the fire continues to burn within acceptable predetermined parameters. Conversely, all human-caused wildland fires must be suppressed.

The affected environment for this analysis is National Forest System lands.

## **Environmental Effects**

### **EFFECTS COMMON TO ALL ALTERNATIVES**

#### **DIRECT AND INDIRECT EFFECTS**

All human (non-management)-ignited wildland fires (regardless of cause) must be suppressed, by law. Human-caused wildland fires are ignited without regard to the damage they may cause. Inappropriate seasonality, intensity or return interval, regardless of cause, can have negative effects on the ecosystem. Human-caused wildland fires often consume more litter and damage or kill more trees than a prescribed fire in the same area (e.g., fire running upslope on a dry, windy day) because weather or ignition patterns may be very different than those chosen for a prescribed fire. Lightning-caused fires must be suppressed if the forest Fire Management Plan (FMP) has not approved a prescription for that location, or when such fires are not burning under the specified conditions outlined in the FMP. [Wildland fire use fires are discussed separately.]

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<sup>12</sup> The term “wildland fire use fire” should not be confused with “wildland fire use,” a broader term encompassing the combination of wildland fire use and prescribed fire application to meet resource objectives (USDI and USDA Forest Service 1998).

Fire control efforts in emergency situations could adversely impact resources. Adverse effects could include sedimentation caused fireline construction, foot traffic on steep slopes, increased road traffic, application of fire retardants which could drift into waterways, drafting of large quantities of water, gas-powered pumps in water, and compounding of human impacts and soil compaction from fire camps. Other possible stream impacts include increased nutrients (which could also be a positive effect), and alteration of habitat from vehicles driving through the channel. Most visible is the degradation of habitat with up to 100 percent tree death, depending on the severity of the fire. Temporary soil sterilization could also occur. However, Standards within the Forest Plan, regardless of alternative chosen, should minimize negative effects resulting from suppression actions.

The number of acres burned per year by wildland fire has not remained constant over the past decade. Weather has been one influence on both the number of ignitions as well as acres burned. Additionally, the chosen alternative could affect the number of fires that are ignited, particularly those caused by escaped campfires and arson. This could be based on a variable level of access to the forest as well as public reaction to management decisions leading to arson fires in response (Table 3 - 86). There is no way to anticipate these levels. There is no method to predict how the pattern of human-caused wildland fires will differ among the alternatives.

**Table 3 - 86. Wildland fire causes that can be correlated with DBNF management decisions\*, 1992-2001.**

Year	Arson	% Arson	Campfire escapes	% Campfire escapes	Other	% Other	Total wildfires	Total acres burned
2001	116	77	7	5	27	18	150	15,814
2000	95	76	4	3	26	21	125	12,426
1999	154	73	16	8	42	20	212	10,463
1998	66	70	11	12	17	18	94	1,426
1997	25	66	5	13	8	21	38	703
1996	56	80	2	3	12	17	70	1,117
1995	139	81	8	5	25	15	172	5,715
1994	136	77	7	4	33	19	176	4,611
1993	68	85	2	3	10	13	80	844
1992	28	60	4	9	15	32	47	586
<b>10-year total</b>	<b>883</b>	<b>76</b>	<b>66</b>	<b>6</b>	<b>215</b>	<b>18</b>	<b>1164</b>	<b>53,705</b>

Arson and campfire escapes are the two wildland fire causes most likely to be related to land management decisions. Arson ignition patterns are correlated with public reaction to some federal decisions; number of campfires (and subsequent escapes) is related to level of recreational use. Note that both the number of ignitions and acres burned are additionally influenced by weather patterns.

### CUMULATIVE EFFECTS

The incremental effects of other federal, non-federal, or private actions do not change, regardless of alternative.

Arson fires occur in high frequency across eastern Kentucky, regardless of land ownership. Because of the fragmented ownership pattern, fires that ignite on National Forest System lands often spread to private land, or vice versa. Kentucky Division of Forestry (KDF) is responsible for most of the suppression of wildland fires on non-federal land. Five of the nine KDF districts overlap the DBNF proclamation boundary (Table 3 - 87). In 2000, nearly all the KDF-suppressed fires, and the acreage burned, were in these districts. Cumulatively, wildland fire, and arson fire especially, potentially damages over 100,000 acres yearly in eastern Kentucky. In 2000 and 2001, over 1,800 homes and businesses were threatened by fire across the state, and 78 structures were destroyed. Fire damage to soils, waterways and trees (particularly commercial stands) concerns government officials and public citizens alike. Smoke, regardless of ignition location, will affect a large area.

**Table 3 - 87. Fires suppressed by Kentucky Division of Forestry (KDF) within selected districts, 2000\*.**

KDF district	DBNF ranger district(s) encompassed	# of KDF-suppressed fires	% of all KDF-suppressed fires	Acres	% of all KDF-suppressed fires
<b>Northeastern</b>	Morehead Stanton	210	13	5,354	4
<b>Kentucky river</b>	Stanton Redbird	287	18	29,313	22
<b>Southeastern</b>	London Stearns Redbird	397	26	63,302	47
<b>South central</b>	Somerset Stearns	124	8	4,442	3
<b>Eastern</b>	Redbird	338	22	28,027	21
	<b>Total</b>	<b>1356</b>	<b>87</b>	<b>130,438</b>	<b>96</b>

\* These figures relate to total KDF District acreage. Source: Unpublished data, KDF.

**ALTERNATIVE A****DIRECT AND INDIRECT AFFECTS**

Wildland fire use fire would be an acceptable tool to meet resource management objectives because DBNF Fire Management Plan, which tiers to the FLMP, would allow wildland fire use fires. However, the necessary development of site-specific prescriptions would be a low priority because lightning strikes under current conditions rarely result in a detectable fire.

**CUMULATIVE AFFECTS**

None other than those discussed above.

**ALTERNATIVES B-1, C-1, C, AND D****DIRECT AND INDIRECT AFFECTS**

Wildland fire use fire would be an acceptable tool to meet resource management objectives because the DBNF Fire Management Plan, which tiers to the FLMP, would allow wildland fire use fires. As more of the dense, closed-canopy forest is restored to lower density, open forests, woodlands and wooded grassland/shrublands, lightning fires could become more common as well as increase in area because environmental conditions would be more conducive to their spread. Thus, the percent of wildland fires caused by lightning could increase over time.

**CUMULATIVE AFFECTS**

None other than those discussed above.

**ALTERNATIVE E-1****DIRECT AND INDIRECT AFFECTS**

Wildland fire use fire would not be an acceptable tool to meet resource management objectives.

**CUMULATIVE AFFECTS**

None other than those discussed above.

## SCENERY

### Affected Environment

Visitors cite the visual appeal of the Daniel Boone National Forest's landscape as one of its greatest attractions. To help maintain the Forest's visual appeal, the Forest Service uses the Scenery Management System (SMS) to inventory and classify landscape character as well as the visual effects of management activities. SMS succeeded the Visual Management System in 1996 and uses many of the same criteria to classify scenery and set scenic objectives. SMS also helps integrate aesthetic values with other biological, physical, and social/heritage resources in the planning process.

Scenic Classes, one component of the SMS, measure the relative importance of landscapes. During project planning, they help compare the value of scenery with the value of other resources. Scenic Classes are determined by combining the three classes of scenic attractiveness with the distance of the viewer from the landscape as well as the viewer's interest in the scenery. Scenic Classes range from 1 to 7. Generally, Scenic Classes 1 and 2 have high public value, Classes 3 to 5 have moderate value, and Classes 6 and 7 have low value. Only Classes 1 to 6 occur in the DBNF's current inventory.

The analysis area includes the DBNF as seen from outside National Forest System lands as well as from within.

The SMS is explained in more detail in Agricultural Handbook Number 701, Landscape Aesthetics. An inventory of Scenic Classes by Prescription Area is shown in Table 3 - 88.

Scenic Integrity Objectives (SIOs) were assigned to each Scenic Class as seen in Table 3 - 90.

Assignment of SIOs is based upon the Desired Future Condition of a Prescription Area. Scenic Integrity Levels were used to compare the differing effects of the six alternatives.

**Table 3 - 88. Landscape character and inventoried acres for Scenic Classes 1 through 6 for prescription areas within the DBNF.**

PRESCRIPTION AREA*	Landscape character	Inventoried acres by Scenic Class					
		1	2	3	4	5	6
<b>1.A. Research Natural Areas</b>	Natural evolving	4,961	0	0	0	0	0
<b>1.C. Cliffline Community</b>	Natural appearing	374	7,601	12,196	4,282	6,520	70,020
<b>1.E. Riparian Corridor</b>	Natural appearing	6,761	9,650	22,754	4,354	10,029	81,860
<b>1.G. Rare Community</b>	Natural appearing	0	510	490	0	0	0
<b>1.I. Designated Old-Growth</b>	Natural appearing	0	253	3,568	1,038	2,576	7,856
<b>1.J. Significant Bat Caves</b>	Natural appearing	125	169	652	273	552	3,778
<b>1.K. Habitat Diversity Emphasis</b>	Natural appearing	38	13,052	55,094	23,272	37,140	283,273
<b>1.M. Custodial Area</b>	Natural Appearing Moving to Natural Evolving	37	10,708	54,110	22,861	36,654	277,260
<b>2.A. Clifty Wilderness</b>	Natural evolving	12,646	0	0	0	0	0
<b>2.B. Beaver Creek Wilderness</b>	Natural evolving	4,791	0	0	0	0	0
<b>2.C. Wilderness Study Area</b>	Natural appearing	2,834					
<b>3.A. Developed Recreation</b>	Natural appearing with cultural nodes	3,700	0	0	0	0	0
<b>3.B. Large Reservoirs</b>	Natural appearing with cultural nodes	30,673	0	0	0	0	0
<b>3.C.1. &amp; 3. Red River National W&amp;S River Segment</b>	Natural evolving	683	0	0	0	0	0
<b>3.C.2. Proposed W&amp;S River: Marsh Creek- Wild River</b>	Natural evolving	1,440	0	0	0	0	0
<b>3.C.4. Proposed W&amp;S River: Cumberland River, War Fork Creek, Rockcastle River - Scenic Rivers</b>	Natural evolving, natural appearing, pastoral, historic	5,622	0	0	0	0	0
<b>3.C.5. Proposed W&amp;S River: Rock Creek &amp; Marsh Creek Recreational Rivers</b>	Natural appearing	274	5,910	0	0	0	0
<b>3.E. Red River Gorge</b>	Natural evolving, natural appearing, pastoral, historic	16,042	0	0	0	0	0
<b>3.F. Natural Arch Scenic Area</b>	Natural appearing	1,065	0	0	0	0	0
<b>3.H.2. Ruffed Grouse Emphasis</b>	Natural appearing	0	31	1,495	623	2,710	5,676
<b>4.A. Timber Production Emphasis</b>	Natural appearing	37	10,708	54,110	22,861	36,654	277,260
<b>4.B. General Forest Area (1985 Plan)</b>	Natural appearing	6,798	20,328	75,369	26,592	43,973	353,445
<b>5.A. Communications Site</b>	Cultural nodes usually in natural appearing settings	0	20	0	0	0	0
<b>5.C. Source Water Protection</b>	Natural appearing	0	3,671	2,672	782	1,366	10,982

\*Acres in the Prescription Areas do not add up to total acres on the Forest because some prescriptions areas overlap.

The original Visual Management System resulted in an inventory of Scenic Objectives used to guide site-specific analysis of Forest management activities. These were called Visual Quality Objectives. The new Scenery Management System uses a similar inventory called Scenery Integrity Objectives.

The relationship of the two Objectives is shown in Table 3 - 89. The relationship between the Scenic Integrity Objective and the Inventoried Scenic Classes are listed by prescription area in Table 3 - 90.

**Table 3 - 89. Objectives under the Scenery Management and Visual Management Systems.**

Scenery Management System Scenic Integrity Objectives	Visual Management System Visual Quality Objectives
Very High (VH)	Preservation
High (H)	Retention
Moderate (M)	Partial retention
Low (L)	Modification
Very Low (VL)	Maximum modification

**Table 3 - 90. Scenic Integrity Objectives (SIO) by Scenic Class within prescription areas.**

Prescription Area	Landscape Character	SIO <sup>1</sup> by Scenic Class					
		1	2	3	4	5	6
1.A.Research Natural Areas	Natural evolving	VH	VH	VH	N/A	N/A	N/A
1.C.Cliffline Community	Natural appearing	H	H	H	H	H	H
1.E.Riparian Corridor	Natural appearing	H	H	H	H	H	H
1.G.Rare Community	Natural appearing	H	H	H	H	H	H
1.I.Designated Old-Growth	Natural appearing	H	H	M	M	M	L
1.J. Significant Bat Caves	Natural appearing	H	H	M	M	M	L
1.K.Habitat Diversity Emphasis	Natural appearing	H	M	L	L	L	L
1.M. Custodial area	Natural Appearing Moving to Natural Evolving	VH	VH	VH	VH	VH	H
2.A.Clifty Wilderness	Natural evolving	VH	VH	VH	VH	VH	VH
2.B.Beaver Creek Wilderness	Natural evolving	VH	VH	VH	VH	VH	VH
2.C. Wilderness Study Area	Natural appearing	VH	VH	VH	VH	VH	VH
3.A.Developed Recreation	Natural appearing with cultural nodes	H	M	M	M	M	N/A
3.B.Large Reservoirs	Natural appearing with cultural nodes	H	M	M	M	M	N/A
3.C.1. & 3. Red River National W&S River Segment	Natural evolving	VH	VH	VH	VH	VH	VH
3.C.2. Proposed W&S River: Marsh Creek-Wild River	Natural evolving	VH	VH	VH	VH	VH	VH
3.C.4. Proposed W&S River: Cumberland River, War Fork Creek, Rockcastle River- Scenic Rivers	Natural evolving, natural appearing, pastoral, historic	H	H	H	H	H	H
3.C.5. Proposed W&S River: Rock Creek and Marsh Creek Recreational Rivers	Natural appearing	H	H	M	M	M	M
3.E.Red River Gorge	Natural evolving, natural appearing, pastoral, historic	VH, H	H	M	M	M	M
3.F.Natural Arch Scenic Area	Natural appearing	VH	H	N/A	N/A	N/A	N/A
3.H.1. Ruffed Grouse Emphasis	Natural appearing	H	M	L	L	L	L
4.A. Timber Production Emphasis	Natural appearing	H	M	L	L	L	L
4.b. General Forest Area (1985 Plan)	Natural appearing	H	M	L	L	L	L
5.A.Communications Site	Cultural nodes usually in natural appearing settings	M	M	L	L	L	L
5.C.Source Water Protection	Natural appearing	H	M	M	L	L	L

<sup>1</sup>SIO codes: VH = Very High; H = High; M = Moderate; L = Low; VL = Very Low; N/A = Not Applicable

## EFFECTS COMMON TO ALL ALTERNATIVES

### DIRECT AND INDIRECT EFFECTS

The following Prescription Areas are common to all alternatives.

**Table 3 - 91. Scenic Integrity Objectives (SIO) acreage in prescription areas common to all alternatives.**

PRESCRIPTION AREA	SIO <sup>1</sup>	Acres <sup>2</sup>
1.A. Research Natural Areas	H	496
1.C. Cliffline Community	H	100,994
1.J. Significant Bat Caves	H	294
	M	1,478
	L	3,777
2.A. Clifty Wilderness	VH	12,646
2.B. Beaver Creek Wilderness	VH	4,791
3.A. Developed Recreation	M	3,700
3.B. Large Reservoirs	H	30,673
3.C.1. & 3. Red River National W&S River Segment	VH	2,123
3.C.2. Proposed W&S River: Marsh Creek-Wild River	VH	1,244
3.C.4. Proposed W&S River: Cumberland River, War Fork Creek, Rockcastle River- Scenic Rivers	H	5,622
3.C.5. Proposed W&S River: Rock Creek and Marsh Creek Recreational Rivers	H	6,184
3.E. Red River Gorge	VH	16,042
3.F. Natural Arch Scenic Area	VH	1,065
5.A. Communications Sites	M	20
5.C. Source Water Protection	M	6,343
	L	13,130

<sup>1</sup>SIO codes: VH = Very High; H = High; M= Moderate; L = Low; VL = Very Low

<sup>2</sup>Acres are the same for each Forest Plan alternative.

Except for the developed recreation sites, there is very little activity planned within these prescriptions. Activities that do occur can be blended with the associated landscape to meet the Scenery Integrity Objectives.

## CUMULATIVE EFFECTS

The Scenery Management Handbook provides guidance in classifying the scenery and recommending actions to protect the scenic character of the landscape. The scenic integrity of the landscape within view of the Forest may change and most likely be reduced to a lower level through development and management on private land. The changes on private land within the proclamation boundary may change the concern level within National Forest System lands. This change would be the same for all alternatives.

Requests from private parties and governments for the use of the National Forest System lands could lead to a change in scenic classes on the DBNF. The number and type of requests are not likely to change between alternatives, however.

Under all alternatives and in all prescription areas, the existing Scenic Integrity Objective should be attainable despite changes on adjacent private land. While the Scenic Integrity Objective may need to be revised based upon changes in adjacent lands, this should not vary between alternatives. Therefore, cumulative effects should remain constant among alternatives.

**Table 3 - 92. Summary of DBNF activities that impact visual integrity, in acres, by alternative.**

Activity	Alt. A	Alt. B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
<b>Two-aged harvest 15 BA</b>	3,000	366	993	1,000	1,000	2,871
<b>Wooded grassland/shrub restoration 15 BA</b>	0	77	705	705	705	77
<b>Woodland restoration 40 BA</b>	0	350	1,483	1,483	1,483	361
<b>Uneven-aged harvest</b>	0	108	108	108	108	108
<b>Acres burned</b>	15,000	2,377	32,900	32,900	32,900	2,377
<b>Total acres affected</b>	18,000	3,277	36,189	36,195	36,196	5,793
<b>Suitable acres</b>	575,458	70,000	347,803	347,803	347,803	373,090
<b>Percent of area affected</b>	3.9%	8.8%	10.2%	10.2%	10.2%	1.6%
<b>Miles of road constructed</b>	35	9	56	56	56	67
<b>Total suitable acres with Very High or High SIO1</b>	107,286	644,908	233,330	233,330	233,330	233,077
<b>Possibility of affecting an area with Very High to High SIO</b>	Very Low	High	Low	Low	Low	Low

Acres of activity are average annual acres planned.

**Table 3 - 93. Scenic Integrity Objective (SIO) acres in each prescription area by alternative.**

Prescription Area <sup>1</sup>	SIO <sup>2</sup>	Alt. A	Alt. B-1	Alt. C	Alt. C-1	Alt. D	Alt. E-1
<b>1.A. Research Natural Areas</b>	H	496	496	496	496	496	496
<b>1.C. Cliffline Community</b>	H	100,994	100,994	100,994	100,994	100,994	100,994
<b>1.E. Riparian Corridor</b>	H	0	126,152	126,152	126,152	126,152	126,152
<b>1.G. Rare Community</b>	H	0	1,200	1,200	1,200	1,200	1,200
<b>1.I. Designated Old-Growth</b>	H	N/A	N/A	253	253	253	325
	M	0	0	7,182	7,182	7,182	0
	L	0	0	7,856	7,856	7,856	0
<b>1.J. Significant Bat Caves</b>	H	294	294	294	294	294	294
	M	1,478	1,478	1,478	1,478	1,478	1,478
	L	3,777	3,777	3,777	3,777	3,777	3,777
<b>1.K. Habitat Diversity Emphasis</b>	H	N/A	N/A	38	38	38	N/A
	M	0	0	12,799	12,799	12,799	0
	L	0	0	383,741	383,741	383,741	0
<b>1.M. Custodial area</b>	VH		124,370				
	H		277,260				
<b>2.A. Clifty Wilderness</b>	VH	12,646	12,646	12,646	12,646	12,646	12,646
<b>2.B. Beaver Creek Wilderness</b>	VH	4,791	4,791	4,791	4,791	4,791	4,791
<b>2.C. Wilderness Study Area</b>	VH		2,834				
<b>3.A. Developed Recreation</b>	M	3,700	3,700	3,700	3,700	3,700	3,700
<b>3.B. Large Reservoirs</b>	H	30,673	30,673	30,673	30,673	30,673	30,673
<b>3.C.1. &amp; 3. Red River National W&amp;S River Segment</b>	VH	2,123	2,123	2,123	2,123	2,123	2,123
<b>3.C.2. Proposed W&amp;S River: Marsh Creek-Wild River</b>	VH	1,244	1,244	1,244	1,244	1,244	1,244
<b>3.C.4. Proposed W&amp;S River: Cumberland River, War Fork Creek, Rockcastle River- Scenic Rivers</b>	H	5,622	5,622	5,622	5,622	5,622	5,622
<b>3.C.5. Proposed W&amp;S River: Rock Creek and Marsh Creek Recreational Rivers</b>	H	6,184	6,184	6,184	6,184	6,184	6,184
<b>3.E. Red River Gorge</b>	VH	16,042	16,042	16,042	16,042	16,042	16,042
<b>3.F. Natural Arch Scenic Area</b>	VH	1,065	1,065	1,065	1,065	1,065	1,065
<b>3.H.1. Ruffed Grouse Emphasis</b>	M	31	N/A	N/A	31	31	N/A
	L	10,504	0	0	10,504	10,504	0
<b>4.A. Timber Production Emphasis</b>	H						37
	M						10,708
	L						390,885
<b>4.B. General Forest Area (1985 Plan)</b>	H	6,798					
	M	20,328					
	L	499,379					
<b>5.A. Communications Sites</b>	M	20	20	20	20	20	20
<b>5.C. Source Water Protection</b>	M	6,343	6,343	6,343	6,343	6,343	6,343
	L	13,130	13,130	13,130	13,130	13,130	13,130
<b>Total acres SIO</b>	VH	22,876	151,472	22,876	22,876	22,876	22,876
	H	110,511	519,722	236,740	236,740	236,740	236,487
	M	26,499	4,771	24,752	24,752	24,752	17,823
	L	519,855	3,777	395,375	395,375	395,375	402,556

<sup>1</sup>Acres in Prescription Areas do not include water or unclassified acres. Some Prescription Areas overlap or lie within each other.

<sup>2</sup>SIO codes: VH = Very High; H = High; M = Moderate; L = Low; VL = Very Low.

**ALTERNATIVE A****DIRECT AND INDIRECT EFFECTS**

Alternative A, which represents the 1985 Plan, would harvest 3,000 acres to a 15-square-foot basal area. Thirty-five miles of road would be constructed annually with 15,000 acres prescribed for burning each year. The existing variety of stand ages, mixture of species in stands of trees, forest openings, and vistas would remain the same. Acres with a Scenic Integrity Level of Very High or High where activity would occur total 107,101. Management activities would have a low likelihood of adversely affecting an area with a Scenic Integrity Level of High.

**ALTERNATIVE B-1****DIRECT AND INDIRECT EFFECTS**

Annually, 443 acres would be scheduled for harvest to a 15-square-foot basal area; 350 acres would be harvested to a 40-square-foot basal area. Nine miles of road would be constructed annually and 2,377 acres would be burned. The existing variety of stand ages, mixture of species in stands of trees, forest openings, and vistas would reduce over time. Acres with a Scenic Integrity Level of Very High or High where activity would occur total 644,908. Management activities would have a very high likelihood of adversely affecting an area with a Scenic Integrity Level of High or Very High.

**ALTERNATIVE C****DIRECT AND INDIRECT EFFECTS**

Annually, 1,698 acres would be scheduled for harvest to 15-square-foot basal area; 1,483 would be harvested annually to 40-square-foot basal area. Fifty-six miles of road construction and 32,900 acres of prescribed burning would be planned annually. The existing variety of stand ages, mixture of species in stands of trees, forest openings, and vistas would remain about the same over time. The variety of stand types (woodland, wooded grasslands) would increase over time. Acres with a Scenic Integrity Level of Very High or High where activity would occur total 233,330. Management activities would have a very low likelihood of adversely affecting an area with a Scenic Integrity Level of High.

**ALTERNATIVE C-1 & D****DIRECT AND INDIRECT EFFECTS**

Annually, 1,705 acres of harvest 15-square-foot basal area would be planned along with 1,483 acres harvested to a 40-square-foot basal area. Fifty-six miles of road construction and 15,000 acres prescribed burning would be scheduled annually. The existing variety of stand ages, mixture of species in stands of trees, forest openings and vistas would remain about the same over time. The variety of stand types (woodland, wooded grasslands) would increase over time.

The acres with a Scenic Integrity Level of Very High or High where management activity would occur is 233,330. Management activities would have a very low likelihood of adversely affecting an area with a Scenic Integrity Level of High.

## **ALTERNATIVE E-1**

### **DIRECT AND INDIRECT EFFECTS**

Annually 2,948 acres would be harvested to a 15-square-foot basal area; 361 acres would be harvested to a 40-square-foot basal area. Sixty-seven miles of road construction and 2,377 acres of prescribed burning would be planned annually. The existing variety of stand ages, mixture of species in stands of trees, forest openings, and vistas would remain about the same over time. The variety of stand types (woodland, wooded grasslands) would increase slightly over time. The acres with a Scenic Integrity Level of Very High or High where activity would occur is 233,330. Management activities would have a very low likelihood of adversely affecting an area with a Scenic Integrity Level of High.

## **SPECIAL AREAS**

A “Special Area” has specific management direction based upon the Forest Service Manual, Secretary of Agriculture authority or Congressional authority. The Kentucky State Nature Preserves Commission and The Nature Conservancy made recommendations for special areas for the protection of biological diversity on the DBNF. Several prescription areas address these recommendations: Cliffline Community, Riparian Corridor, Rare Community, Research Natural Area, Old-growth, Significant Bat Caves, Red River Gorge, both Wilderness areas, Natural Arch Scenic Area, and Wild & Scenic Rivers. The Habitat Diversity Prescription Area also addresses the recommendations. Some of these prescription areas are classified as Special Areas; others are not.

The following section discusses the Roadless Area analysis, which could lead to further Special Area classification.

## **ROADLESS AREAS**

A roadless area re-inventory was completed for the DBNF as part of the analysis of the management situation. Several areas were examined in detail and found not to meet the criteria. The Wolfpen area did meet the criteria for a roadless area and became an inventoried roadless Area (Appendix C).

The Wolfpen inventoried roadless Area, within the Red River Gorge Geological Area and adjacent to the Clifty Wilderness, was examined for consideration as a Wilderness study area, as was the Jellico Mountain area and the Beaver Creek Wildlife Management Area. Evaluation of these areas was based on the Forest Service Handbook as well as the Forest Service’s “Criteria for Roadless Areas in the East,” “Criteria for the Identification of Roadless Areas,” “Information needed for Forest Plan Revision,” “Southern Appalachian Assessment,” and the Regional Forester’s letter, “Clarification on Roadless Area Guidelines.” See Appendix C for more information.

The Wolfpen area, approximately 2,834 acres, is within the Red River Gorge Geological Area and is bounded on the east by Clifty Wilderness and the south by the Red River Wild and Scenic River corridor. It was evaluated by the Forest Service and found to meet the criteria as a Roadless Area in

the East as defined in Forest Service Handbook 1909.12. The re-evaluation of the DBNF for potential roadless areas, confirms that the Wolfpen area is an inventoried roadless area and the only area that qualifies. The area has one small tract of rugged private land in the southwest corner that can be accessed without going through National Forest System lands. It contains two unimproved roads, and a portion of the Sheltoewe Trace National Recreation Trail. Past human activities such as logging are fast disappearing. The Area like most of the Red River Gorge has very heavy recreation use and is heavily impacted by that use. Most human activity is related to dispersed recreation, primarily backcountry hiking and primitive camping. There are some privately held mineral rights within the area.

### **Roadless Area Conservation Rule**

On January 12, 2001, the Forest Service issued the Final Rule for Roadless Area Conservation in the Federal Register. Since that time, numerous legal challenges have been made to this decision, including a ruling on July 14, 2003, from the United States District Court, Wyoming District, where Judge Clarence Brimmer found the Roadless Area Conservation Rule to be in violation of the National Environmental Policy Act and the Wilderness Act and enjoined its implementation. However, this issue is not settled. Appeals of the Wyoming District Court decision, other litigation, new rulemaking, or new FSM directives could result in a change in direction for inventoried roadless areas.

The Roadless Area Conservation Rule (Roadless Rule) would place restrictions on the road construction and reconstruction activities; and the timber cutting, sale, or removal activities that could occur in inventoried roadless areas. 36 CFR 294.12 and 294.13 identify the exceptions where road construction/reconstruction activities and timber cutting/removal activities would be allowed.

In this EIS, the inventoried roadless areas were evaluated for possible wilderness study area recommendations. If areas were not recommended for wilderness study designation, other land allocations were considered for these areas, depending upon the overall emphasis of each plan alternative. In some alternatives, a particular roadless area's characteristics would be maintained, while in other alternatives, the area's roadless characteristics could be altered. The following describes by alternative, what would happen to these land allocations should the Roadless Area Conservation Rule restrictions go into effect.

### **ALTERNATIVE A, C, C-1, D AND E-1**

In Alternative A, C, C-1, D, and E-1 the Wolfpen Inventoried Roadless area (2,834 acres) is within the Red River Gorge Prescription Area. In this prescription area it remains an inventoried roadless area and will be evaluated as such during any site-specific analysis that includes the area.

### **ALTERNATIVE B-1**

In Alternative B-1 the Wolfpen Inventoried Roadless area (2,834 acres) would be recommended for designation as a Wilderness study area. Wolfpen, which is immediately adjacent to Clifty Wilderness, could meet the criteria for Eastern Wilderness if existing recreation activities and roads are eliminated. The Wolfpen Inventoried Roadless area was not included in the Wilderness designation of the Clifty Wilderness because of the existing unimproved roads and the heavy recreation use in the area. No additional special areas are recommended for the 2004 Forest Plan.

## LAND ADJUSTMENTS AND USES

### Affected Environment

The Daniel Boone National Forest land adjustment program includes: administration of land purchases, exchanges, transfers, or donations; acquisition and granting of easements; location and maintenance of landlines; and resolution of title claims and occupancy trespass cases. Land adjustments may result in changes to National Forest System land boundary lines.

The area for this analysis includes National Forest System lands as well as all other lands within the DBNF proclamation boundary, totaling 2,042,474 acres. Analyses of direct, indirect, and cumulative effects of the various alternatives are also based on this area. Within the proclamation boundary, 34 percent -- 693,728 acres -- is National Forest System lands. Occasional small tracts of National Forest System land occur outside the Proclamation Boundary. Boundary lines totaling 4,085 miles encompass National Forest System lands. These figures reflect a mixed ownership pattern of public and private lands throughout much of the DBNF. This intermingled ownership sometimes results in boundary problems, title claims, encroachments, and access challenges. An estimated 600 to 700 of these types of cases exist on the DBNF.

Land adjustments are made through land purchases, exchanges, transfers, title claims, and Small Tract Act cases. The Small Tract Act of 1983 authorizes the resolution of claims involving less than 10 acres through sale of land, exchange of land, or a combination of both. Since 1990 the DBNF has purchased approximately 34,825 acres, gained more than 4,381 acres through exchange, and acquired 124 easements across private lands. Each year the Forest resolves about five to seven occupancy trespass cases and averages about three title claim cases.

Land uses are activities conducted on National Forest System lands by individuals (e.g., private property access), corporations (e.g. transmission lines), or political jurisdictions (e.g., potable water lines). Land uses are authorized either by a special use authorization, an easement deed, a cooperative agreement, or a memorandum of understanding. Of the number of special use authorizations on the DBNF, 19 percent are transmission uses, 45 percent involve public roads and utilities, and 11 percent involve recreation uses (Table 3 - 94). Special use authorizations impact about three percent of the total acres on the Daniel Boone National Forest.

**Table 3 - 94. Types of land use on the DBNF, 2002, by number of authorizations and acres.**

Kind of Use	# of Auths.	Acres
Transmission	81	2,302
Agricultural	39	182
Industrial	3	114
Public information & community	18	15
Recreation	47	17,758*
Research, study, training	12	568
Transportation	139	949
Utility/Communication	56	298
Water	34	207
Temporary Uses	70	N/A
<b>Total</b>	<b>499</b>	<b>22,394</b>

\*Select Outfitter/Guide permits were for use of large areas.

Indicators used to evaluate land adjustments include acres of land added to or removed from the National Forest System. Numbers of special use authorizations were used to evaluate the impacts of each alternative from special uses. Because the exact number of acres or special use authorizations cannot be projected, a comparative method was used to illustrate the anticipated change in National Forest System lands acreage and uses as compared to the 1985 Plan.

## **Environmental Effects**

### **EFFECTS COMMON TO ALL ALTERNATIVES**

#### **DIRECT AND INDIRECT EFFECTS**

There are no environmental effects from the process of purchasing, exchanging, transferring, or donating land. Consolidation would have a similar result in all alternatives. Acquisition of private inholdings would promote more efficient administration. Similarly, disposing of scattered, isolated, and difficult to administer National Forest tracts would improve efficiency. As the National Forest becomes more consolidated, the need for easements would be reduced. Consolidation priorities, however, would differ based on the difference in Desired Future Conditions (DFCs) by alternative. The goals and DFC's of an area would guide what types of lands could be acquired or exchanged. A Landownership Adjustment Map, that displays current ownership, and priority areas for acquisition or exchange, in order to consolidate large areas is available at the Forest Supervisor's Office and at each District Ranger's Office.

Funding is one effect of land adjustments that would equally impact all alternatives. In the previous 10 years, funding for land acquisition has ranged from none to \$2 million. Funding for a purchase program is related to the overall economy and influenced by public support.

Efficient maintenance of property lines would be a priority in all alternatives. Boundary maintenance is often included in project budgets. A decline in project funding would translate into less opportunity to use project dollars for boundary location. Any environmental consequence from boundary management for any alternative selected is expected to be negligible.

Trespass and title claim cases would be similar in all alternatives. As urban interface increases, the number of trespass and claims cases would also be expected to increase. Resolution of trespass and title claim cases in any of the alternatives would have negligible environmental consequences.

Granting easements and procuring rights-of-way to access National Forest System land would vary among the alternatives only in the size of the program. Providing the public with legal access to National Forest System lands would remain a priority in each alternative. Better access through rights-of-way acquisitions will make the Forest more accessible and result in better utilization of resources.

The Goals and Desired Future Conditions of an area would guide the types of uses authorized. Recreation residence permits on new sites would not be authorized in the future in all alternatives.

**CUMULATIVE EFFECTS**

Land adjustments and uses in any given year have never involved more than 5,000 acres (0.24% of affected environment). In the last 12 years combined, land adjustments and uses have involved 48,740 acres (2.4% of affected environment). There are no known, identifiable cumulative effects from land adjustments and uses.

**ALTERNATIVE A****DIRECT AND INDIRECT EFFECTS**

Under this alternative, the 1985 Plan would continue to be implemented with no known effects to land adjustments and uses.

**CUMULATIVE EFFECTS**

None beyond those already described above.

**ALTERNATIVE B-1****DIRECT AND INDIRECT EFFECTS**

Emphasis in this alternative is custodial management with a minimum of direct human influence. Maintenance of existing recreation facilities would continue. The land adjustment program would be expected to emphasize acquisition of wilderness inholdings, land in wild and scenic river corridors and land for ecosystem protection. Selection of this alternative would result in a reduction of land use authorizations since emphasis would be placed on minimizing direct human impact.

**CUMULATIVE EFFECTS**

None beyond those already described above.

**ALTERNATIVE C****DIRECT AND INDIRECT EFFECTS**

This alternative emphasizes ecosystem management while providing for multiple public benefits. The land adjustment program would focus on obtaining diverse or underrepresented habitat types, environmentally sensitive lands such as wetland, old-growth, and riparian sites and land needed for protection of PETS species habitat. Selection of this alternative would result in very little change in special use management.

**CUMULATIVE EFFECTS**

None beyond those already described above.

**ALTERNATIVE C-1****DIRECT AND INDIRECT EFFECTS**

This alternative would emphasize maintenance of ecological process and function while providing for multiple public benefits with an emphasis on recreation. Land adjustment emphasis would be similar to Alternative C except for a heavier interest in acquiring land suitable for recreation use. Special use activity would differ only slightly from existing activity. An increase in recreation related authorizations, such as outfitter/guides, concessionaires, and recreation events, could result from selection of this alternative.

**CUMULATIVE EFFECTS**

None beyond those already described above.

**ALTERNATIVE D****DIRECT AND INDIRECT EFFECTS**

This alternative would emphasize recreational opportunities to the extent possible. The emphasis for land adjustment in this alternative would be acquisition of lands that enhance recreational opportunities. Some examples would be wilderness inholdings, water frontage property, lands with aesthetic or heritage resources, or lands offering more dispersed recreational opportunities such as hunting, fishing, hiking, and primitive camping. Selection of this alternative would likely increase the number of special use authorizations. A heavy emphasis on recreation would generate more requests for outfitter/guides, recreation event and concessionaire authorizations.

**CUMULATIVE EFFECTS**

None beyond those already described above.

**ALTERNATIVE E-1****DIRECT AND INDIRECT EFFECTS**

In this alternative the emphasis would be on production of goods and services beneficial to local and regional communities. This alternative would have effects similar to Alternative A. Land adjustment would have the widest latitude for development. Land suitable to provide high-quality forest products, wildlife, non-timber forest products, recreation, minerals, and for special uses would be targeted for acquisition. Special use authorizations would likely increase in an effort to provide maximum quality utilization from the forest.

**CUMULATIVE EFFECTS**

There would be no cumulative effects beyond those already described above.