UNITED STATES DEPARTMENT OF AGRICULTURE
Forest Service

Fork Mountain Vegetation Management Project

Environmental Assessment

Eastern Divide Ranger District, George Washington and Jefferson National Forests
Giles County, Virginia and Monroe County, West Virginia

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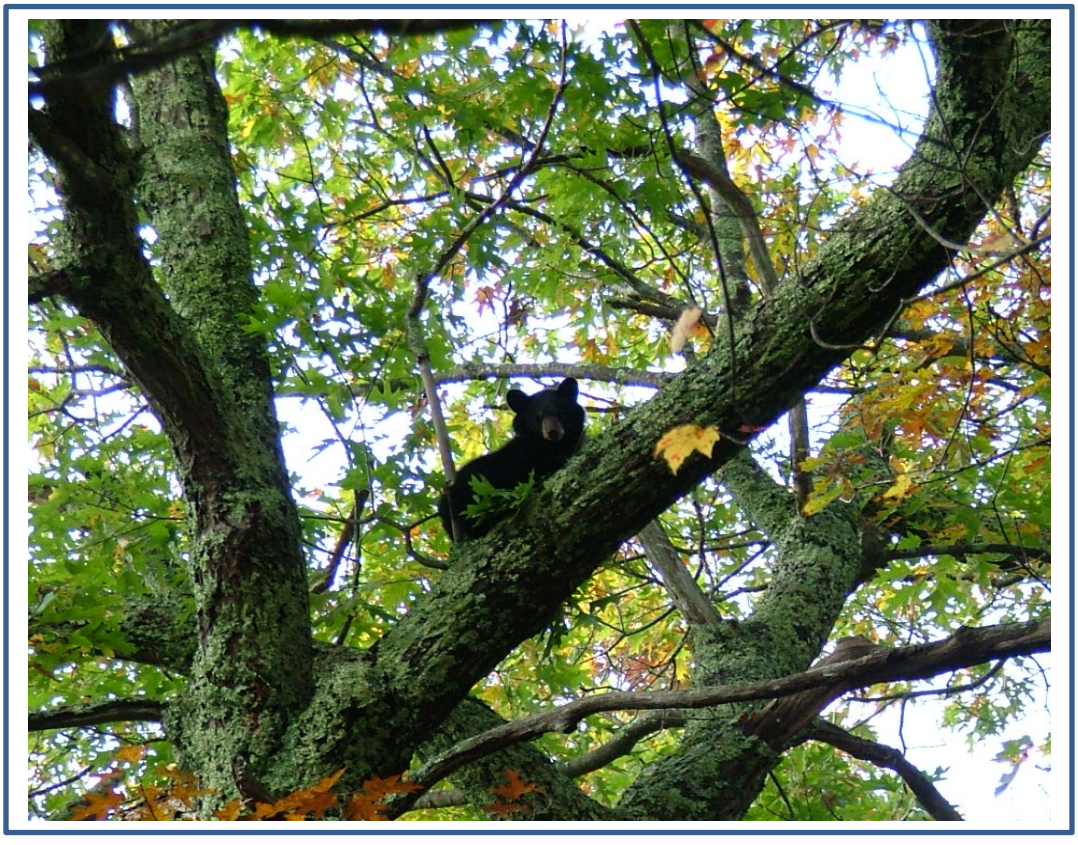

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CONTENTS

List of Tables

APPENDIX A - MAPS

List of Maps

APPENDIX B - THE DESIGN CRITERIA AND MITIGATION MEASURES

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Eastern Divide Ranger District is conducting an environmental analysis for the Fork Mountain Vegetation Management Project located in Giles County, Virginia and Monroe County, West Virginia. The project area is located on Fork Mountain and the south side of Peters Mountain north of Virginia State Route 635 (Stony Creek Road), approximately 13 air miles northeast of Pearisburg, Virginia and 1.5 air miles northwest of Waiteville, West Virginia (Appendix A, Map 1- Vicinity Map & Management Prescriptions).

This project primarily implements the vegetation management objectives of the 2004 Revised Jefferson National Forest Land and Resource Management Plan (Forest Plan) for Management Prescription (Rx) 8C–Black Bear Habitat Management. This management prescription emphasizes optimal habitat for black bears and for other wide-ranging area sensitive species where management activities are designed to provide a secluded and diverse habitat for bear, ensure adequate den sites, and maintain hard and soft mast production (pp. 3-120 through 3-124, Forest Plan). Other species expected to be found in the area include ovenbirds, cerulean warblers, hooded warblers, pileated woodpeckers, eastern gray squirrel and eastern wild turkey.

The Forest Service has prepared this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA) and other relevant Federal and State laws and regulations. This EA discloses direct, indirect, and cumulative environmental impacts that would result from the implementation of the proposed action and other alternatives and is organized into four chapters:

Chapter 1 – Proposed Action: This chapter includes information on the project area, the proposed action, purpose and need for the project, scoping, and issues.

Chapter 2 – Alternatives Considered: This chapter details the proposed actions as well as the alternative methods for achieving the stated purpose and need. Alternatives are based on issues and concerns raised by the public, other agencies, and internally. A summary of the proposed projects associated with each alternative is provided.

Chapter 3 – Environmental Effects: This chapter describes the existing conditions of various resources and the environmental effects of implementing the proposed action and each alternative.

Chapter 4 – Project Consultation and Coordination: This chapter provides a list of specialists and Federal and State agencies consulted during the development of the EA. It also identifies those who provided comments during the analysis process.

GENERAL AREA DESCRIPTION

The Fork Mountain project area encompasses approximately 11,714 acres of national forest system lands. There is one private inholding of approximately 185 acres located on the ridge top of Fork Mountain (shown in white on Map 1 in Appendix A). The area includes portions of the Potts Creek and Stony Creek watersheds. The topography is typical of the Ridge and Valley ecological subsection of the Central Appalachian Province, with long mountain ridges sharply dissected by numerous steep draws and limited flat areas along major streams. Slopes range from 5 to 35 percent, and the area is primarily south and north aspects. Elevations range between 2,600 feet above sea level along Stony Creek and North Potts Creek to about 3,900 feet along the top of Fork Mountain and 4,000 feet on top of Peters Mountain located on the north boundary of the project area.

National forest system lands within the project area are primarily dry-to-mesic oak forest communities, with some areas of cove hardwoods and a few stands of yellow pine on the southern aspects of finger ridges. Approximately 73% of the forested area is suitable (available) for commercial timber production under the criteria in the Forest Plan.

While none of the areas proposed for timber harvest contain old growth, it does exist in small to medium sized patches throughout the project area. See areas shown in green on Map 1 in Appendix A for Old Growth Emphasis Areas. Additional areas have been added to the existing old growth inventory from surveys conducted for this project. The age and species distribution of the area's vegetation is a function of commercial logging that primarily occurred between 1882 and 1940. Based on observations while conducting the old growth inventory, the presence of surface rock and steep slopes has primarily influenced where old growth occurs. Oak species dominate the old growth found in the area. The inventory identified new old growth patches as well as refined existing old growth boundaries. A map of the current inventory of old growth patches is in the project file.

The entire project area is skewed to the mid successional habitat where approximately 76% of the forested area is between 41 and 100 years old. Late successional habitat (101-130 years old) and old growth habitat (greater than 130 years old) account for 9% (997 acres) and 9% (1002 acres) of the project area, respectively. There are 753 acres (6%) in sapling-pole (11-40 years old) condition. Only 13 acres are in early successional habitat (0-10 years old) and that accounts for less than 1% of the project area versus the 4-10% desired in the Forest Plan for Rx 8C-Black Bear Habitat Management areas. Fire exclusion over the past 60-80 years has limited oak seedling establishment in the understory in favor of more shade tolerant species such as red maple, striped maple, sourwood and black gum. Soft mast exists in isolated areas but is not abundant within the project area. Blueberry and deciduous holly shrubs comprise most of the existing soft mast producing species. The area also contains 25 acres of grass/forb habitat in the form of linear wildlife clearings along closed roads and 11 individual wildlife openings.

The west side of the project area is accessed by Virginia State Route (VA) 613 which turns into Forest System Road (FSR) 945 (Salt Sulphur Turnpike) just above the private land inholding. Off of VA 613 or FSR 945 are the following FSRs: 10432 (Hermie Road), 10430 (Patterson Road), 10412 (Guthrie Road), 10411 (Warren Road), 10373 (Southside Peters Mountain), 1503 (Monroe Line Road), 10420 (Barton Road). The east side is accessed by FSR 10521 (Whiskey Hollow Road) and FSR 10522 (Fork Mountain Road), both begin off West Virginia State Route (WV) 17 (Waiteville Road). FSR 10481 (North Fork Potts Creek) accesses the northeast section of the project area from a road on private property. All FSRs, with the exception of FSR 945, are gated and closed to public vehicle traffic yearlong. FSR 945 is open yearlong. Map 2-Alternative 1 Overview of Commercial Harvests displays the access roads.

Proposed Action

The proposed vegetative treatments are designed to move towards the desired habitat mix for Rx 8C-Black Bear Habitat Management areas. Progress towards the early successional habitat objective will be made through proposed commercial timber regeneration harvests designed to create early successional forested conditions, which provide food and hiding and nesting cover for a variety of wildlife species. The food is often in the form of soft mast produced from a number of species such as pokeberry, blackberry, and blueberry. Soft mast can mitigate the impacts of years when acorn production is low. These young stands will also ensure a steady supply of hard mast in the most productive age classes in the future. Post-harvest silvicultural treatments will ensure that oaks and other nut-producing trees are dominant components of the future forest, which meets the long-term hard mast production objective.

Mid and late seral forests will continue to dominate the landscape while many acres will move to the 100+ year old age class. Currently, 76% of the analysis area is 41-100 years old with only 18% greater than 100 years old. No harvest is proposed in stands older than 100 years. The immediate hard mast production objective, including cerulean warbler habitat management, will be met through these existing mature oak stands and the commercial thinning of some mature oak stands. The thinning will favor dominant oak crowns thus enhancing mast production potential. This thinning also will create structural diversity that favors a variety of nesting forest birds such as the cerulean warbler, hooded warbler, veery, and wood thrush.

The creation of open woodland habitat will provide herbaceous habitat. The use of prescribed burning to promote oak regeneration and yellow pine restoration will also result in herbaceous vegetation throughout the understory of the burn units. These management actions are important to help meet the objective of interspersed herbaceous openings.

The control of non-native species competing with native vegetation is also a desired activity within the project area. Road corridors and previously disturbed areas can function as reservoirs for invasive plants creating the need for control measures.

The following are specific actions identified to strive towards meeting Rx 8C habitat objectives and standards. The proposed action is Alternative 1 (Appendix A, Map 2- Alternative 1 Overview of Commercial Harvests) and includes the following activities:

Early Successional Habitat Creation– Commercial harvest of 26 units on approximately 635 acres of mixed hardwood stands between 68 and 97 years old implementing four different silvicultural prescriptions (See Table 4. Commercial Harvest Activities Proposed for Alternative 1). This includes 360 acres of regeneration harvest, 252 acres of thinning/group selection, and 23 acres of open oak woodland habitat. Prescription methods are explained below in the Prescriptions section.

Construct 31 landings to provide adequate space for safe and efficient logging, loading and hauling operations. Following completion of their use, these areas would be revegetated using native seed to prevent erosion and provide wildlife habitat and forage.

Open Woodland Creation - Create open oak woodland conditions on 23 acres in two units after timber harvest. Activities would include piling slash, scarifying areas of soil, cutting stumps level to the ground, grubbing and piling some larger stumps, seeding areas with native grass seed, fertilizing, liming and mulching. The objective is to maintain these 23 acres in an open woodland condition with dominant oak trees with open-grown crowns, very little midstory and a native grass understory to provide wildlife benefits for a diversity of species including black bear, turkey and several songbirds.

Precommercial Thinning - Implement pre-commercial thinning through crop tree release on approximately 673 acres across 26 stands in the seedling-sapling seral stage. Most of the stands range in age from 26 to 32 years old. Crop tree release will be accomplished using chainsaws or handtools to remove competing vegetation near favored trees. This treatment will improve crown development on trees exhibiting good mast production potential and will increase vertical diversity.

Manual Site Prep - Conduct manual site preparation using chainsaws and supplemental planting on approximately 360 acres of regenerated stands and approximately 30 acres of group selection openings in 2 thinning units. Northern red oak, white oak or American chestnut species would be planted in these regenerated areas if there is a lack of competitive hard mast regeneration. This would help ensure an adequate composition of hard mast species in the new stand that, among other wildlife benefits, would provide future hard mast production.

Wildlife Opening Creation – Create wildlife openings on 8 acres in four landings by enlarging these landings after timber harvest. Activities would include piling slash, scarifying areas of soil, cutting stumps level to the ground, grubbing and piling some larger stumps, seeding areas with native grass seed, fertilizing, liming and mulching.

Road Maintenance – Road maintenance includes brushing, ditch pulling, blading, culvert replacement and gravel placement and would occur on 8.4 miles of Forest system roads. The following FSRs would receive some or all of the above maintenance activities.

- 0.4 miles of FSR 10432
- 0.7 miles of FSR 10430
- 1.1 miles of FSR 10412
- 1.2 miles of FSR 10411
- 0.3 miles of FSR 10373
- 0.6 miles of FSR 1503

- 2.3 miles of FSR 10420
- 0.3 miles of FSR 10521
- 1.5 miles of FSR 945

System Road Construction – Build approximately 3.9 miles of system roads in two segments. Each segment will be managed as closed to vehicular traffic following the project.

- Barton Road (FSR 10420) Extension for 2.8 miles to access Units 1-4 and 6-8, south of Potts Creek
- Johnson Flats Spur for 1.0 miles to access Units 9-11, north of Potts Creek

Temporary Road Construction – Build approximately 1.4 miles of temporary roads in five segments. These roads would be revegetated, bermed and closed to all vehicle traffic after all proposed activities requiring access are completed.

- 0.9 miles required to access Units 15 & 16
- 0.1 miles required to access Unit 11
- 0.1 miles required to access Unit 21
- 0.1 miles required to access Unit 22
- 0.2 miles required to access Unit 26

Road Decommissioning – Decommission 6.5 miles of existing Forest System Road in the project area. The road alignments of FSR 10521 and 15022 have slopes that are too steep and do not meet standards of system roads constructed today. FSR 10481 road alignment is located in close proximity to the north fork of Potts Creek and has experienced considerable illegal ATV use in the past. Activities proposed to decommission these roads include; water baring steep segments, constructing earthen berms, ripping where needed, and seeding with native grasses. Only the decommissioning of FSR 10481 and the section of FSR10521 in the drainage near the private land on the northeast corner of the project area will be done in a way that blocks access by felling trees and/or placing large vegetation in the roadway.

- 2.6 miles of FSR 10521 (Whiskey Hollow)
- 2.0 miles of FSR 10522 (Fork Mountain)
- 1.9 miles of FSR 10481 (North Fork Potts Creek).

Prescribed Fire – Conduct prescribed burning on approximately 3,581 acres across four burn blocks after commercial harvests are completed in those blocks. Burn block 1 is 2,691 acres, block 2 is 428 acres, block 3 is 64 acres and block 4 is 398 acres. The objectives in approximately 3,153 acres in three of the burn blocks would be to promote advanced oak regeneration in harvested areas, set back oak competitors like yellow poplar, striped and red maple, reduce fuel loading in areas outside the harvested units, and enhance forage throughout the burn block. This would be accomplished primarily with the use of backing fire tactics Yellow pine regeneration would be an additional objective in the fourth burn block on approximately 428 acres. A higher intensity burn is required to accomplish yellow pine regeneration objectives. Firing tactics would primarily include flanking fire with backing fire to a lesser degree. These could be growing season or dormant season burns. The decision will be primarily based on which seasonal burn will best limit overstory mortality. There will be a need for multiple prescribed burns in these areas to meet the silvicultural and wildlife objectives over a 5-10 year post-harvest period. Construction of approximately 0.5 miles of dozer line and 0.75 miles of handline would be required to augment existing containment lines, like roads and streams, for these burning blocks. Existing fire barriers like roads and streams are used for burn block containment lines wherever possible.

Non-Native and/or Invasive Plant Species Treatments –

- Treat non-native invasive species along Forest System Roads, totaling approximately 55 acres using a low volume foliar spray of glyphosate (Rodeo) or triclopyr (Garlon 4) to control invasive woody species, such as Tree-of-Heaven, Autumn Olive, Royal Paulownia, and Multi-flora Rose.
- Treat non-native invasive species over approximately 135 acres in five stands ranging from 26 to 43 years of age. Treatment by basal bark application would utilize triclopyr with an adjuvant to control invasive woody species such as Tree-of-heaven, Autumn Olive and Royal Paulownia in these stands. Within this acreage figure, only individual invasive plants scattered

over the 135 acres would be treated. For example, the 135 acres represents all the acreage in the proposed treatment units, but only individual non-native invasive species would be treated if found in these units. The same applies for the rest of the proposed treatment acres – herbicide would be applied directly to individual plants scattered over the treatment area

- Treat approximately 33 acres of hay-scented fern in harvest units located along FSRs 10411 and 10420 where found. Prior to harvest, it is not entirely certain where this fern is likely to flourish and impede forest regeneration, but it is likely to expand along these roads. This would involve using a low volume foliar spray of glyphosate to control this species.
- Treat approximately 275 acres with a basal bark herbicide application of triclopyr with an adjuvant to control non-native species, red and striped maple and other undesirable species throughout the thinning stands and open oak woodland areas. This activity will help maintain, enhance and restore the diversity and complexity of the native vegetation in the project area. Within this acreage figure, only individual invasive plants (either non-native invasive species or other unwanted woody vegetation that compete with important wildlife forage species or forest regeneration) scattered over the 275 acres would be treated. The same applies for the rest of the proposed treatment acres – herbicide would be applied directly to individual plants scattered over the treatment area

Grape Arbor Enhancement – Enhance grape arbors on approximately 104 acres for their value as wildlife food and shelter. This involves felling trees up to 12-inches diameter at breast height (dbh) that shade the perimeters of existing arbors. Cut trees would remain on site for wildlife cover.

PURPOSE AND NEED FOR ACTION

The 2004 Revised Jefferson National Forest Land and Resource Management Plan (Plan) identifies desired conditions and objectives at both the forestwide level and at the management prescription level. The Fork Mountain project is a site-specific proposal to implement the Forest Plan by moving the existing conditions within the Management Prescription (Rx) 8C–Black Bear Habitat Management lands in this area toward the Plan's desired conditions and objectives for these lands.

The following section describes the desired conditions and objectives for the Fork Mountain project area based on the Plan, followed by a description of the existing conditions.

Desired Conditions

Desired Conditions Forestwide

Wildlife and Threatened, Endangered, and Sensitive Species Habitat Goal 6 (Plan, p. 2-13): Maintain and restore natural communities in amounts, arrangements, and conditions capable of supporting native and desired non-native species within the planning area. Provide quality wildlife-based recreation opportunities to the public, including hunting, fishing, and wildlife viewing.

Vegetation, Old Growth and Forest Health Forest-wide Goal 12 (Plan, p. 2-24): Manage forest ecosystems to maintain or restore composition (mix of species), structure (age class distribution), and function (resulting benefits to the ecosystem and humans) with desired ranges of variability.

Timber Management Goal 15 (Plan, p. 2-32): Where forest management activities are needed and appropriate to achieve the desired composition, structure, function, productivity, and sustainability of forest ecosystems; a result of such activities will also be to provide a stable supply of wood products for local needs.

Desired Conditions for Management Areas 2 (Upper James River) and 3 (New River)

The project area lies within Management Area 2, the Upper James River Management Area and Management Area 3, the New River Management Area (Plan, pp. 4-7 through 4-15). The Desired Condition for these management areas includes restoration of the more open oak and oak-pine woodlands on the drier south-facing slopes and ridge tops through reintroduction of wildland and

prescribed fire to benefit many of the wildlife species found throughout this management area. Both early and late successional forest species can find important elements of their habitat needs in these historically widespread communities. Increased use of fire will also reduce potential wildland-urban interface problems along the Forest boundary where communities are developing. Habitat for more remote wildlife, like black bear, continues to be the emphasis in the Potts Creek drainage. There are no objectives specific to the management areas.

Desired Conditions for Management Prescriptions (Rxs)

All of the proposed activities, with the exception of prescribed burning, are located within a contiguous block of Rx 8C-Black Bear Habitat Management, totaling 11,714 acres (94.7%). There are scattered, small areas of Rx 6C-Old Growth Associated with Disturbance (406 acres, 3.2%) that fall within the prescribed burn units, and Riparian Corridors (Rx 11) exist throughout the project area. A small, elongated tract of Rx 9F-Rare Communities (259 acres, 2.1%) is also located within the project area boundary. (Shown in gold on Map 1 in Appendix A)

There are approximately 520 acres within the 8C Rx in the project area located on the south side of Stony Creek Road, but there are no proposed activities in these compartments. In addition, approximately 635 acres located on the east side of West Virginia State Road 15 in Monroe County do not have proposed activities, but they are also included in the project analysis. All proposed timber harvest units are within Rx 8C and within the Potts and Stony Creek watersheds.

Table 1. Management Prescriptions in the Fork Mountain Project Area

Prescription	Description	Acres
8C – contiguous block	Black Bear Habitat Management	11,049
6C	Old Growth Associated with Disturbance	406
9F	Rare Communities	259
11	Riparian Corridors	embedded
TOTAL		11,714

All proposed cutting activities occur within the Rx 8C area (See Maps 5a through 5d, Appendix A). The burning blocks are designed to use existing or natural fire breaks whenever possible to avoid construction of fire lines; however, in order to restore several hundred acres of oak-pine woodlands, approximately 0.5 miles of fireline would be constructed using a dozer and an additional 0.75 miles of handline would be constructed (See Map 10, Appendix A). As outlined below, the proposed prescribed burning is compatible with the Plan, the desired conditions, and the standards within each management prescription that falls within the project area.

Rx 8C–Black Bear Habitat Management

The desired condition for Rx 8C areas is primarily to manage the area for a mix of habitats for plants and animals associated with mid- to late-successional forest habitats (greater than 40 years of age) dominating the landscape, while having an interspersion of forest communities greater than 100 years of age. Herbaceous openings and understory browse/forage species are also desired. Along with black bears and bobcats, area-sensitive and other wildlife species associated with mid- to late-successional forest species expected to inhabit this area include: ovenbirds, northern saw-whet owls, cerulean warblers, wood thrushes, pileated woodpeckers, hooded warblers, scarlet tanagers, southern pigmy shrew, downy woodpecker, eastern gray squirrel, and eastern wood pee-wee. This management prescription also provides suitable habitat for eastern wild turkey. (Plan, p. 3-120).

A mix of forest successional stages characterizes these areas, but the focus is on oaks and hickories in their prime mast-producing years, between 40 and 100 years of age. The four primary objectives of Rx 8C that work toward this overall emphasis are (Plan, pp. 3-120 through 3-122):

> **8C-OBJ1: Maintain a minimum of 60% of the area between 40-100 years of age.** A mid-to late-successional forest greater than 40 years of age should dominate the landscape, with a

focus on oaks and hickories in their prime mast-producing years (40-100 years of age). Acorns are the primary food of black bears that inhabit the national forests in Virginia. In addition, the desired condition for these 8C areas specifically addresses providing a moderate stocking of tall trees with large diameters when cerulean warblers exist, as in this project area. It also says a dense shrub understory is maintained or enhanced where hooded warblers exist, again in this project area. The midstory should be multi-layered, composed of a diversity of shrubs, vines, grape arbors, and saplings.

8C-OBJ2: Maintain a minimum of 25% percent of the area in late-successional to old growth forest conditions. This includes embedded old growth and adjacent backcountry and wilderness areas. The area should be interspersed with both forest communities greater than 100 years of age and herbaceous openings, providing both wildlife habitat and visual diversity.

8C-OBJ3: Maintain a minimum of 4% of the prescription area in early successional forest habitat conditions (stand age less than 10 years, opening 2 acres in size and greater). Four to 10% of the forested land outside of semi-primitive core areas should be in this early successional forest conditions in order to ensure a steady supply of hard mast and ensure that oaks and other nut- producing trees are dominant components of the future forest. These early successional areas also establish and maintain a diversity of soft mast producing species so that berries and fruits are available in all season. Soft mast can mitigate the impacts of years when hard mast is low. Regeneration areas should have irregular shapes and be dispersed throughout the area.

Prescribed fire is also used to maintain the forested communities, encourage soft mast and oak sprouting, and reduce competition from more shade tolerant species. Southern yellow pine communities should also be maintained and restored, often with fire.

8C-OBJ4: Maintain an open road density at or below 0.8 miles per square mile or per 1,000 acres (applies to national forest system roads only). Overall, a secluded and diverse habitat should be provided, while protecting den trees. The Plan recognizes that roads are necessary to create and maintain habitat diversity and to effectively manage bear populations by distributing hunting pressure. It calls for managing open roads density as just described to ensure secluded habitats. Road and trail management is one of the most important factors in providing optimum black bear habitat. Roads management may also be used as a population regulation tool in cooperation with state wildlife management agencies. Controls on access may be tightened or loosened depending on the trend in local bear numbers, desired harvest levels, and other factors. There is no change to open road density with this proposal.

Rx 6C-Old Growth Forest Communities Associated with Disturbance

Management for the Rx 6C areas emphasizes protection, restoration, and management of old growth forests and their associated wildlife, botanical, recreational, scientific, educational, cultural, and spiritual values. On drier sites, large yellow pine exists. Plan Standards 6C-011 and 6C-012 emphasize the use of prescribed fire to restore and maintain old growth conditions. Prescribed fires are also designed to remove the oak leaf litter and duff layer, which inhibit pine development (Plan p. 3-83). No trees are proposed to be harvested within this Rx area (Plan pp. 3-81 – 3-84).

Rx 9F–Rare Communities

Rare communities are assemblages of plants and animals that occupy a small portion of the landscape, but contribute significantly to plant and animal diversity. They are protected from human-caused detrimental habitat change, the taking of threatened or endangered species, and the collection of living plants or animals unless such collections are for the purpose of achieving the stated management goals. The North Fork Stony Creek Special Biological Area (259 acres) is a high elevation valley containing several rare plants associated with beaver meadows and wet soils. Management activities occur within rare communities only where maintenance or restoration of rare community composition, structure, or function is expected. Non-native species can be controlled when causing negative impacts to rare communities (Plan, pp. 3-166 through 3-170).

Rx 11–Riparian Corridors

These areas are managed to maintain, restore and/or enhance the inherent ecological processes and functions of the associated aquatic, riparian, and upland components along all perennial and intermittent stream channels that show signs of scour, and around natural ponds, lakeshores, wetlands, springs and seeps. Vegetation management activities, including prescribed fire, may take place to maintain, restore, and/or enhance the diversity and complexity of native vegetation, rehabilitate both natural and human-caused disturbances, provide habitat improvements for aquatic and riparian-associated wildlife species (including migratory birds), provide for visitor safety, or to accommodate appropriate recreational uses (Plan, pp. 3-178 through 3-181). Rx 11 areas near the proposed harvest units have been identified on the ground. No trees are proposed to be harvested within this Rx area with the exception of incidental trees that need to be removed for road reconstruction.

Existing Conditions

For the analysis of successional habitat, the acres associated with the project area (Rx 8C and the acres of Rx 11 riparian habitat within that contiguous block for a total of 11,714 acres) are included in comparing the existing condition to the desired condition. Table 2 shows the successional stages present and their relative abundance in the contiguous 8C management area. Mid successional stages dominate the landscape. As shown in Table 2, the forested habitat (11,714 acres) in the project area is skewed to the mid successional habitats; approximately 76% of the area is in mid successional habitat (41–100 years) and there are only 38 acres within early successional habitat (0-10 years). Approximately 9% of the area is within late-successional habitat. In addition, approximately 9% of the area is in old growth condition of 130+ years.

Table 2. Existing Successional Habitats within the Forested Project Area, Rx 8C

Successional Habitat	Acres	Percent
Early (0-10 yrs)	13	<1%
Sapling/Pole (11-40 yrs)	753	6%
Mid (41-100 yrs)	8,924	76%
Late (101-130 yrs)	997	9%
Old (131+ yrs)	1,002	9%
Permanent Openings	25	<1%
Total	11,714	100%

Advanced oak regeneration is very sparse to non-existent and not tall enough to compete with other species, especially on higher quality, more productive sites. The lack of early successional and old growth habitat (both of which are below the desired range) has shaped the project proposal. The proposed action would increase the amount of habitat in the 0-10 year age class while allowing the oldest areas to move toward an old growth condition. Given the fact that hard mast production is important to black bears and associated species, the desire to see oak retained and regenerated is emphasized in this Rx area.

Since all of the proposed harvesting activities fall within Rx 8C, the in-depth discussion will focus on Management Prescription 8C – Black Bear Habitat Management. The Rx 8C area associated with most of the proposed actions is a contiguous block containing 11,714 acres that includes approximately 406 acres of Rx 6C, and intermingled riparian corridors of Rx 11, within the interior of the Rx 8C block.

Putting management of this 8C area into perspective with all the 8C areas on the Jefferson National Forest, there are 19 Rx 8C management areas dispersed across the Forest, ranging in size from 411 acres (number 17 on Map 11, Appendix A) to this continuous piece which has about 11,700 acres of the 8C prescription (12 and 13 on the map). The 411-acre parcel is the far west end of Sinking Creek Mountain. The entire top of Sinking Creek Mountain is 8C but it is interspersed with 6C areas (Old Growth with Disturbance). The three 8C areas on top of Sinking Creek Mountain total about 7,500 acres.

There are generally three levels of recreation opportunity classes associated with 8C areas. They are Roaded Natural (RN), Semi-primitive Motorized (SPM), and Semi-primitive Non-motorized (SPNM). (See the Forest Plan, Final Environmental Impact Statement (2004 FEIS), p. 6-34 for information about these classifications.) These classifications reflect the remoteness of the area, from a recreational and sense of solitude standpoint. All three classifications are applied to areas characterized by a predominately natural or natural appearing environment. However, Semi-Primitive areas have at least a moderately high probability of experiencing isolation from the sights and sounds of humans, and experiencing closeness to nature and sense of self-reliance. Roaded Natural areas have a low probability of experiencing isolation and these areas evidence of other uses is prevalent.

The two large concentrations of 8C closest to this project area are areas number 10 and 11 (one concentration) and area number 14. Areas 10 and 11 total about 5,000 acres and surround a Rx 12B-Non-motorized Backcountry Emphasis. These two areas along with the 12B area and some imbedded 6C areas make up the Mottesheard Roadless Area. No management activity is proposed within this Roadless Area so it will continue to age, subject primarily only to natural forces. There are no developed recreation facilities or maintained trails in this area and no roads open to public motorized vehicle use. As you can see on the map, all of this 8C area is considered Semi-primitive. The 8C area numbered 14 on Map 11 in Appendix A was reviewed in 2007 for the Olean Vegetation Management Project. This project regenerated about 6% of the Olean 8C area. No roads were constructed. The Olean area has an open road density of 1.15 miles/mi^2, which exceeds the Forest Plan objective for open road density of 0.8 miles/mi^2. For the Olean area, there were no opportunities to close roads in order to meet the open road density objective. The majority of open roads in the Olean Project Area is clustered in the northeastern corner (in a 600-acre block) and provides public access. The 0.9 miles of Olean Road that are open are needed to provide access to private land. However, outside of the clustered corner, there is still a core of about 2,900 acres where the open road density is 0.5 miles/mi^2. The Olean 8C area is all Roaded Natural, represented by green on the map, meaning it has “a low probability of experiencing isolation from the sights and sounds of man” (2004 FEIS p. 6-34).

The Fork Mountain area is mostly Roaded Natural with some of the area in the far west end classified as Semi-primitive. The presence of roads from past logging, prior to Forest Service ownership, result in the Roaded Natural designation for most of the area. All the roads in the Fork Mountain area, other than the main road of Salt Sulphur Turnpike are gated and closed yearlong to public motorized use. The fact that these roads are closed combined with other site conditions (considerable distance from population centers, limited access, abundance of den trees, and terrain that limits human use) made the Fork Mountain area a great location for focusing the 8C prescription.

This project focuses on the vegetation management objectives of Rx 8C Management Prescription. This prescription emphasizes managing for optimal habitat for black bears and other wide-ranging area sensitive species (Plan pp. 3-120 through 3-124). The Plan states “Management activities are designed to: 1) provides a secluded and diverse habitat; 2) ensure adequate den sites, and 3) maintain hard and soft mast production (Plan p. 3-120)”. The Fork Mountain area provides secluded habitat with many den sites, which make this a good bear area; however, increased forest age diversity and other activities to increase soft mast availability will improve bear habitat conditions.

The proposed vegetation management activities move the area towards some of the Desired Conditions of Rx 8C as outlined in the Plan. The Desired Conditions are achieved by maintaining at least 60% of the area in forested stands greater than 40-100 years of age, at least 25% of the area in stands greater than 100 years of age, and a minimum of 4% of the area in stands less than 10 years of age. These Plan objectives for Rx 8C (Plan, p. 3-122) are discussed in the next section where these objectives are compared with the existing conditions. Emphasis is also placed on increasing vertical vegetative diversity, maintaining or enhancing soft mast production, and limiting motorized access (Plan, p. 3-120).

Lastly, where activities are appropriate to achieve the desired composition, structure, function, productivity, and sustainability of forest ecosystems, a result of such activities will also be to provide a stable supply of wood products for local needs (Plan, p. 2-32). This is a Forest-wide objective.

Need

Comparing the existing conditions to the desired conditions and objectives for the Rx 8C area identifies several opportunities to move the area closer to the desired (Table 3). The following purposes for this proposal and associated needs for the action are as follows:

Table 3. Comparison of Existing Conditions with Desired Conditions and the Proposed Action at the End of 10 Years

Forest Plan Objectives	Existing Conditions	Opportunity and Need for Action	Proposed Action (at the end of the 10 year entry period)
8C-OBJ1: Maintain minimum of 60% of area 40-100 years old (minimum of 7,028 acres)	76% (8,924 acres) of Rx 8C area is 40-100 years old	16% of the area could be reviewed for regeneration to meet 8C-OBJ3	6,634 acres (57%) of Rx 8C area will be > 40 years old. It is not higher because many stands are over 90 now and will be over 100 years old, as shown below
8C-OBJ2: Maintain minimum of 25% of area > 100 years old (minimum of 2,929 acres)	18% (1,999 acres) of Rx 8C area is > 100 years old	In ten more years, this objective will be greatly exceeded due to the number of forested stands that are currently 90-100 years old, so this objective will be met at the end of this entry period while still regenerating some of the areas currently in this age group	38% (4,430 acres) will be > 100 years old
8C-OBJ3: Maintain minimum of 4% of forested area < 10 years old with openings ≥ 2 acres in size (minimum of 469 acres)	<1% (13 acres) of Rx 8C area is in early successional forest habitat	There is a need to pursue creating at least 469 acres of forest regeneration to create this habitat component	360 acres (3%) of Rx 8C would be 0-10 years old
8C-OBJ4: Maintain an open road density ≤ 0.8 miles per square mile	Open road density in Rx 8C area is currently 0.4 miles per square mile	Objective met, ensure that proposal does not exceed the desired open road density	The new system road will be closed to public motorized vehicle use so objective will still be met, as density will remain at 0.4 miles per square mile

To provide for the diversity of habitats desired within this bear management area, road construction will need to occur in order to access areas for commercial timber harvest. This will provide for the 0-10 forest habitat and the production of soft mast. The long-term objective is to manage these regenerated or thinned stands into the future to provide for future hard and soft mast.

Scope of the Environmental Assessment

National Forest planning takes place at several levels: National, Regional, Forest, and Project. The Fork Mountain Vegetation Project EA is a project-level analysis document; its scope is confined to addressing the purpose and need of the project and the possible environmental consequences of the

proposal and alternatives. It does not attempt to address decisions made at higher levels. It does however; implement direction provided at higher levels.

The Final Environmental Impact Statement for the Plan will guide this analysis. Together with the Plan, these documents provide the programmatic, or first, level of the two level decision process adopted by the Forest Service. These documents satisfy many requirements of the National Forest Management Act (NFMA 1976) while providing programmatic guidance. Where appropriate, the Fork Mountain Vegetation Project EA tiers to the Revised Plan's Final Environmental Impact Statement (2004 FEIS) (40 CFR 1502.20).

This EA evaluates and documents the potential effects caused by the proposed activities and various alternatives. The site-specific proposed action and alternatives to it are identified in Environmental Effects section of this document. The administrative scope of this document can be defined as the laws and regulations that provide the framework for the analysis contained in this EA.

All of these documents are available for review at the George Washington and Jefferson National Forests Supervisor's Office, 5162 Valleypointe Parkway, Roanoke VA 24019 or the Eastern Divide Ranger District Office, 110 Southpark Drive, Blacksburg VA 24060.

DECISION TO BE MADE

Based on the stated purpose and need, the deciding official will review the analysis in environmental assessment for this project and decide the following:

Should vegetative treatments including shelterwood harvest, site preparation (mechanical, burning, herbicide or some combination), planting oaks and/or chestnut, non-native invasive species mechanical or herbicide treatment, and thinning be carried out in the project area at this time? If so, what are the most appropriate treatment methods and what specific areas should be treated? What roads, if any, are needed to access the treatment areas? How should roads in the area be managed? Should fire be prescribed to reduce fuels and competing vegetation and if so what types of control lines are needed for the prescribed burn?

CHAPTER 2 - ALTERNATIVES

PUBLIC INVOLVEMENT

Scoping is the process of gathering comments about a site-specific proposed federal action to determine the scope of issues to be addressed and for identifying the unresolved issues, which are related to the proposed action (40 CFR 1501.7).

This proposal first appeared on the District's quarterly Schedule of Proposed Actions (SOPA) in the third quarter of calendar year 2013 as the Fork Mountain Vegetation Management Project and has appeared on the schedule as such since that time. Scoping was conducted by the District Interdisciplinary Team (IDT) to determine the issues and concerns related to the proposed action.

Scoping letters were mailed on August 6, 2013 to interested and affected agencies, organizations, and individuals informing them of the proposed action and requesting their input. A Legal Notice requesting comments was published in The *Roanoke Times* newspaper on August 7, 2013. The *Roanoke Times* is the "newspaper of record" for the Eastern Divide District. Some comments expressed concern that there was no legal notice in a West Virginia newspaper, given that a major part of the project is in Monroe County, West Virginia. Although no additional legal notice is required, in order to respond to this, the District put a legal notice in the *Monroe Watchman* on September 19, 2013. A FrontPage article, complete with colored maps of the project was also published in the *Monroe Watchman* on October 10, 2013. A follow up article on the project, with a focus on the prescribed burning, treatments to promote advanced oak regeneration and discussion of limited herbicide use, complete with photos was published in the *Monroe Watchman* on March 13, 2014.

Some comments were supportive. Many commenters had concern related to herbicide use and water quality, damage to trees during prescribed burning, a desire not to see the area change or any trees cut, and/or concerns about log truck traffic. A summary table of all comments received is provided in the project file.

ISSUES

Input gathered from all sources during the comment period was evaluated by the Interdisciplinary Team for relevance to the project and placed into one of two categories:

1. Project Issues- These issues are relevant to the project and are carried forward in the environmental analysis.

2. Non-Project Issues- These issues are ones that are not applicable to the project, usually for one of the following reasons: a) are beyond the scope of the proposed action, b) have already been decided by law, regulation or policy, or c) are conjectural, or not supported by scientific evidence.

In general, project issues are considered for formulating and developing alternatives, identifying applicable design criteria and/or mitigation measures, and in tracking and disclosing environmental effects. The "indicators" are used to measure differences between the alternatives and their effects relative to the issues. Two project issues were used to formulate alternatives, as discussed below. Alternatives were built around these two issues by reducing areas harvested and reducing the associated road construction, as these activities create the potential impact to watershed and water quality.

1. POTTS CREEK and STONY CREEK WATERSHEDS IMPACTS– There is concern that the commercial harvesting, system road construction, herbicide use, bladed skid and temporary road construction and prescribed burning activities may adversely impact water and aquatic resources, in a cumulative manner, within the Potts Creek and Stony Creek watersheds. The Potts Creek watershed has had one project in recent years: The Potts Creek Rail Trail. The Stony Creek watershed has had three projects in recent years: Kelly Flats, Sarton Ridge and White Rocks Vegetation Management Projects. Both Stony

Creek and Upper Potts Creek are identified in the Plan as Priority Watersheds possessing outstanding aquatic biodiversity because of the presence of the candy darter in Stony Creek and the James spinymussel in Potts Creek. The James spinymussel, a federally endangered freshwater mussel occurs in the South Fork of Potts Creek and Potts Creek proper, downstream of the project area. The candy darter, a sensitive fish species occurs in Stony Creek, downstream of the project area.

INDICATORS:

a. Cumulative estimated sediment yield from project activities in both Potts Creek and Stony Creek watersheds.

b. Whether or not the alternative would have significant impacts on the water and aquatic resources of Potts and Stony Creeks.

2. NEW SYSTEM ROAD CONSTRUCTION –There is a concern that new road construction would create an increase in erosion causing sedimentation, especially of Potts Creek as discussed above, and would increase illegal vehicle traffic in the area. Adequate management access to the eastern half of this project area currently does not exist. All three current Forest System Roads (FSRs) in this part of the project area are proposed for decommissioning. (See Map 2- in Appendix A). Of these three roads, FSR 10521 (Whiskey Hollow Road) and FSR 10522 (Fork Mountain) have road alignments that are excessively steep. FSR 10481 runs in and out of a riparian area. None of these roads meets standards of system roads constructed today. In order to provide appropriate management access to this part of the project area, approximately 3.9 miles of road construction are included in the Proposed Action (Alternative 1). These new road segments would come off FSR 10420 and be built on grades that are 3 to 8%, with one short pitch of about 10% near the end of the proposed Barton Road Extension (in Alternatives 1 and 4).

INDICATORS:

a. Whether or not the system road construction would have significant impacts on the soil, water, recreation and/or road management resources.

b. Whether or not the proposed road prism is in an acceptable location to construct a system road.

SILVICULTURAL PRESCRIPTIONS

The rationale for each forest stand treatment is detailed in the stand prescriptions found in the project record.

Shelterwood with Reserves. This is a regeneration treatment. The purpose of this treatment is to provide early successional habitat for a variety of wildlife and plant species including deer, ruffed grouse, and various songbirds. It provides a distribution of wildlife and plant habitat diversity across the landscape and raw wood materials to the local market. It also promotes hardwood regeneration while maintaining an overstory hard mast component.

Seventeen of the twenty-six proposed harvest units are Shelterwood with Reserves regeneration harvests (shown in Table 4. Commercial Harvest Activities Proposed for Alternative 1). This method results in forested stands being managed as even-aged or two-aged stands. Stands managed in an even-aged silvicultural system would be regenerated by removing most of the overstory now, leaving some of the old trees to serve as a source of seed and to protect the regeneration. In this proposal, the “shelter” trees would remain on site (versus the standard practice of removing them later when the regeneration is fully established) to provide structural diversity for improved wildlife habitat, to maintain them as potential den trees and for other wildlife nesting use, and to enhance scenic values.

The majority of these units are forest types 53 (white oak, northern red oak, hickory) and 60 (chestnut oak, scarlet oak). Site indexes range from 60–80, which is favorable for oak. This prescription would

be used to create early successional habitat while promoting oak regeneration in the new, young stands. The number of residual trees would range from 15-25 square feet of basal area per acre.

Distribution of residual trees would be non-uniform with clumps of various sizes and irregular shapes. These clumps of residual trees would be carried forward indefinitely with the new regeneration. Light conditions within the residual clumps should be favorable for development of advanced regeneration of hard mast producing species while openings would give shade-intolerant species full sun to develop. The clumps would provide habitat for primary and secondary cavity users as well as cover for deer and other wildlife species, and the loss of residual trees would be less by clumping the trees versus retaining individual trees scattered across the unit, due to wind-throw or logging damage.

Where choices for residual trees do not allow for the creation of clumps, the most dominant mast-producing trees in that unit exhibiting large healthy crowns with good form would be selected for retention even if this means a more even distribution of scattered leave trees. This pattern could also create favorable light conditions for oak regeneration while inhibiting growth of other competitors like yellow poplar. These scattered leave trees would produce similar wildlife benefits like when left in clumps, except for the more protective cover benefit.

Residual trees would be selected to meet management objectives and would consist of groupings of den trees, healthy oak and hickory, or those found in rock fields. Following harvest, site preparation would take place in openings, slashing down residual small trees between 1" and 6" diameter at breast height (dbh). The healthiest and largest soft mast producing trees (sourwood, serviceberry, dogwood, and black gum) would be retained for their wildlife forage value. New regeneration in openings would be more species rich than in the existing stand and subsequent timber stand improvement is expected to be needed to control competition from rapidly growing yellow poplar, striped maple and red maple.

Thinning. This is a cultural treatment designed to reduce stand density of trees primarily to improve growth, enhance forest health, control species composition, and recover potential mortality. Six units would be managed under a thinning prescription (shown in Table 4. Commercial Harvest Activities Proposed for Alternative 1). The objectives are to thin the stands to favor dominant and codominant canopy trees which will result in forested stands with fewer but larger trees. This structure will improve conditions for oak regeneration, increase hard mast production for bear and other wildlife forage, provide vertical diversity within the stand and improve habitat conditions for a variety of forest songbirds.

During thinning, most of the dominant mast-producing trees would be retained. Some small canopy gaps would be created by felling some of the dominant and codominant trees and most of the intermediate and suppressed trees. Approximately 25-35% of the existing canopy would be removed. The increased sunlight would promote the development of advanced oak regeneration and stimulate the development of the midstory and understory structure needed for many wildlife species. Cerulean warblers are found in one stand prescribed under this treatment and would benefit because they prefer a moderate stocking of tall trees (dominant) with larger diameters and spreading crowns.

All of the units prescribed for thinning are forest type 53 and have site indexes ranging from 60–80, which is favorable for oak. Trees would be removed down to a residual basal area of 60-80 square feet per acre. Thinning would be designed to leave large, healthy oaks with a crown ratio greater than 30%, potential or existing den trees, other hard mast-producing species or other species like yellow poplar and black cherry whose crowns are dominant in the canopy. Subsequent timber stand improvement is likely to control competition such as striped maple and red maple.

Thinning with Group Selections. Two stands in Compartment 7042 would be managed under this uneven-aged management silvicultural system (shown in Table 4. Commercial Harvest Activities Proposed for Alternative 1). Group selection, by itself, is an uneven-aged management tool designed to regenerate new age classes in stands by removing mature trees in small groups or clusters. This method creates certain characteristic conditions, particularly when the cutting leaves fairly circular openings. These conditions include increased levels of light, nutrients and moisture, and increased

direct solar energy at the surface – promoting more rapid decomposition and release of nutrients within the group.

Trees would be removed in 3/4 to 2-acre sized groups to provide microclimates suitable for oak regeneration. No early successional forest would be created by these group selections because their size would be less than 2 acres so they are not large enough to create a successional area. Yellow poplar is a fast-growing, shade-intolerant species and makes up a fair component of the species composition in the two stands prescribed under this silvicultural method. It provides fierce competition to oak and is problematic for oak regeneration. Oak would not be able to out compete yellow poplar in larger openings where light would be abundant. Opening the canopy with 3/4 to 2-acre groups would benefit oak species by providing light conditions favorable for advanced oak regeneration. Groups would be scattered throughout the stands and their locations driven by the presence of declining oak, and areas of poor species diversity.

Between the group openings created by this method, the matrix would be treated using the thinning prescription above to allow more sunlight to penetrate the canopy and start the process of promoting advanced oak regeneration; although at a slower pace than would occur in the harvested groups. Thinning would leave 60 to 80 square feet of basal area per acre leaving healthy oak, other hard mast producers, and den trees.

The two stands that would be treated under this prescription are forest type 53 and have a site index of 70. This prescription increases spatial heterogeneity, vertical diversity, and promotes hard mast production in stands where yellow poplar competition would be a problem for oak regeneration if the area had a more extensive regeneration cut. The structural diversity created would provide diverse habitat and mimic old growth conditions.

Open Woodlands – Shelterwood with Reserves. There is one 18-acre unit and two small parts, totaling 5 acres, of a neighboring shelterwood unit that would be managed under this prescription. The "open woodland" prescription would create a two-aged stand with a higher residual basal area than the shelterwood with reserves method described above. There would not be any intention of returning to remove the residual overstory created by the initial harvest. The objective is to maintain the trees to group into very large diameter trees for their wildlife value, providing a long-term source of mast and a source of potential den trees, while creating an open understory that can benefit an array of wildlife species found in the project area like bear, wild turkey and songbirds. The understory would consist of a grass/forb mix and scattered blueberry depending on the rockiness of the soil. This approach would create stands managed under the shelterwood with reserves two-aged silvicultural system.

Both units are forest type 53 and have a site index of 70, which is ideal for oak stand management. The landscape in these two stands is unusually flat considering the overall project area. Trees would be harvested across the entire unit down to a residual basal area range of 30–50 depending on crown size and species composition. The remaining overstory would allow plentiful sunlight to reach the ground and stimulate the understory and midstory. The objective is to promote an open grassy understory interspersed with large diameter mast-producing trees far into the future. Mowing and/or prescribed fire will be used to maintain and promote the grass/forb habitat.

Other post-harvest treatments will be required to move these stands to their desired conditions. Those activities would include grubbing of larger stumps, piling stumps and large diameter slash, pile burning, scarifying patches of soil for seedbed preparation, and sowing native warm season grass seed, liming, and fertilizing, mulching and subsequent mowing. Planting of superior northern red oaks and white oaks and blight-resistant American chestnuts, should chestnuts become available, would be considered if conditions dictate the need for some regeneration.

ALTERNATIVES CONSIDERED

This chapter describes the various alternatives developed by the IDT designed to respond to the resource needs of the project area and to specific issues and concerns identified through the public scoping process. Alternatives were designed with an interdisciplinary approach considering:

1. the size and scope of the project,
2. the purpose and need,
3. the issues, and
4. The expected environmental impacts.

The alternatives include mitigation measures and monitoring requirements. This chapter also provides a brief comparison of the alternatives. This information, along with the disclosure of projected environmental consequences in Chapter 3 and other included analysis found in the project file, provides the decision-maker with the information necessary to make a reasoned choice between the alternatives. Alternatives considered but eliminated from detailed analysis area also briefly described.

Alternative 1 (Proposed Action)

Table 4. Management Activities for Alternative 1

Activity	Units
Commercial Timber Harvest	635 Acres
• Shelterwood with Reserves	*360 acres*
• Thinning	*156 acres*
• Thinning with Group Selection	*96 acres*
• Open Woodlands	*23 acres*
System Road Construction	3.8 Miles
Decommission System Roads	6.5 Miles
System Road Maintenance	8.4 Miles
Temporary Road Construction	1.4 Miles
Landing Construction (31 landings)	8.5 Acres
Prescribed Burning (4 burn blocks)	3,581 Acres
Treatment of Non-Native Invasive Species along Roads with Herbicide (as needed)	55 Acres
Control of Hay-scented Fern with Herbicide (as needed)	33 Acres
Treatment of Non-Native Invasive Species in Stands with Herbicide (as needed)	135 Acres
Mechanical Site Prep	390 Acres
Supplemental Planting of Oaks and American Chestnut (as needed)	390 Acres
Grape Arbor Enhancement	104 Acres
Pre-commercial Thinning (crop tree release)	673 Acres
Control of Striped Maple, Non-Native Species and undesirable species through basal bark application of herbicide (as needed)	275 Acres
Development of Open Oak Woodland Habitat	23 Acres

Table 5. Commercial Harvest Activities Proposed for Alternative 1

Unit Number	Compartment/ Stands	Acres	Forest Type	Site Index	Stand Age (Years)	Proposed Prescription
1	7050/ 9	21	53	80	93	Thinning
2	7050/ 10, 12	21	53	70	75	Thinning

Unit Number	Compartment/ Stands	Acres	Forest Type	Site Index	Stand Age (Years)	Proposed Prescription
3	7050/ 12, 13	13	53	70	68	Shelterwood w/ Reserves
4	7050/ 12	25	53	70	76	Shelterwood w/ Reserves
5 (2 tracts)	7045/ 34, 36	9	53	70	76	Shelterwood w/ Reserves
6	7050/10	18	60	70	87	Open Woodland
7	7050/ 10, 17	14	53	80	78	Shelterwood w/ Reserves
8	7050/ 15	13	53	70	75	Shelterwood w/ Reserves
9	7048/ 18, 19, 32	19	53	70	76	Shelterwood w/ Reserves
10	7048/ 32, 35	20	60	60	89	Shelterwood w/ Reserves
11	7048/ 27	12	53	70	81	Shelterwood w/ Reserves
12	7042/ 8	32	53	70	90	Shelterwood w/ Reserves
13	7042/ 3	27	55	70	90	Shelterwood w/ Reserves
14	7042/ 9, 12, 13, 19	28 5	60	70	85	Shelterwood w/ Reserves Open Woodland
15	7042/ 10, 11, 19	60	53	60	83	Thinning w/ Group Selections
16	7042/ 6, 10, 11	36	53	60	77	Thinning w/ Group Selections
17	7038/ 23, 28	22	53	60	97	Shelterwood w/ Reserves
18	7038/ 23, 28	15	53	60	97	Shelterwood w/ Reserves
19	7037/ 1, 3	27	45	70	86	Shelterwood w/ Reserves
20	7037/ 1, 2	17	53	70	86	Thinning
21	7041/ 7, 8	32	53	60	86	Shelterwood w/ Reserves
22	7041/ 7, 18	34	53	80	86	Shelterwood w/ Reserves
23	7041/ 8	23	53	60	87	Thinning
24	7041/ 11, 13	14	53	70	76	Shelterwood w/ Reserves
25	7043/ 28	43	53	60	93	Thinning
26 (2 tracts)	7043/ 24	31	53	60	90	Thinning

*45 = Chestnut Oak, Scarlet Oak, Yellow Pine
*53 = White Oak, Northern Red Oak, Hickory
*55 = Northern Red Oak
*60 = Chestnut Oak, Scarlet Oak

Alternative 2 (No Action)

No vegetative treatments or other actions described in Chapter 1 of this document would be implemented under this alternative. Current management would continue. The no action alternative recognizes that ecosystems change in the absence of active management. It is essentially the “status

quo" that allows current activities and policies, such as road and wildlife opening maintenance, and wildland fire management to continue.

Alternative 3 (No New System Road Construction)

Only existing Forest System Roads and temporary roads would be used for management activities. This alternative would have fewer vegetation treatments and associated post-harvest activities, because the proposed road construction which accesses several forest stands proposed for treatment under Alternative 1 (Appendix A, Map 3- Alternative 3 Overview of Commercial Harvests) would not occur.

This alternative responds to concerns about potential adverse impacts of timber harvest, road building, and other vegetative management activities to aquatic resources and public access in the project area.

Table 6. Commercial Harvest Activities Proposed for Alternative 3

Unit Number	Compartment/ Stands	Acres	Forest Type	Site Index	Stand Age (Years)	Proposed Prescription
5 (2 tracts)	7045/ 34, 36	9	53	70	76	Shelterwood w/ Reserves
12	7042/ 8	32	53	70	90	Shelterwood w/ Reserves
13	7042/ 3	27	55	70	90	Shelterwood w/ Reserves
14	7042/ 9, 12, 13, 19	28 5	60	70	85	Shelterwood w/ Reserves Open Woodland
15	7042/ 10, 11, 19	60	53	60	83	Thinning w/ Group Selections
16	7042/ 6, 10, 11	36	53	60	77	Thinning w/ Group Selections
17	7038/ 23, 28	22	53	60	97	Shelterwood w/ Reserves
18	7038/ 23, 28	15	53	60	97	Shelterwood w/ Reserves
19	7037/ 1, 3	27	45	70	86	Shelterwood w/ Reserves
20	7037/ 1, 2	17	53	70	86	Thinning
21	7041/ 7, 8	32	53	60	86	Shelterwood w/ Reserves
22	7041/ 7, 18	34	53	80	86	Shelterwood w/ Reserves
23	7041/ 8	23	53	60	87	Thinning
24	7041/ 11, 13	14	53	70	76	Shelterwood w/ Reserves
25	7043/ 28	43	53	60	93	Thinning
26 (2 tracts)	7043/ 24	31	53	60	90	Thinning

*45 = Chestnut Oak, Scarlet Oak, Yellow Pine
*53 = White Oak, Northern Red Oak, Hickory
*55 = Northern Red Oak
*60 = Chestnut Oak, Scarlet Oak

Alternative 4 (Barton Road Extension Only)

In this alternative, the only new system road construction would be the Barton Road extension. Construction of the Johnson Flats Spur section, approximately 1 mile of new road that spurs to the

north and east of the Barton Road Extension, is not in this alternative. Proposed harvest units and associated post-harvest treatments north of Potts Creek would not occur (Appendix A, Map 4-Alternative 4 Overview of Commercial Harvests). This alternative also responds to concerns about potential adverse impacts of timber harvest, road building, and other vegetative management activities to aquatic resources and public access in the project area.

Table 7. Commercial Harvest Activities Proposed for Alternative 4

Unit Number	Compartment/ Stands	Acres	Forest Type	Site Index	Stand Age (Years)	Proposed Prescription
1	7050/ 9	21	53	80	93	Thinning
2	7050/ 10, 12	21	53	70	75	Thinning
3	7050/ 12, 13	13	53	70	68	Shelterwood w/ Reserves
4	7050/ 12	25	53	70	76	Shelterwood w/ Reserves
5 (2 tracts)	7045/ 34, 36	9	53	70	76	Shelterwood w/ Reserves
6	7050/10	18	60	70	87	Open Woodland
7	7050/ 10, 17	14	53	80	78	Shelterwood w/ Reserves
8	7050/ 15	13	53	70	75	Shelterwood w/ Reserves
12	7042/ 8	32	53	70	90	Shelterwood w/ Reserves
13	7042/ 3	27	55	70	90	Shelterwood w/ Reserves
14	7042/ 9, 12, 13, 19	28 5	60	70	85	Shelterwood w/ Reserves Open Woodland
15	7042/ 10, 11, 19	60	53	60	83	Thinning w/ Group Selections
16	7042/ 6, 10, 11	36	53	60	77	Thinning w/ Group Selections
17	7038/ 23, 28	22	53	60	97	Shelterwood w/ Reserves
18	7038/ 23, 28	15	53	60	97	Shelterwood w/ Reserves
19	7037/ 1, 3	27	45	70	86	Shelterwood w/ Reserves
20	7037/ 1, 2	17	53	70	86	Thinning
21	7041/ 7, 8	32	53	60	86	Shelterwood w/ Reserves
22	7041/ 7, 18	34	53	80	86	Shelterwood w/ Reserves
23	7041/ 8	23	53	60	87	Thinning
24	7041/ 11, 13	14	53	70	76	Shelterwood w/ Reserves
25	7043/ 28	43	53	60	93	Thinning
26 (2 tracts)	7043/ 24	31	53	60	90	Thinning

*45 = Chestnut Oak, Scarlet Oak, Yellow Pine
*53 = White Oak, Northern Red Oak, Hickory
*55 = Northern Red Oak
*60 = Chestnut Oak, Scarlet Oak

Comparison of Alternatives

Table 8. Comparison of Management Activities by Alternative
Acreages and mileage are approximate. See the attached maps for specific locations of activities in each action alternative (1, 3, and 4).

Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Commercial Timber Harvest	634 Acres	0 Acres	459 Acres	584 Acres
• *Shelterwood with Reserves*	*360 acres*	*0 acres*	*244 acres*	*309 acres*
• *Thinning*	*156 acres*	*0 acres*	*114 acres*	*156 acres*
• *Thinning with Group Selection*	*96 acres*	*0 acres*	*96 acres*	*96 acres*
• *Open Woodlands*	*23 acres*	*0 acres*	*5 acres*	*23 acres*
System Road Construction	3.8 Miles	0 Miles	0 Miles	2.8 Miles
Decommission System Roads	6.5 Miles	0 Miles	6.5 Miles	6.5 Miles
System Road Maintenance	8.4 Miles	0 Miles	8.4 Miles	8.4 Miles
Temporary Road Construction	1.4 Miles	0 Miles	1.3 Miles	1.3 Miles
Landing Construction (31 landings in Alt 1)	8.5 Acres	0 Acres	5.3 Acres	7.5 Acres
Prescribed Burning (4 burn blocks in Alt 1)	3,581 Acres	0 Acres	890 Acres Burn Blocks 2,3 & 4	3,581 Acres
Treatment of Non-Native and Invasive Species along roads with Herbicide (as needed)	55 Acres	0 Acres	55 Acres	55 Acres
Control of Hay-scented fern with Herbicide (as needed)	33 Acres	0 Acres	33 Acres	33 Acres
Treatment of Non-Native and Invasive Species in stands with Herbicide (as needed)	135 Acres	0 Acres	135 Acres	135 Acres
Mechanical Site Prep	390 Acres	0 Acres	274 Acres	339 Acres
Supplemental Planting of Oak and American Chestnut seedlings (as needed)	390 Acres	0 Acres	274 Acres	339 Acres
Grape Arbor Enhancement	104 Acres	0 Acres	104 Acres	104 Acres
Pre-commercial Thinning (crop tree release)	673 Acres	0 Acres	673 Acres	673 Acres
Control of striped maple, non-native species and undesirable species through basal bark application of herbicide (as needed)	275 Acres	0 Acres	215 Acres	275 Acres
Development of Open Oak Woodland Habitat	23 Acres	0 Acres	5 Acres	23 Acres

Table 9. Comparison of Forest Plan Objectives at End of 10 Year Entry Period by Alternative
Acreages and mileages are approximate.

Plan Objective	Unit of Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Minimum of 60%- 40 – 100 years of age	% of Rx 8C Project Area	56.6%	59.7%	57.6%	57.1%

Minimum of 25%- > 100 years	% of Rx 8C Project Area	37.8%	38.6%	37.8%	37.8%
Minimum of 4% and maximum of 10% in early successional- 0 – 10 years of age	% of Rx 8C Project Area	3.1%	>1%	2.1%	2.6%
Open Road density- <= 0.8 miles per square mile	Miles/square mile	0.4	0.4	0.4	0.4

Alternatives Eliminated from Detailed Study

Several alternatives were considered but not proposed for detailed study because they did not contribute to the purpose and need of the action, were inconsistent with Plan management direction, or were not feasible due to existing conditions in the project area. Two potential alternatives that received the most consideration but dropped from detailed analysis are described below.

Expanded Even-age and Uneven-age Management on the Southeast Aspect of Fork Mountain – An alternative to create additional early successional habitat to reach the 4% minimum objective through even-age management on the southeast aspect of Fork Mountain east of VA 613 and north of VA 635 and WV 17 was considered. Access is limited and would have required substantial new road construction. Further, site indexes in these stands on this aspect of Fork Mountain are low. These stands are slower growing, produce lower quality of timber and lower value species and would not support the cost of new road construction and the required post-harvest activities needed to ensure adequate regeneration. There is also an increased visual concern from the Appalachian National Scenic Trail corridor on this aspect of Fork Mountain. Development of this alternative might have fully achieved meeting 8C-OBJ3, which is not met with any of the action alternatives, but the benefits do not appear to outweigh the costs from an economic or resource protection perspective, so this alternative is not proposed as one to be analyzed in detail.

Even-age Management using Clearcutting Method of Regeneration in the Proposed Action- An alternative to use clearcutting or clearcutting with reserves as the regeneration method to create early successional habitat and ensure adequate oak regeneration was dropped from consideration because it did not create the post-harvest microclimate that offers the best chance of advance oak regeneration. It also did not provide the best opportunity to create future den trees in the harvested stands nor the vertical diversity desired for a bear management objective. Managing for future den sites is important in an area managed for black bear. Shelterwood with reserves would create more shading to minimize other species competition, especially yellow poplar, with advanced oak regeneration.

Design Criteria and Mitigation Measures

Each action alternative will follow the Forestwide common standards stated in the Plan. Most applicable are the standards found on pp. 2-7 through 2-62 for Forestwide Standards, pp. 3-120 through 3-124 related to Standards for Rx 8C (Black Bear Habitat Management) and pp. 3-181 through 3-187 related to Standards for Rx 11 (Riparian Corridors). Standards particular to project implementation for this EA are outlined in Appendix B. Potential effects can be reduced or eliminated by implementing design criteria specified in the Plan standards and through use of Virginia Department of Forestry Best Management Practices for Water Quality (2011 Revision) and West Virginia Division of Forestry Best Management Practices for Controlling Soil Erosion and Sedimentation from Logging Operations (2009 Revision).

Project-Specific Design Features or Mitigation Measures:

The following measures were specifically developed for this project and are not outlined in the Plan.

- The boundary of Unit 24 was modified due to its proximity to a Virginia Department of Conservation and Recreation's Division of Natural Heritage Resource site. None of the acreage in this unit lies north of FSR 10411.

- Road construction, specifically the Barton Road Extension would require crossing some areas of old growth where rock bars are associated with subsurface flow of water. Every effort will be made to minimize the removal of large old growth trees as this road corridor is constructed.

- After stabilizing erosion sources, FSR 10481 and the north end of FSR 10521 will be decommissioned and will have adjacent vegetation placed in the roadway to improve protection of the soil and associated riparian areas and reduce the potential for any vehicle use.

- The area has numerous potential bear dens that will be individually identified and buffered from disturbance by 100 feet when marking commercial timber sales. Potential den trees are greater than 20 inches dbh. Potential den trees also include those that are hollow with broken tops or those with limbs greater than 12 inches diameter broken near the bole of the tree. This area contained the highest concentration of radio-collared sows for the southern portion of the Cooperative Allegheny Bear Study. The ruggedness of the area and large quantity of potential den sites may help explain these observations.

- Where there are small inclusions of steeper slopes (over 35%) in the harvest units, it will require winching logs to a skid road to mitigate the slope and avoid excessive skid road building. Winches will be required in the timber harvest contract.

- Each burn unit will be planned in accordance with the Smoke Management Guidelines such that specific parameters are met, including wind speeds and directions.

- The road decommissioning of FSR 10522 and FSR10521 from the south end near VA State Route 635 up to the point where it hits the proposed new road construction will be done in a way that walking these old roadbeds will not be a problem. Only the decommissioning of FSR 10481 and the section of FSR 10521 in the drainage near the private land on the northeast corner of the project area will be done in a way that blocks access by placing large vegetation in the roadway.

MONITORING

Monitoring of the project actions will occur to ensure that various aspects of the project adhere to the standards of the Plan, the applicable State Best Management Practices, and conform to project-specific mitigation measures set forth in this document. Monitoring will also occur to verify that accuracy of the predicted effects this assessment discloses. Specific monitoring responsibilities and activities include:

The Timber Management Assistant (TMA)/Silviculturist and District Biologist will review the project prior to implementation to ensure that the locations of any access routes, sale boundaries, and the silvicultural prescriptions are carried out as described by this assessment.

The Timber Sale Contract team, primarily the Timber Sale Administrator, will ensure actual operation of the timber sale follows measures described in this assessment.

The District TMA/Silviculturist/Forester/Technicians will survey the stands 1 year and 3 years following sale closure to determine harvest areas have regenerated adequately. In addition to adequate regeneration, the species composition of the regeneration will be monitored since one of the primary objectives for this project is to provide oak and potential American chestnut regeneration. A significant part of certifying regeneration will be to monitor for the presence of any non-native invasive species in these areas.

The District Biological Technicians will continue to monitor aquatic macroinvertebrates in North Fork Stony Creek and North Fork Potts Creek.

The District TMA/Silviculturist will monitor all road locations, landings and bladed skid roads for at least three years following sale closure to ensure sites are stable and adequately re-vegetated and will monitor control needs of non-native invasive species.

The District Biologist will monitor the Open Oak Woodland Habitat for successful establishment of desired understory vegetation and control needs for invasive species.

CHAPTER 3 – AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

PAST, PRESENT AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past activities in the project area are:

- Construction of a 0.1 acre parking area at the beginning of the Whiskey Hollow Road.
- 3.1 miles of past impacts from previously decommissioned roads, old trails, parking areas, old landings, old skid trails and an unauthorized road in Compartments 7037, 7038, 7041, 7042, 7048, 7050. These impacts have resulted in an estimated 8 acres of long-term effect to soil productivity.
- Prescribed burning of the Salt Sulphur Block in 2008.
- Construction of the Potts Creek Rail Trail from the old railroad through private land.
- Gypsy moth defoliation in the Dixon Branch portion of the project area. Areas estimated up to 10 acres show signs of overstory oak mortality resulting from the last defoliation.

Future activities:

- The Eastern Divide Ranger District made a decision to create 8 acres of grass/forb habitat, prescribe burn 40 acres, and enhance grape arbors on 57 acres on the eastern end of Fork Mountain on September 20, 2006; these activities have not yet occurred. It also included construction of a small parking area, which was constructed.
- Mountain Valley Pipeline, LLC is proposing to construct and operate approximately 286 miles of a natural gas pipeline referred to as the Mountain Valley Pipeline. MVP has pre-filed with the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. Should MVP file an application to construct a pipeline, FERC will be the lead agency and will conduct an in-depth environmental analysis prior to deciding on the need for the pipeline. A portion of the proposed pipeline would cross National Forest System lands on the Jefferson National Forest. If FERC would determine the pipeline is needed, the Forest Service would make a separate determination whether to issue a right-of-way permit to construct, operate, and maintain a natural gas pipeline on the JNF. MVP has identified an alternative route that would cross the Jefferson National Forest just east of the Fork Mountain Vegetation Management Project. The effects of the pipeline could overlap the effects of the Fork Mountain Project in the areas of vegetation changes, impacts on water quality in Potts Creek, and on the visual resources as seen from Hanging Rock and Wind Rock.

BIOLOGICAL ENVIRONMENT

Major Forest Communities

Issue Related to the Resource:
None.

Scope of the Analysis:
The geographic scope is based on the contiguous Rx 8C area. This includes 11,714 acres of national forest system land along the south side of Peters Mountain and including Fork Mountain. The scope of the analysis for most aspects of the vegetation analysis is limited to the area receiving active management and the areas within 100 feet of those activities. The temporal bounds of this analysis include past management activities that have shaped the current vegetation conditions within the project area and any foreseeable vegetative manipulation within the next 10 years.

This is the scope of the analysis for all resource discussions unless otherwise noted.

Existing Situation:
The project area contains approximately 11,714 acres of forested land with approximately 94% of this within Rx 8C. Small pockets of Rx 6B-Old Growth Forest Communities Dependent on Fire and 6C-Old Growth Forest Communities Associated with Disturbance are scattered throughout the project area

and make up approximately 406 acres (about 4%) of the forested project area. The other management prescriptions in the project area all make up a very small proportion. They include Rx 9F-Rare Communities and Rx 11-Riparian Areas. All proposed treatments are planned to take place within Rx 8C, except for the prescribed burn blocks, which include small portions of Rx 6C, Rx 9F, and Rx 11.

Past events have played a significant role in creating the vegetative condition existing today. Most of the area, prior to national forest acquisition, was extensively harvested for lumber and pulpwood during the early 1900s. The chestnut blight during the 1920s and 30s removed all of the American chestnut from the overstory and created openings that enabled previously overtopped trees, primarily oak species, to grow and replace the American chestnut in the overstory. This area has also been subjected to recurrent wildfires in the past as evidenced from the charred stumps and basal fire scars found throughout the project area. In addition to poor harvesting practices prior to national forest acquisition, ice and wind events have had a negative impact on the forests in some stands in the project area. Over the past 60 years, wildfires have been excluded from the project area due to an aggressive fire suppression program. This has allowed shade tolerant and fire intolerant tree species such as red maple, striped maple and white pine to become more common in the understory. These species are likely to become more dominant than oaks in future stand composition since most oaks found on the Forest are classified as intermediate in shade tolerance and not able to compete with vegetation that has a high shade tolerance.

Burn block 4 (Map 10-Prescribed Burn Treatments) proposed for prescribed fire in this action previously received a prescribed fire treatment in 2009. Unlike the description above, this small area has less shade tolerant and fire intolerant species in the understory. The area is closer to a natural fire regime than surrounding forests due to this use of prescribed fire.

Aggressive fire suppression has also lead to the development of very dense under- and mid-stories and an accumulation of down woody debris on the forest floor. These conditions result in an increased risk of catastrophic wildfire than would otherwise exist if aggressive fire suppression had not occurred and the natural fire regime was allowed to continue.

There have been no timber harvests in the project area in the past 20 years. The stands that were harvested in the past are now fully regenerated and can be described as being in either the sapling or immature poletimber stage of development. These stands are no longer providing early successional habitat, which is an important wildlife habitat objective for this management area (refer to Chapter 1 of this EA).

The vegetation is comprised primarily of forested stands of upland hardwoods and upland oaks with some areas of mixed hardwood-pine stands. The higher quality sites support northern red oak, yellow poplar, chestnut oak, black oak, and red maple. On drier aspects, species consist primarily of chestnut oak, white oak, black oak, and scarlet oak. There are a few stands that contain significant pitch and shortleaf components; otherwise hickory and yellow pine are scattered throughout the area. In stands being considered for harvest, densities range from about 100 to 180 square feet of basal area per acre. This basal area is considerably higher than the recommended basal area of about 60 to 80 square feet per acre. Examples of common species found in the midstory include: mountain laurel, serviceberry, black gum, sassafras, white pine, striped maple, sourwood, American chestnut, white oak, chestnut oak, red maple, hickory and dogwood. Examples of common understory species include: mountain laurel, blueberry, huckleberry, grapevine, greenbrier, Christmas fern, goldenrod and trailing arbutus. This mixture of vegetation is typical of soils developed over shale bedrock in the Ridge and Valley portion of the Appalachian Mountains.

Advanced oak regeneration is sparse and is generally no more than 12 inches in height. The lack of abundant advanced oak regeneration suggests a difficulty in regenerating these stands in oak. The understory species are dominated by striped maple, red maple, sourwood along with patches of mountain laurel. In some areas, white pine regeneration dominates the understory. Many of these stands reflect cutting from the early 1900s and evidence of past fire is found throughout the project area.

The entire project area is skewed to the mid successional habitat where approximately 76% of the forested area is between 41 and 100 years old. Late successional- between 101 and 130 years old- and old growth habitat (greater than 130 years old) account for 9% (997 acres) and 9% (1,002 acres) of the project area, respectively. There are 753 acres (6%) in sapling-pole (11-40 years) condition. There are only 13 acres of early successional habitat (0 to 10 years old) and that accounts for less than 1% of the project area versus the 4 to 10% called for in the Forest Plan. This area is found within a previously burned area in proposed Burn Block 4 on the south side of Peters Mountain. The 8C prescription area has four objectives as stated in the 2004 Revised Jefferson National Forest Plan. The existing condition only reaches two of those objectives. The project area currently reaches objective 8C-OBJ1, which states, "maintain a minimum of 60% of the area 40-100 years of age" (Table 2). The project area also satisfies objective 8C-OBJ4, which states, "maintain an open road density at or below 0.8 miles per square mile".

The existing condition of the project area does not reach 8C-OBJ2 or 8C-OBJ3, which state, "maintain a minimum of 25% in late-successional to old growth forest conditions greater than 100 years of age" and "maintain a minimum of 4% but of the forested prescription area in early-successional forest habitat condition (stand age less than 10 years, openings 2 acres in size and greater)" respectively.

Direct, Indirect and Cumulative Effects of the Alternatives:

Table 10. Comparison of Forest Plan Objectives at End of Ten Year Entry Period by Alternative

Environmental Indicator	Unit of Measure	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Minimum of 60%- 40 – 100 years of age	% of Rx 8C Project Area	56.6%	59.7%	57.6%	57.1%
Minimum of 25%- > 100 years	% of Rx 8C Project Area	37.8%	38.6%	37.8%	37.8%
Minimum of 4% and maximum of 10% in early successional- 0 – 10 years of age	% of Rx 8C Project Area	3.1%	>1%	2.1%	2.6%
Open Road density- <= 0.8 miles per square mile	Miles/ sq. mile	0.4	0.4	0.4	0.4

Alternative 1

Under this alternative approximately 635 acres would be managed under a combination of even-aged, uneven-aged, and intermediate systems of timber management. During this cutting cycle, approximately 360 acres of regeneration harvest would be carried out across seventeen cutting units. Group selection harvests with thinning in the matrix between groups would occur in two units on approximately 96 acres. Thinning would occur between regeneration harvests in six units on approximately 156 acres. Younger thriftier stands would be created on the 252 acres that are thinned. Open Woodland harvests would occur in one unit and a part of another unit totaling approximately 23 acres.

Other activities under this alternative include 3.8 miles of Forest system road construction, 6.5 miles of decommissioning Forest system roads, prescribed burning on approximately 3581 acres in four blocks with 0.5 miles of total dozer line, 135 acres of non-native invasive species control in forested stands by herbicide treatment, 55 acres of non-native invasive species treatment along roads by herbicide treatment, 104 acres of grape arbor enhancement, 390 acres of mechanical site preparation and planting of oak species or blight-resistant American chestnut seedlings in regeneration units, 673 acres of pre-commercial thinning, development of 23 acres of open oak woodland habitat, construction of 8 acres of wildlife openings and 1.4 miles of temporary road construction.

With the implementation of the shelterwood with reserves harvest method, the dominant cover on the harvested stands in the short and intermediate terms would consist of a sparse overstory of mature trees and den trees with an understory of regeneration. The harvesting of these stands would allow for the regeneration of trees within the harvest areas while providing a volume of forest products that would otherwise be lost if the trees were to continue to age and eventually die. The retention of approximately 15-25 basal area of the overstory would allow abundant sunlight to reach the forest floor to aid in the growth of intermediately shade tolerant species such as oaks. There is a slight increased probability that there would be a shift in species composition following harvest toward more shade tolerant species using the shelterwood method as compared to a conventional clearcut method.

Whenever possible the leave trees retained in the overstory will include longer-lived species that produce hard mast such as white oak, chestnut oak, and hickory. Large hollow trees and snags would also be left as they are desirable den sites for wildlife. Based on past monitoring of regenerated stands on the Eastern Divide District in general, and specifically in nearby project areas, it is reasonable to assume that the harvested areas can be fully regenerated within three years after harvest. In the proposed harvest units, there are a sufficient number of stems of a size and age to provide stump sprouts and to a lesser extent, advanced regeneration to fully regenerate the proposed harvest units under the guidelines set up on page 2-33 of the Forest Plan (FW-117 Standard).

The post-harvest site preparation treatment on the regenerated units will aid in controlling competing vegetation and allow more sunlight, water, and nutrients for desirable species for regeneration. Undesirable stems from 1-6 inches diameter at breast height (dbh) would be cut down, decreasing competition to the developing desirable regeneration. Most of the soft mast and flowering species such as dogwood, red bud, and serviceberry will be left for wildlife (soft mast) and aesthetic appeal.

This alternative would result in an improved distribution of successional habitats. After harvest, approximately 3.1% of the Rx 8C acres would be in the 0 to 10 year age class. The overstory is expected to be about 40-60% oak species with yellow poplar, cucumber, hickory, and red maple making up much of the species balance. Within the oak component, chestnut oak is expected to become dominant because it sprouts more readily than the other oak species. Planted oaks (most likely northern red oak or white oak) may become important mast producers in the future stands.

Alternative 2

This is the no action alternative. Stand structure and composition would not be altered. Natural processes of forest succession would not be interrupted. No regeneration would occur because of human activities under this alternative. Shade tolerant species in the understory would continue to grow. The establishment and growth of adequate regeneration of hard mast species such as oak and hickory which are less tolerant of shade, would be dependent upon natural processes such as a catastrophic blowdown event, intense wildfire, or other naturally occurring events that would open up the forest canopy. Adequate regeneration within these proposed harvest areas under the no action alternative is neither predictable nor expected. Over the long-term, these gap dynamics will move this stand from an oak dominated stand, to favor more shade tolerant species in the overstory such as red maple, black gum and white pine.

Few opportunities for new colonization of sites by non-native invasive species (NNIS) would occur. No impact to wildfire risk would occur as a result of vegetation manipulation. No portion of the area would be returned to natural fire regimes. Yellow pine community types would not be enhanced.

Under this alternative no vegetative treatments would be implemented and no effort would be made to provide early and mid to late successional habitats for a variety of plant and wildlife species. The project area is expected to become older with approximately 39% of the forested acreage being greater than 100 years old by the end of the next ten years. On sites of better quality (site index 70 and above for oak) the forest composition is expected to shift toward red maple and yellow poplar as the oak dies out. This would not be expected to happen for another 100 years or more as natural succession occurs.

Forest Plan objectives for Rx 8C would not be reached. Objective 8C-OBJ1 (maintain a minimum of 60% of the area greater than 40 years of age) would still not be met with this alternative. Furthermore, without any young stands moving through early successional and sapling stages this objective would eventually not be met in the foreseeable future due to the aging forest and emphasis would be on Objective 8C-OBJ2 (maintain a minimum of 25% of the area in late-successional to old growth forest conditions greater than 100 years old) where the majority of the forested acreage would lie. Objective 8C-OBJ3 (maintain a minimum of 4% in early-successional forest habitat conditions) would not be met and Objective 8C-OBJ4 (maintain an open road density at or below 0.8 miles per square mile) would continue to be met.

The balance of the project area would be skewed toward forests over 100 years old and would not meet the intent of Rx 8C. Furthermore, yellow pine would drop for the project area due to age related death of dominant trees and lack of regeneration due to wildfire suppression and lack of disturbance.

Alternative 3

Under this alternative all units (Units 1 through 11, except Unit 5) accessed by new road construction would be dropped from the project due to lack of access. Under Alternative 3, the road construction would not occur, which would effectively drop all post-harvest vegetation management activities east of Johnson Flats that are proposed in Alternative 1.

Approximately 455 acres of commercial harvest would occur using a combination of even-aged and uneven-aged systems of timber management. Approximately 240 acres would be regenerated through the shelterwood with reserve method, 114 acres would be thinned, 96 acres would be managed under the group selection prescription and only 5 acres would be managed as open woodlands.

Under this alternative prescribed burning on 890 acres in three blocks is proposed. Decommissioning of 6.5 miles of road would still be implemented. Other activities included in this alternative are reflected in Table 4.

This alternative would result in an improved distribution of successional habitats. After harvest, approximately 2.1% of the acres in Rx 8C would be in the 0 to 10 year age class. The overstory is expected to be about 40-60% oak species with yellow poplar, cucumber, hickory, and red maple making up much of the species balance. Within the oak component, chestnut oak is expected to become dominant because it sprouts more readily than the other oak species. Planted oaks (most likely northern red oak and white oak) may become important mast producers in the next stands. American chestnut may also be planted should it become available. The effects for prescribed burning and yellow pine enhancement would be somewhat less because the larger 2,691 acre prescribed burn would not be implemented under this alternative.

Alternative 4

Under this alternative, Units 9 through 11 accessed by the Johnson Flats Spur new road construction would be dropped from the project due to lack of access. Under Alternative 4, this segment of new road construction would not occur, which would effectively drop all post-harvest vegetation management activities that are related to these three units.

Approximately 584 acres of commercial harvest would occur using a combination of even-aged and uneven-aged systems of timber management. Approximately 309 acres would be regenerated through the shelterwood with reserve method, 156 acres would be thinned, 96 acres would be managed under the group selection prescription and 23 acres would be managed as open woodlands.

Under this alternative prescribed burning would be the same as Alternative 1. Decommissioning of all 6.5 miles of road would still be implemented. Other activities included in this alternative are reflected in Table 4.

This alternative would result in an improved distribution of successional habitats. After harvest, approximately 2.6% of the acres in Rx 8C would be in the 0 to 10 year age class. The overstory is expected to be about 40-60% oak species with yellow poplar, cucumber, hickory, and red maple making up much of the species balance. Within the oak component, chestnut oak is expected to

become dominant because it sprouts more readily than the other oak species. Planted oaks (most likely northern red oak and white oaks) may become important mast producers in the next stands. American chestnut may also be planted should it become available. The effects for prescribed burning and yellow pine enhancement would be the same as the proposed alternative.

Cumulative Impacts:
The impacts of all past actions are represented by the existing situation as far as vegetation is concerned. Reasonably foreseeable actions in the harvest units, prescribed fire and wildlife openings are limited to control of NNIS primarily through chemical means. Glyphosate and/or triclopyr would be the herbicides used on the NNIS treatments. These are herbicides that we are very familiar with and whose efficacy is well known. Species such as ailanthus, paulownia, Japanese honeysuckle, and autumn olive would be treated as needed. The combined effect would be reduction in seed source and number of stems of woody competition to desirable regeneration. Native species would be provided a much better chance to establish themselves and grow successfully to maturity. The ecological integrity and resilience of the harvested areas would be enhanced by reducing NNIS and enhancing native species.

No other vegetative management projects are planned on national forest system lands in the area within the next 10 years. Thus, no cumulative impacts are anticipated from these proposed actions above and beyond those identified as direct and indirect.

Future activities:

- Mountain Valley Pipeline, LLC is proposing to construct and operate approximately 286 miles of a natural gas pipeline referred to as the Mountain Valley Pipeline. MVP has pre-filed with the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. Should MVP file an application to construct a pipeline, FERC will be the lead agency and will conduct an in-depth environmental analysis prior to deciding on the need for the pipeline. A portion of the proposed pipeline would cross National Forest System lands on the Jefferson National Forest. If FERC would determine the pipeline is needed, the Forest Service would make a separate determination whether to issue a right-of-way permit to construct, operate, and maintain a natural gas pipeline on the JNF. MVP has identified an alternative route that would cross the Jefferson National Forest just east of the Fork Mountain Vegetation Management Project. The effects of the pipeline could overlap the effects of the Fork Mountain Project in the areas of vegetation changes. The proposed MVP corridor would result in approximately 8.0 additional acres of grass/forb habitat being created and added to each alternative. Thus, this results in an increase of maintained grass/forb habitat type for all alternatives (Alt. 1 = 82 ac; Alt. 2 = 41 ac; Alt. 3 = 50 ac; Alt. 4 = 82 ac.). This would benefit bear, wild turkey, ruffed grouse, and deer utilizing the eastern end of Fork Mountain, as very little grass/forb habitat is currently found on the National Forest.

Rare Communities

Rare communities and other special biological areas on the Jefferson National Forest were identified through a cooperative effort between the Forest Service and the Virginia Department of Conservation and Recreation, Division of Natural Heritage as part of the Forest Plan revision process. The Division of Natural Heritage has more recently identified additional Conservation Sites discussed below.

Issue Related to the Resource:
None.

Existing Situation:
The North Fork Stony Creek Special Biological Area is found within the project area. The area is a high-elevation valley with northern hardwood slopes, surrounding a hemlock and rhododendron valley. The area contains several rare plants that are associated with beaver meadows and boggy areas in the valley. This area is stable and no activities are needed to enhance the area.

In addition, the Virginia Natural Heritage Program has identified two newer conservation sites within the project area. The first is the North Fork Stony Creek West Conservation Site, which is downstream of the previous site and is considered to have outstanding significance to biodiversity. Within that site, there are several rare plants and a Central Appalachian Pitch Pine Bog community, which is considered significant. Secondly, the Kire Bog Site was identified as containing similar plants and the community as identified at the North Fork Stony West site. Naturally occurring or prescribed fires help keep this area in an open condition.

Species associated with wetlands or bogs are the resources of concern within all three identified sites.

Direct and Indirect Effects of the Alternatives:

Alternatives 1, 3, and 4

No activities are planned within the North Fork Stony Creek Special Biological Area (SBA) for any of the action alternatives (1, 3, and 4). Two harvest units border the boundary of the SBA in all three action alternatives. Given the distance from the boundary of the SBA to the rare plants and the fact they grow in open areas, no impacts are expected from any changed light conditions created from the proposed timber harvest. In addition, standard riparian protections measures will prevent sediment from reaching streams that feed into the Special Biological Area.

Regarding the West Conservation Site, the Department of Conservation and Recreation's Division of Natural Heritage requested that a portion of one harvest unit (Unit 24) be dropped because of its proximity to natural heritage resources. In response to this request, the requested portion of Unit 24 has been removed for Alternatives 1, 3, and 4. Given this, there would be no negative impacts upon this site from proposed activities. Prescribed fire has and would continue to be used in portions of this area, and this is considered beneficial to keeping the area open.

The Kire Bog site is within Prescribed Burn Block 1 and natural barriers will be used as containment lines. Use of prescribed fire in this area will have negligible effects due to the wet nature of the site. No ground disturbing activities are planned in close proximity to the Kire Bog site.

Alternative 2

With no action, there is no potential to affect the conservation sites or Special Biological Area.

Cumulative Effects of the Alternatives:

Alternatives 1-4

Burn Block 4 (Salt Sulphur burn) is covered by a previous decision, the Decision Notice for the Eastern Divide Ranger District Prescribed Burn Projects signed on September 27, 2013. This burn is expected to occur again in the future. No other activities are planned in the Special Biological Area or conservation sites in the future. The North Fork Stony West Conservation Site has been burned through in the past with no impact, so fire is not expected to affect the wetlands and bogs. Thus, there are no cumulative effects expected upon any of the wetland conservation sites. The MVP proposed corridor will not have an effect on any rare communities.

Old Growth

Issue Related to the Resource:

None.

Existing Situation:

In June of 1997, the Regional Forester issued new guidance on the definition and management of old growth forest communities in a report entitled "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region." The project area was inventoried for old growth both in proposed treatment and non-treatment areas. There was an increase in old growth identified and most of it was associated with surface rock and boulder fields. The project area contains hundreds of acres of outstanding examples of dry mesic old growth, but there are also

distinct second growth stands in the area. There are some stands that may have had individual trees removed or where fire played a role in setting back succession. Because of the inventory completed for this project, 27 new patches of old growth were identified that ranged in size from 1 to 30 acres. This resulted in 246 acres being added to the old growth inventory for this project area. Existing old growth boundaries were also ground-verified and boundaries modified as needed.

Areas proposed for harvest under the action alternative were evaluated to see if any of the treatment areas met the age, disturbance, basal area, and diameter at breast height (dbh) criteria identified in the Regional Guidance. Though remnant old trees can be found throughout the area, no old growth stands are proposed for harvest. None of these areas met the criteria to be considered existing old growth; though immediately adjacent to them there may be an old growth patch/stand.

The old growth identified primarily existed as chestnut oak on southern exposures mixed with white oak, red oak, red maple and some yellow poplar or northern red oak and cucumber and red maple on the north aspect of Fork Mountain.

Direct and Indirect Effects of the Alternatives:

Alternative 1

None of the areas proposed for commercial timber treatment contain existing old growth as defined by the Regional Guidance (of appropriate age and greater than 1 acre in size). Thus, there would be no direct impacts to existing old growth from harvesting. Old growth was found adjacent to twelve harvest units, and harvest activities may allow for increased light into these adjacent old growth stands. The increased light may influence understory development but will not impact the older trees. It is possible wind damage may occur to residual trees that are along the edges of harvest areas, depending upon slope location and aspect. Given the amount of existing old growth and the fact that mid to late successional forest forms the forest matrix, there was no need to identify corridors between old growth patches (see Regional Guidance, page 18).

Road construction, specifically the Barton Road Extension would require crossing some areas of old growth where rock bars are associated with subsurface flow of water. Every effort will be made to minimize the removal of large old growth trees as this road corridor is constructed.

Prescribed burning will introduce fire into areas containing old growth. It is possible, some existing standing dead or damaged trees (with past fire scars) could catch fire and be consumed. Given the extensive amount of old growth in the area, no significant change in the amount of standing dead and den trees is expected.

Alternative 2

With no harvest, the trees in the area will continue to mature and acquire more characteristics of old growth stands. No road construction would cross any existing old growth. With no prescribed burning, the consumption of standing dead trees through this management activity would not occur.

Alternative 3

With the Barton Road not being extended, old growth around six units would not be indirectly impacted from changed light conditions associated with harvests identified in Alternative 1 and 4. In addition, no old growth would be crossed with road corridors.

Alternative 4

Similar to the same effects of those identified for Alternative 1.

Cumulative Effects of the Alternatives:

Alternatives 1-4

There are no other foreseeable actions planned in the old growth areas, other than the prescribed burning identified, that would impact the old growth. Any mortality due to road construction or prescribed fire is anticipated to be very minor. It is possible that potential gypsy moth impacts could occur in the future, but when and where is unknown. If defoliated, much of the old growth would likely die as many of these trees are already weakened with only partial crowns. No significant cumulative

effects on old growth areas are anticipated with any of the alternatives. The MVP proposed corridor will not have an effect on identified old growth.

Openings and Utility Rights-of-Way

Issue Related to the Resource:
None.

Existing Situation:
There are 11 established wildlife clearings within the project area. Forest Roads 1503, 10373, 10411, 10412, 10420, and 10434 function as linear grass/forb strips as they are gated and mowed to provide this habitat, primarily for turkey poults. These openings and roads provide approximately 25 acres of grass/forb habitat.

Direct and Indirect Effects of the Alternatives:
Alternative 1
There would be approximately 15.5 acres of temporary grass/forb habitat created from log landings from the harvest of 26 units. Four of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. Thus, there would be 8 acres permanently maintained in addition to the 25 acres that is already maintained as 11 openings and linear wildlife strips. Finally, 23 acres of open woodland habitat comprised of a grass/forb ground cover would result from this alternative. These habitat improvements would provide additional bugging areas for local wild turkey and ruffed grouse poults. Deer would also benefit from the forage created.

Alternative 2
With no commercial timber harvest activities occurring, no additional temporary or permanent grass/forb habitat would be created through management.

Alternative 3
There would be approximately 10.0 acres of temporary grass/forb habitat created from log landings from the harvest of 16 units. Two of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. Thus, there would be 4 acres permanently maintained in addition the 25 already existing. Finally, 5 acres of open woodland habitat comprised of a grass/forb ground cover would result from this alternative. These habitat improvements would provide additional bugging areas for local wild turkey and ruffed grouse poults. Deer would also benefit from the forage created.

Alternative 4
There would be approximately 14.0 acres of temporary grass/forb habitat created from log landings from the harvest of 23 units. Four of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. The acreage and effects of the addition of permanent grass/forb habitat as open woodland and permanent openings would be the same as Alternative 1.

Cumulative Effects of the Alternatives:
Alternatives 1, 2, 3, and 4
The Eastern Divide Ranger District made a decision to create 8 acres of grass/forb habitat, prescribe burn 40 acres, and enhance grape arbors on 57 acres on the eastern end of Fork Mountain on September 20, 2006. These activities have not been implemented yet. It also included construction of a small parking area, which was constructed. This decision will be reaffirmed through the Decision Notice associated with this EA and the 8 acres of savannah or open woodland habitat will be constructed as planned. . In addition, the proposed MVP corridor would result in approximately 8.0 additional acres of grass/forb habitat being created and added to each alternative. Thus, this results in an increase of maintained grass/forb habitat type for all alternatives (Alt. 1 = 72 ac; Alt. 2 = 41 ac; Alt. 3 = 50 ac; Alt. 4 = 72 ac.). This would benefit bear, wild turkey, ruffed grouse, and deer productivity within the area.

Interior Habitats

Issue Related to the Resource:
None.

Existing Situation:
Forest fragmentation is the breaking up of large contiguous areas of forested land into smaller units. This causes an increase in forest edge; the border between forest and non-forested areas, and reduces the amount of forest interior habitat present. It also causes an increase in temperatures at the ground level from thermal radiation.

Fragmentation and the resulting edge habitat can cause a change in the plant and animal communities within an ecotone. Forest management activities such as timber harvesting and road construction are commonly cited as causes of forest fragmentation. Both increase edge. Edges are often referred to as "ecological traps" for some species of songbirds, because their structural diversity is attractive to the birds when they are seeking nesting locations. This same structural diversity, however, attracts predators and parasites, which can decrease the songbirds' nesting success. Brood parasitism from brown-headed cowbirds is often mentioned in this scenario. Brown-headed cowbirds, commonly found in southwest Virginia, are usually associated with permanent pastures and urban areas. Although cowbirds do occur on private agricultural lands in the upper Potts Creek watershed, they are not considered common on national forest system lands.

Finch (1991) reviewed existing neotropical bird population literature and identified some of the conflicting evidence. Most studies documenting the negative effects on forest interior species have been undertaken in agricultural regions where forests have been isolated and there has been a large decrease in the region's total area of forest. Even in more extensively forested areas, Rodewald and Yahner (2001) provide evidence that agricultural disturbances within forested landscapes seemed to negatively affect bird communities in adjacent forest more than silvicultural disturbances. Managing extensively forested landscapes at a variety of scales and through a variety of regeneration methods can provide suitable habitat for both species that need large unbroken forest habitats and species that need forest edges and early successional habitat (Annand and Thompson 1997). However, Buford and Capen (1999) present evidence that challenges the argument that songbirds breeding in an extensive forest landscape are not affected by canopy disturbance. Their study suggests breeding success of some forest interior species is reduced significantly in extensive forested areas with only 10% of the area considered open. In addition, Flaspohler and others (2001) provided evidence that the creation of openings in forest landscapes reduces nesting success for ground nesting songbirds in a zone adjacent to the opening. These openings were clearcuts, not agricultural clearings.

There are thousands of acres on Peters Mountain and in the inventoried roadless area that comprises the western portion of the project area that is considered forest interior habitat. The analysis of impacts upon forest interior habitat will involve the project area and adjacent private lands continuous with the project area that are wooded. This impacted area was defined by buffering all existing open areas, roads not covered with a tree canopy, and recent harvest areas (10 years of age or younger) within the national forest lands and adjacent open areas on private land by 300 feet to account for edge effects.

Direct and Indirect Effects of the Alternatives:
Alternative 1
The regeneration of 356 acres and construction of 3.9 miles of system and 1.4 miles of temporary road would result in edge creation and the loss of approximately 900 acres of forest interior habitat for a 10-year period. The thinning of 161 acres of mesic oak will create conditions and structural diversity that understory species such as the wood thrush and veery find desirable.

The effects of this alternative upon MIS associated with forest interior habitat would include the following:

Ovenbird – Preferring mature, dry, deciduous hardwoods with a closed canopy, the ovenbird is an area sensitive MIS requiring relatively large undisturbed tracts. As ground nesters, they are especially vulnerable to predators. Breeding habitat is deciduous or mixed forest (rarely pure pine woods) with moderate understory, preferably in uplands. Minimum tract size is 37 acres, (Hamel 1992). It is common within the upland hardwood stands in the project area. This species will be displaced from the regeneration harvest units. However, there is a large amount of forest interior habitat on Peters Mountain that can provide needed habitat. In addition, prescribed burning and other silvicultural treatments are not expected to impact local populations. Local populations are expected to decline for a 10-15 year period until the regeneration areas get older. On the Forest, overall total ovenbird populations are stable or increasing (USDA Forest Service, 2004)

Alternative 2
With a lack of timber harvest and road building, this alternative would not directly reduce existing interior habitat, thus this would benefit local populations of the MIS associated with forested interior habitat, the ovenbird, and provide the most potential habitat for this species in the short-term.

Alternative 3
The regeneration of 240 acres and construction of 1.3 miles of temporary road would result in edge creation and the loss of approximately 410 acres of forest interior habitat for a 10-year period.

The thinning of 119 acres of mesic oak will create conditions and structural diversity that understory species such as the wood thrush and veery find desirable.

The effects of this alternative upon MIS associated with forest interior habitat would include the following:

Ovenbird –This species will be displaced from the regeneration harvest units. However, this alternative does not harvest as much dryer oak sites as Alternative 1 or 4, thus is considered less of an impact than those alternatives. In addition, there is a large amount of forest interior habitat on Peters Mountain and within the inventoried roadless area that is in the western portion of the project area. Local populations are expected to decline for a 10–15 year period following harvest. On the Forest, overall total ovenbird populations are stable or increasing (USDA Forest Service, 2004).

Alternative 4
The regeneration of 305 acres and construction of 1.3 miles of temporary and 2.9 miles of system road would result in edge creation and the loss of approximately 710 acres of forest interior habitat for a 10-year period. The thinning of 161 acres would produce the same results identified in Alternative 1.

The effects of this alternative upon MIS associated with forest interior habitat would include the following:

Ovenbird –This species will be displaced from the regeneration harvest units and the effects would be very similar to those Alternative 1. There are three less harvest units in this alternative than Alternative 1; these three units are considered prime ovenbird habitat as they are dry oak sites on a south aspect. In addition, there is a large amount of forest interior habitat on Peters Mountain and within the inventoried roadless area that is in the western portion of the project area. Local populations are expected to decline for a 10–15 year period following harvest, but less so than in Alternative 1. On the Forest, overall total ovenbird populations are stable or increasing (USDA Forest Service, 2004).

Cumulative Effects of the Alternatives:
The Eastern Divide Ranger District made a decision to create 8 acres of grass/forb habitat, prescribe burn 40 acres, and enhance grape arbors on 57 acres on the eastern end of Fork Mountain on September 20, 2006. It also included construction of a small parking area, which was constructed. This decision will be reaffirmed and the 8 acres of open woodland habitat is intended to be constructed as planned. Given the residual basal area to be left, this would not be considered a regeneration area or a traditional wildlife opening; thus no detrimental edge effects are anticipated. Thus, no cumulative effect on the amount of available interior forest habitat is expected. However,

the crossing of the project area by the proposed MVP corridor would reduce forest interior habitat by approximately an additional 78 acres for each action alternative.

Riparian Habitats

Issue Related to the Resource:
None.

Existing Situation:
Within the area associated with proposed timber management and road construction activities, riparian areas were mapped based field reviews and professional knowledge of their historic flows. There are also riparian corridors within the prescribed burning areas.

Direct and Indirect Effects of the Alternatives:

Alternative 1

The construction of 3.9 miles of new system road and 1.4 miles of temporary road will result in the crossing of nine perennial streams and one intermittent stream. In addition, several rock bars are to be crossed that are known or believed to carry subsurface flows. No commercial timber harvesting will occur within intermittent or perennial riparian corridors. There would be one intermittent stream crossed with a designated skid trail; the crossing would be a ford with lots of natural rock.

Prescribed fire will occur within riparian corridors, most often as very low intensity backing fires, using streams as control lines. Because of their low intensity, these fires are not expected to substantially alter vegetation or leaf litter conditions. Therefore, there will be no noticeable effects on riparian areas from prescribed fire.

Approximately 0.65 miles of FSR 10481 and about 0.35 miles of FSR 10521 are negatively impacting riparian areas. These roads in their entirety will be decommissioned in all the action alternatives. After stabilizing erosion sources, FSR 10481 and the north end of FSR 10521 will have adjacent vegetation placed in the roadway to improve protection of the soil and associated riparian areas and reduce the potential for any vehicle use.

The effects of this alternative upon MIS associated with riparian habitat would include the following:

Acadian flycatcher – This common migrant flycatcher is found mainly in moist deciduous forests with a moderate understory near streams. Nests are found on horizontal or down-hanging branches of deciduous trees, usually over a stream. This arboreal hawking insectivore generally sits on a branch 10 to 40 feet high near a stream where it will sally after flying insects (Hamel, 1992). The Acadian flycatcher is deemed an appropriate species to indicate management-induced changes to mature riparian forests. It is highly associated with mature deciduous forests along streams and bottomland hardwoods throughout the Forest. This species is selected to help indicate the effects of management activities on mature riparian habitats. North Fork of Potts Creek and North Fork of Stony Creek and all their perennial water sources provide habitat for this species.

With designation of riparian corridors and their protection by following Forest Plan standards, there would be no impact to Acadian Flycatcher populations. Stabilizing and decommissioning 1.0 miles of road within or adjacent to riparian areas will reduce potential sedimentation and improve riparian conditions in these areas.

Prescribed burning will be allowed to occur in riparian areas within the burn blocks, but no negative impacts are expected as the mesic conditions and heavy shade will result in very low intensity fires.

Alternative 2

With the no action alternative, no potential exists to impact riparian habitat or corridors. There would be no change in existing Acadian flycatcher habitat.

Alternative 3

No intermittent or perennial streams are crossed with the construction of 1.3 miles of temporary road in this alternative. Prescribed fire will occur within riparian corridors, most often as very low intensity backing fires, using streams as control lines. Because of their low intensity, these fires are not expected to substantially alter vegetation or leaf litter conditions. Therefore, there will be no noticeable effects on riparian areas from prescribed fire. No commercial timber harvesting will occur within intermittent or perennial riparian corridors. There would be one intermittent stream crossed with a designated skid trail; the crossing would be a ford with lots of natural rock.

The effects of this alternative upon MIS associated with riparian habitat would include the following:

Acadian flycatcher – With designation of riparian corridors and their protection by following Forest Plan standards, and given all new riparian area crossings are of intermittent streams, there would be no impact to Acadian Flycatcher populations. Stabilizing and decommissioning 1.0 miles of road within or adjacent to riparian areas will reduce potential sedimentation and improve riparian conditions in these areas.

Prescribed burning will be allowed to occur in riparian areas within the burn blocks, but no negative impacts are expected as the mesic conditions and heavy shade will result in very low intensity fires.

Alternative 4

The construction of 2.9 miles of new system road and 1.3 miles of temporary road will result in the crossing of six perennial streams and one intermittent stream. In addition, several rock bars are to be crossed that are known or believed to carry subsurface flows. The effects would be similar to those identified in Alternative 1.

Acadian flycatcher – With designation of riparian corridors and their protection by following Forest Plan standards, and given all new riparian area crossings are of intermittent streams, there would be no impact to Acadian Flycatcher populations. Stabilizing and decommissioning 1.0 miles of road within or adjacent to riparian areas will reduce potential sedimentation and improve riparian conditions in these areas.

Prescribed burning will be allowed to occur in riparian areas within the burn blocks, but no negative impacts are expected as the mesic conditions and heavy shade will result in very low intensity fires.

Cumulative Effects of the Alternatives:

Implementation of the riparian prescription under any action alternative is expected to increase the acreage within riparian corridors that is in late successional forest (RLRMP, FEIS Table 3-54 and 3-55). Increases in older forests would result in increases in abundance of snags and downed wood, important habitat components for many riparian-dependent species. The road decommissioning projects will enhance conditions in the associated riparian areas. The MVP proposed corridor will not have an effect on any riparian areas within the National Forest.

Acadian flycatcher – The impacts of past gypsy moth defoliations on the riparian zones will result in more downed wood and a denser understory for some number of years. This would likely not harm the local population. Minor positive cumulative effects are anticipated.

Snags, Dens, and Downed Wood

Issue Related to the Resource:

None.

Existing Situation:

Snags, downed wood, and den trees are typically most abundant in late successional forests. Current abundance of late successional forest by community type is shown under the section on Successional Forests. This information indicates late successional forests are abundant in the project area. Snags and downed wood also may be extremely abundant in forests affected by mortality events such as

storms and insect and disease outbreaks. In addition, this area contains areas with lots of surface rock and boulder fields, which harbor old growth forest. This area has 1,002 acres of inventoried old growth that functions as prime habitat for dead standing and down wood. Most of the inventoried old growth is associated with boulder fields and/or surface rock; chestnut oak, northern red oak, white oak and yellow poplar and black gum associated with drains comprise a majority of the old growth tree species present. The old growth inventory map for this project area shows that this component is widely distributed.

On the Jefferson National Forest, there are approximately 17.5 snags per acre across the Forest. This information was gathered from 129 Forest Inventory Analysis (FIA, USDA Forest Service 1991) plots done on the Jefferson National Forest. Included here as snags are those coded "rotten culls" (2 per acre with an average diameter of 17 inches) and "dead" (15.5 per acre with an average diameter of 9 inches in the FIA plot data). The area contains much more than this Forest average. The lack of management for the past 25 years over much of the area, combined with gypsy moth infestations, and an aging forest all equate to an abundance of snags, downed wood, and den trees.

Acres of late successional forest is an appropriate indicator of the effects of management on these habitat elements because of their relative abundance in this successional stage. The pileated woodpecker (*Drycopus pileatus*) is the best management indicator species (MIS) for snags, dens, and downed wood. It requires large cavity trees for nesting and forages on dead trees and downed logs across a variety of community types (Hamel 1992:190). Populations of this species are tracked by the annual Breeding Bird Surveys (BBS) and bird point counts conducted throughout the Southeast.

Direct and Indirect Effects of the Alternatives:

Alternative 1

In the proposed regeneration harvests of 360 acres, snags would be left as they are not merchantable, but they often fall over or must be felled if they pose a safety hazard to logging operations. Forestwide direction for potential black bear den trees states that den trees would be left during all vegetation management treatments. Potential den trees are greater than 20 inches DBH. Potential den trees also include those that are hollow with broken tops or those with limbs greater than 12 inches diameter broken near the bole of the tree. The area has numerous potential bear dens and they will be individually identified and buffered from disturbance by 100 feet when marking commercial timber sales.

Direct impacts to the Indiana bat may result in direct mortality or injury to roosting bats when intentional felling of undetected roosts, or accidental felling of occupied snags or damaged or hollow trees occurs during fuelwood gathering, timber harvest, or site preparation. The likelihood of cutting a tree containing a maternity colony or individual roosting Indiana bat is anticipated to be extremely low because of the large number of suitable roost trees present on the Jefferson National Forest, the low level of management activities across the Forest that could result in the cutting of snags, the rarity of the species, and the wide dispersal of Indiana bats and maternity colonies throughout the species' range. Additionally, and most importantly, there are no known maternity colonies on the Jefferson National Forest or in the State of Virginia. Forestwide direction for snags follows the Indiana Bat guidance of leaving a minimum of 6 snags or cavity trees (9 inch diameter or larger) per acre, unless they are a safety hazard, for clearcuts 10 to 25 acres in size. Group selection openings and clearcuts less than 10 acres have no provision for retention of a minimum number of snags, cavity trees, and residual basal area. All other harvesting methods (and clearcut openings 26-40 acres in size) will retain a minimum residual 15 square feet of basal area per acre (including 56 snags or cavity trees) scattered or clumped.

Riparian Corridor direction for large woody debris (LWD) in streams includes the objective to restore and maintain approximately 200 pieces of LWD per stream mile to maintain habitat diversity for aquatic-dependent species. LWD is a piece of wood within the stream channel that is at least 4 inches in diameter and 4 feet long. The proposed actions would not increase the amount of LWD in any stream. However, protection of the riparian area would allow for the natural future recruitment of LWD in the future.

With these provisions included under all action alternatives, existing snags, downed wood, and den trees would be well maintained on national forest system lands. Fire, wildfire or prescribed fire, may reduce snags and downed wood in fire-dependent communities, but it can also cause some tree mortality creating new snags and downed wood. Reduced density of these habitat elements in fire-dependent communities is expected to be within the range of variability that typically occurred in these communities under historical fire regimes.

Recruitment of new snags, downed wood, and den trees is most dependent on providing abundant late successional forests. Expected percentages of late successional forests are presented under the section on Successional Forests. This analysis indicates that within 10 years following plan implementation, all alternatives will contain at least 70% of the forested acres in late to old successional stages.

With the above protection and management provisions and the continuous creation of more habitat through aging age-class distributions, all alternatives will result in an increasing abundance and improved distribution of these habitat elements over the next 50 years, with benefits to associated species. Increased mortality of trees due to gypsy moth induced mortality have increased the abundance of snags and eventually downed wood regardless of management approaches (see cumulative effects discussion below).

The effects of these alternatives upon MIS associated with snags and down wood habitat would include the following:

Pileated Woodpecker - The pileated woodpecker generally prefers mature deciduous forests ranging from bottomlands to uplands. Key habitat requirements include older mature forests with dead trees (snags) for nesting. Pileated woodpeckers will also nest in large dead limbs on live trees. Nests are large cavities they construct usually over 30 feet above the ground. They feed on ants, insects, and insect larvae (mainly carpenter ants and wood-boring beetles) found by probing under the bark of standing trees and stumps or fallen logs. Some fruits and berries are taken in fall and winter (Hamel, 1992). They are permanent residents. The pileated woodpecker is an MIS for snag dependent wildlife. Within the project area, there is an abundance of potential snags.

In all timber harvest units, the retention of larger snags would provide suitable nest cavities for species such as the pileated woodpecker. In addition, the reserve trees would provide a future source of snags. The opening up of the forest is not desirable for this species, which prefers an extensive, mature forest. However, the effects of this alternative would not be considered significant because of the total amount of old growth forest within the project area and the large percentage of the project area that is unlikely to be managed through timber harvesting. Breeding Bird Survey data for the state of Virginia indicate an increase in pileated woodpeckers and populations are expected to remain relatively stable or increase in the near future on national forest lands, and this would apply to this project area (Appendix G, USDA Forest Service, 2004). It is unlikely that the amount of snags cut with this alternative would measurably effect the population in the project area.

Alternative 2
With no commercial timber harvest, there would be no removal or felling of existing snags. Existing populations of pileated woodpeckers are expected to remain stable or increase.

Alternative 3
This alternative does not include any new system road construction or the timber harvest units associated with those new roads. This alternative is less impactive upon this habitat component than either Alternative 1 or 4 because fewer acres of trees are harvested, reducing the potential for snags in those areas to fall over and none would be cut for safety reasons. Existing populations of pileated woodpeckers are expected to remain stable or increase.

Alternative 4
This alternative contains construction of the Barton Road extension. That extension would go through several areas that contain old growth and/or large decadent trees, which serve as optimal habitat for

primary and secondary cavity users. This alternative is more impactive than Alternative 3 and very similar to Alternative 1. Existing populations of pileated woodpeckers are expected to remain stable.

Cumulative Effects of the Alternatives:
Pileated woodpecker – Given the extent of tree mortality from past gypsy moth defoliation in the Dixon Branch area, and expected mortality in the future, populations of pileated woodpeckers are expected to increase in this area over time. The MVP proposed corridor may result in snags or den trees being cut down during construction but these effects are limited to approximately 18 acres.

Terrestrial Species and Their Habitats

Successional Forests

Issue Related to the Resource:
None.

Existing Situation:
Table 11 contrasts the current distribution of major habitat components on national forest lands in the analysis area with the desired level as identified in the Plan (p. 3-114).

Table 11. Current and Desired Wildlife Habitat Components for the Rx 8C Area

Habitat Component	Existing Situation (acres)	Desired Condition (acres)
Grass/Forb Habitat	25 acres	Inclusive in the 0-10 acres
0-10 Years Old	13 acres	469+ acres
40-100 Years Old	8,924 acres	7,028 acres
100+ Years Old	1,999 acres	2,929 acres
Open Road Density (miles/square mile)	0.4 miles/square mile	<0.8 miles/square mile

The need for seedling/sapling conditions to provide habitat for birds associated with early successional habitats is a current topic of concern. Old fields can provide conditions required by many early seral species, but this habitat type itself is very uncommon on the National Forest. The minimal area that is required by each species varies and is not fully understood. Kirpez and Stauffer (1994) documented local research findings that harvest groups of approximately 0.5 to 2 acres in size provide suitable habitat for such early seral-dependent birds as the indigo bunting and rufous-sided towhee. They also reported that early successional patches needed to be at least two acres in size for the prairie warbler to occupy the area. Local U.S. Forest Service bird monitoring efforts identified the chestnut-sided warbler, an early seral species, inhabiting group harvest areas of less than 1 acre in size. In a discussion of management of early successional habitats, Thompson and Dessecker (1997) identified group selection areas of less than 0.5 acres as inadequate for a variety of forest songbirds. There is a group of forest songbirds that require disturbance patches that are less than 10 years of age and greater than 2 acres is size. Minimal size does not equate to ideal or optimum size. Information for most species is lacking on this subject. Expert opinion on ruffed grouse patch size requirements identified patches ranging from 2 to 20 acres, with areas of 5 to 10 acres being ideal in size (Thompson, personal communication).

The North Fork of Stony Fork valley contains numerous beaver meadows that provide a form of early successional habitat. These areas exist within identified riparian habitat and contain numerous rare plants. These areas will undergo succession until local beaver reoccupy the area as food resources return; thus, they are constantly in a transitory condition.

The Southern National Forest's Migratory and Resident Landbird Conservation Strategy position statement states that "Interspersing these early successional habitats will not conflict with the commitment to sustain habitats for the high priority forest interior/area sensitive bird species and is

necessary in order to meet the habitat needs for a significant number of native plants and animals (including migratory and resident birds) as required by the NFMA." (Gaines and Morris 1996).

Direct and Indirect Effects of the Alternatives:

Alternative 1

Timber harvesting actions would increase the 0-10 year old age class by 360 acres and provide for patches of early seral forested habitat within the project area. This would benefit early successional avian species, which are lacking appropriate habitat in larger patches within this 8C prescription area. Species that require a minimal area of disturbance greater than 2 acres would benefit the most from the treatments proposed under this alternative. Wildlife species such as ruffed grouse and such neotropical migratory birds as the eastern towhee, yellow-breasted chat, prairie warbler, gray catbird, and indigo bunting would benefit from the creation of additional early seral habitat (0-10 year age class).

Species requiring forest interior conditions, such as the ovenbird and scarlet tanager, would be displaced from harvest areas. There are large areas of forest interior habitat on Peters Mountain and inside the inventoried roadless area that comprises the western end of the project area. If the harvest is conducted during the breeding bird season, it is possible individual nests or fledglings of forest nesting bird species could be killed as a result of felling trees. However, local populations would not decline as a result of this level of harvesting. The Stony Creek watershed is approximately 97% forested and these species are common.

On dryer sites, mixed oaks, red maple, and black gum will make up most of the overstory in these harvest areas with conditions made favorable for a dense understory to develop. On more mesic sites, yellow poplar, cucumber, red maple, and northern red oak will represent most of the overstory; however, red oak will exist because it will be a “leave tree” species during marking for the commercial timber sale. In the thinning areas, a diverse vegetation structure, which is helpful in reducing predation upon nesting birds (Ratti and Reese 1988), is expected.

System and temporary road, bladed skid road, and dozer fireline construction may result in some amphibians, reptiles, small mammals, and insects within the construction zone being crushed by heavy equipment or buried by dirt from the blading. In addition, some terrestrial or semi-aquatic species of salamanders, insects, reptiles, and small mammals within and adjacent to the harvest units may be directly impacted by heavy equipment use on skid roads.

Indirect impacts may occur to some terrestrial or semi-aquatic species of salamanders by the increased sunlight on the forest floor, causing it to dry out. This may affect food supplies and predation rates of/by some salamander and other predator species. Log ends and slash may improve ground cover habitat for some species.

Some amphibians, reptiles or small invertebrates could be killed by the 3,581 acres of prescribed burning, or indirectly from the increased thermal effects of the sun following the use of prescribed fire. Larger animals would move from the path of advancing fire given the planned intensity of the fires. Fuels larger than 2-3 inches in diameter would not be consumed by the fire, and organisms beneath bark and under logs and rock would be protected from radiant heat. Any direct effects at the population level would be short-term, and revegetation would occur rapidly following burning.

Site preparation activities (manual) would not be expected to have any effect on wildlife resources under this alternative with implementation of design criteria, primarily management standards and guidelines in the Plan. Important soft mast producers would be protected.

The enhancement of oak would provide additional wildlife food in future years. These activities are designed to promote the development of quality mast bearing trees per acre, which will provide food to mast-eating wildlife such as squirrel, turkey, bear and deer in future years. The use of prescribed fire is designed to promote growth of existing oak, create conditions desirable for oak regeneration, restore yellow pine communities, and control species more vulnerable to fire.

Non-native invasive species such as tree of heaven and royal paulownia would be treated with a foliar spray of glyphosate along roads (55 acres) or a basal bark application (410 acres) within former regenerated stands or older stands that are planned to be treated. In addition, 33 acres of forested habitat would be treated to control hay-scented fern inorder to promote oak seedling establishment.

During herbicide application, direct exposure to wildlife is unlikely. The treatment is selective as a low volume foliar spray is proposed to treat individual plants; most wildlife species would move out of the immediate area. Smaller animals that remain are either under cover or would seek cover upon human disturbance. Dermal exposure may be determined using the criteria of either extreme or realistic doses. The realistic dose estimate for glyphosate (Table 8-6, p.8-11 of the VMAM EIS) suggests that this herbicide is below the EPA risk criterion of 1/5 LD50 (median lethal dose) for all representative birds, reptiles, amphibians, and mammals.

Glyphosate is classified as slightly toxic. Wildlife feeding on treated plants may ingest some herbicide, but the risk from oral ingestion is slight. Glyphosate is a chemical that presents a "low to very low" risk (VMAM, Appendix A, p.8-4). Local populations of small mammals, small birds, terrestrial amphibians, and reptiles may be adversely affected when large areas are treated); however, the reproductive capacity of these species is generally high enough to replace the lost individuals within next breeding cycle. Application in this proposal is selective in nature as individual stems are to be treated not a continous large area. Populations of larger mammals, birds, and any domestic animals present are not likely to be affected at all (p. 8-4, Vol. II, DEIS VMAM). Glyphosate is rapidly excreted. Based on high elimination rates and low tissue retention, there is a very low risk for bioaccumulaiton (DEIS VMAM, Volume II, P 3-27).

No known documentation in the published literature exists describing the effects of this herbicide on lepidopterans and other arthropods. This herbicide was developed to impact plant physiology. The selective nature of the application would limit any impact on arthropod populations. Milkweed and other flowering plant species would not be targeted. In summary, risk is at a low ("no risk") level at typical application rates, according to EPA standards for terrestrial animals (VMAM, p. IV-75) for this herbicide.

Triclopyr is classified as slightly toxic. Wildlife feeding on treated plants may ingest some herbicide, but the risk from oral ingestion is slight. Triclopyr is a chemical that presents a "low to moderate" risk (VMAM, Appendix A, p.8-4). Local populations of small mammals, small birds, terrestrial amphibians, and reptiles may be adversely affected when large areas are treated; however, the reproductive capacity of these species is generally high enough to replace the lost individuals within next breeding cycle. Application in this proposal is selective in nature as individual stems are to be treated not a continous large area. Populations of larger mammals, birds, and any domestic animals present are not likely to be affected at all (DEIS VMAM, Vol. II, p. 8-4). Triclopyr is rapidly excreted. Based on high elimination rates and low tissue retention, there is a very low risk for bioaccumulaiton (DEIS VMAM, Vol. II, p. 3-27).

The effects of this alternative upon MIS associated with successional forests would include the following:

Management Indicator Species

The effects of this alternative upon MIS associated with successional forests would include the following:

Chestnut-sided warbler – The habitat of this common migrant warbler is typically found in second-growth hardwoods and overgrown fields in the Appalachian Mountains in Virginia, over 2,500 feet in elevation. On the Jefferson National Forest it is therefore found in the Blue Ridge, Ridge and Valley, and Cumberland mountains. It is most numerous in abandoned fields with scattered saplings, along woodland edges, and in open park-like deciduous woods. It nests 1 to 4 feet above the ground in saplings and shrubs and feeds on insects gleaned from leaves and twigs in deciduous vegetation (Hamel, 1992). The chestnut-sided warbler is an MIS for high-elevation early-successional habitats because of its strong association with these habitats, and because its populations should be responsive to forest management efforts that create and sustain such habitats. The use of prescribed

fire may result in some small patches of regeneration, especially where heavy fuels exist, which would benefit this species. All other cultural treatments have no real impact upon this species. Local populations will benefit the most from this alternative, as it creates the most early seral habitat at higher elevations.

Eastern towhee – This common short distant migrant is typically found in early successional habitat. They nest in thickets or brushy places on the ground or in shrubs or saplings to five feet high (Hamel 1992). Eastern towhees require shrubs, saplings, or understory trees in a wide variety of situations, usually where a thicket is present. Populations respond favorably to conditions created three years following forest regeneration in larger forest patches (Thompson and Fritzell 1990). Towhees are common within early successional and brushy habitat found in the area. The towhee is an MIS for early-successional habitats because of its strong association with these habitats, and because its populations should be responsive to forest management efforts that create and sustain such habitats. The use of prescribed fire may result in some small patches of regeneration, especially where heavy fuels exist, which would benefit this species. All other cultural treatments have no real impact upon this species. Local populations will benefit the most from this alternative, as it creates the most early seral habitat.

Alternative 2

Under this alternative, much of the habitat conditions in the area would continue to move toward an older seral stage. Local populations of species preferring late successional forest and especially primary and secondary cavity users, would increase with an aging forest.

Management Indicator Species

This alternative does not ensure larger patches needed by the chestnut-sided warbler or eastern towhee will occur; only existing beaver meadows, wildlife clearings and associated edges would provide desired habitat for these species. Existing populations would remain stable.

Alternative 3

Timber harvesting actions proposed under this alternative would increase the 0-10 year old age class by 240 acres and provide for patches of early seral forested habitat within the project area. This would benefit early successional avian species, but at approximately 67% of the level identified in Alternative 1. Early successional habitat would be found around existing road corridors. For the acreage treated, the effects would be the same as those identified in Alternative 1, but the scale of disturbance reduced and less beneficial to early seral species than Alternative 1.

Those species that use large tracts of mid to late successional forested habitat would benefit more from this alternative versus Alternative 1 as no new road construction or harvests would occur in the North Fork of Potts Creek drainage.

The use of herbicides and their effects are similar to Alternative 1, but less total stems and acreage would be treated under this alternative.

Management Indicator Species

This alternative does not ensure larger patches needed by the chestnut-sided warbler or eastern towhee will occur; only existing beaver meadows, wildlife clearings and associated edges would provide desired habitat for these species. Existing populations would remain stable, but are considered low.

Alternative 4

Timber harvesting actions proposed under this alternative would increase the 0-10 year old age class by 305 acres and provide for patches of early seral forested habitat within the project area. This would benefit early successional avian species, but at approximately 86% of the level identified in Alternative 1. Early successional habitat would be found around existing road corridors and the extension of the Barton Road into the North Fork of Potts Creek watershed. For the acreage treated, the effects would be the same as those identified in Alternative 1, but the scale of disturbance reduced and less beneficial to early seral species than Alternative 1 but greater than Alternative 3.

Those species that use large tracts of mid to late successional forested habitat would be impacted very similarly to that described in Alternative 1.

The use of herbicides and their effects are similar to Alternative 1, but less total stems and acreage would be treated under this alternative.

Management Indicator Species

This alternative does not ensure larger patches needed by the chestnut-sided warbler or eastern towhee will occur; only existing beaver meadows, wildlife clearings and associated edges would provide desired habitat for these species. Existing populations would remain stable.

Cumulative Effects of the Alternatives:

Table 12 displays the expected habitat conditions within the analysis area immediately following the timber harvest projects under each alternative. There would be short-term impacts to mast production in areas harvested, but they are already impacted to some degree from recent mortality.

Table 12. Distribution of Wildlife Habitat Components within the Analysis Area (11,714 acres) Following Commercial Timber Harvest

Habitat Component	Alternative 1 (acres, %)	Alternative 2 (acres, %)	Alternative 3 (acres, %)	Alternative 4 (acres, %)
Grass/Forb	56 acres, 0.5%	25 acres, 0.2%	34 acres, 0.3%	56 acres, 0.5%
0-10 Years Old (Total)	360 acres, 3.1%	38 acres, 0.3%	240 acres, 2.0%	305 acres, 2.6%
40-100 Years	8,810 acres, 75.2%	9,170 acres, 78.3%	8,930 acres, 76.2%	8,865 acres, 75.7%
100+ Years	1,753 acres, 15.0%	1,753 acres, 15.0%	1,753 acres, 15.0%	1,753 acres, 15.0%
Open Road Density (miles/square mile)	0.4 miles/square mile	0.4 miles/square mile	0.4 miles/square mile	0.4 miles/square mile

The Eastern Divide Ranger District made a decision to create 8 acres of grass/forb habitat, prescribe burn 40 acres, and enhance grape arbors on 57 acres on the eastern end of Fork Mountain on September 20, 2006. It also included construction of a small parking area, which was constructed. This decision will be reaffirmed and the 8 acres of savannah or open woodland habitat is intended to be constructed as planned. In addition, the proposed MVP corridor would result in approximately 8.0 additional acres of grass/forb habitat being created and added to each alternative. Thus, this results in an increase of maintained grass/forb habitat type for all alternatives (Alt. 1 = 72 ac; Alt. 2 = 41 ac; Alt. 3 = 50 ac; Alt. 4 = 72 ac.). This would benefit bear, wild turkey, ruffed grouse, and deer productivity within the area.

Chestnut-sided warbler –With additional tree mortality through time, chestnut-sided warbler habitat conditions are expected to improve and populations increase.

Eastern towhee –With additional tree mortality through time, eastern towhee habitat conditions are expected to improve and populations increase.

Demand Species

Issue Related to the Resource:

None.

Existing Situation:

Hunting of white-tailed deer, wild turkey, and black bear is very popular within the project area. The North Fork of Stony and North Fork of Potts Creek watersheds form an extensively forested area with lots of public hunting opportunities. Populations of bear are considered good, but the extensive snow

depth and length of 2010 resulted in lower deer populations based on casual observations in the area during project planning. The area has tremendous mast production potential, however, when hard mast failures occur, food sources are more limited and deer result to browsing.

Direct and Indirect Effects of the Alternatives:

Alternative 1

The effects of this alternative upon MIS considered demand species, because they are hunted, would include the following:

Black bear - Most of the diet of black bears (77.7% annually) comes from vegetable matter with soft mast making up about 38.2% of the total diet (Trippensee 1948). Soft mast becomes a very important food source in late summer through fall for building stores of body fat. Body fat is a critical factor in bear survival and reproduction. The north side of Fork Mountain and the south side of Peters Mountain provide abundant bear denning sites with large cavity trees in the areas identified as old growth.

Bear would benefit from the proposed timber harvest and other cultural activities under this alternative. Timber harvesting, follow up invasive species control and prescribe burning, all increase soft mast production from species such as grape, blueberry, blackberry, greenbrier. Soft mast production should increase and benefit local bear for the next several years. Hard mast (acorns) production would not decline significantly in the project area in the short-term, because of this harvest alone. In the long-term, improving the age class distribution of the forest better ensures hard mast production over time.

The grape arbor enhancement is specifically aimed at providing an alternative food source for black bear when hard mast failures occur. In addition, the open woodland and open areas increase provides a valuable green food source for bear when they emerge from their den sites.

Wild turkey – Wild turkey occupy a wide range of habitats, with diversified habitats providing optimum conditions (Schroeder 1985). This includes mature mast-producing stands during fall and winter, shrub dominated stands for nesting, and herb dominated communities, including agricultural clearings for brood rearing.

Local populations will have greater nesting and bugging opportunities because of the proposed harvest. The revegetation of roads, skid trails and log landings would provide approximately 15.5 acres of temporary grass/forb habitat. Four of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. Thus, there would be 8 acres permanently maintained. In addition, 23 acres of open woodland habitat comprised of a grass/forb ground cover would result from this alternative, creating an improved source and distribution of insect matter (especially grasshoppers) and associated protein for young poults.

White-tailed deer – White-tailed deer use a variety of habitat types. A mixture of habitat types and resulting edge insures an abundant food source is available throughout the year. White-tailed deer heavily use hard mast in the fall (usually acorns) and accumulate sustaining fat reserves for the winter.

The increase in browse availability under this alternative would benefit the local deer population. Good acorn crops usually mean higher reproductive rates and better antler development for deer populations. The increase in grass/forb habitat and grape arbor enhancement will provide for alternative food sources when mast failures occur.

Alternative 2

The effects of this alternative upon MIS considered demand species, because they are hunted, would include the following:

Black Bear – Local populations would remain stable in the short-term, as no major changes would occur in food availability within the project area. All existing den sites would not be impacted from management activities and the hardest portions of the area to reach on foot would remain that way.

Thus, no additional hunting pressure is expected. However, over the long-term, the oak component is likely to be reduced through gypsy moth mortality, especially in non-managed areas. This would result in a decrease in the capacity of the area to support current bear populations.

Wild turkey – Local populations would remain stable in the short-term, but over the long-term with a likely reduction in the oak component, populations will decrease slightly.

White-tailed deer – Local populations would remain stable in the short-term, but over the long-term with a likely reduction in the oak component, populations will decrease slightly.

Alternative 3

The effects of this alternative upon MIS considered demand species would be similar to Alternative 1 in the areas where vegetation management activities would occur through timber harvest, prescribed burning, non-commercial timber improvement, soft mast enhancement and control of invasive species. Impacts upon the demand species, because they are hunted, would include the following:

Black Bear – Local populations within the North Fork of Stony Creek watershed would increase with an increase in soft mast production, for the next 5 to 10 years. This alternative food source to hard mast would be found in harvest areas, prescribed burn areas, and in areas treated non-commercially and specifically for grape arbor enhancement.

Wild turkey – Local populations within the North fork of Stony Creek watershed would increase with increased bugging areas. There would be approximately 10.0 acres of temporary grass/forb habitat created from log landings from the harvest of 16 units. Two of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. Thus, there would be 4 acres permanently maintained. In addition, 5 acres of open woodland habitat comprised of a grass/forb ground cover would result from this alternative. These habitat improvements would provide additional bugging areas for local wild turkey and ruffed grouse poults.

White-tailed deer – Local populations within the North Fork of Stony Creek watershed would increase with increased forage and grass/forb habitat.

Alternative 4

There would be approximately 14.0 acres of temporary grass/forb habitat created from log landings from the harvest of 23 units. Four of the landings would be expanded to 2 acres each and maintained as grass/forb habitat. The acreage and effects of the addition of permanent grass/forb habitat as open woodland and permanent openings would be the same as Alternative 1. The effects of this alternative upon MIS considered demand species, because they are hunted, would include the following:

Black Bear – Local populations within the project area would increase with an increase in soft mast production, for the next 5 to 10 years.

Wild turkey – Local populations within the project area would increase with increased bugging areas.

White-tailed deer – Local populations within the project area would increase with increased forage and grass/forb habitat.

Cumulative Effects of the Alternatives:

The Eastern Divide Ranger District made a decision to create 8 acres of grass/forb habitat, prescribe burn 40 acres, and enhance grape arbors on 57 acres on the eastern end of Fork Mountain on September 20, 2006. It also included construction of a small parking area, which was constructed. This decision will be reaffirmed and the 8 acres of open woodland habitat is intended to be constructed as planned. In addition, the proposed MVP corridor would result in approximately 8.0 additional acres of grass/forb habitat being created and added to each alternative. Thus, this results in an increase of maintained grass/forb habitat type for all alternatives (Alt. 1 = 72 ac; Alt. 2 = 41 ac; Alt. 3 = 50 ac; Alt. 4 = 72 ac.). This would benefit bear, wild turkey, ruffed grouse, and deer utilizing

the eastern end of Fork Mountain, as very little grass/forb habitat is currently found on the National Forest.

Migratory Species

Issue Related to the Resource:
None.

Existing Situation:
The project area contains a wide variety of migratory species associated with mature forest. In addition, the thick understories of mountain laurel and rhododendron along the streams provide for shrub nesting species. Black-throated green warblers, scarlet tanagers, ovenbirds, blue-headed vireos, red-eyed vireos, and veery are common in the area. The area lacks early successional migrants that use larger forested openings. However, beaver meadows along the North Fork of Stony Creek provide some early successional habitat.

The area contains marginal to poor cerulean habitat based on the few individual male birds detected over the years as observed by the District Wildlife Biologist. However, the two to three individuals detected in 2012 occurred in, or next to, two identified thinning units (Units 1 and 2 of Alternative 1 and Alternative 4. Preliminary planning had identified these areas for regeneration harvest, but the presence of cerulean warblers and the opportunity to improve their habitat resulted in the proposal to thin these areas instead.

Migratory birds have become a focus of conservation concern due to evidence of declining population trends for many species. To ensure that forest plan revision alternatives include provisions for migratory bird habitat, planning efforts included coordination with the Migratory Bird Office of the U.S. Fish and Wildlife Service and others under the umbrella of Partners in Flight (PIF). PIF is a cooperative effort involving partnerships among federal, state, and local government agencies, foundations, professional organizations, conservation groups, industry, the academic community and private individuals. It was launched in response to growing concerns about declines in populations of land bird species and to emphasize conservation of birds not covered by existing conservation initiatives.

PIF has developed Bird Conservation Plans for each physiographic area relevant to the national forest planning area. These plans are science-based, long-term, proactive strategies for bird conservation across all land ownerships and designed to ensure long-term maintenance of healthy populations of native land birds. Forest Service biologists worked with PIF regional and local coordinators to identify key management issues and opportunities for high priority species on National Forest System lands, and developed related goals, objectives, and standards for incorporation into the Revised Forest Plan. In addition, *The Southern National Forest's Migratory and Resident Landbird Conservation Strategy* (Gaines and Morris 1996) was also reviewed and incorporated into planning efforts. This strategy identifies priority species and provides a framework for monitoring populations.

Direct and Indirect Effects of the Alternatives:
Because migratory and resident landbirds are so ubiquitous and diverse, they are relevant to the majority of ecological communities and habitat elements considered during forest planning. As a result, provisions for these species are integrated into numerous plan objectives and standards focused on achieving desired habitat conditions. Effects of these provisions on ecological communities and associated species are addressed in the Forest Plan and appropriate sections of this environmental analysis. Effects to specific species of birds are addressed under appropriate sections for those chosen as Management Indicator Species (MIS).

The majority of the Jefferson National Forest is contained within the Ridge and Valley Ecological Section. National Forests play an important role in conservation of bird species within the Ridge and Valley Section. Key landbird conservation issues within this Section are summarized below.

1). Creation and maintenance of early succession shrub habitat is desirable in order to provide habitat for the Appalachian Bewick's Wren, golden-winged warbler, prairie warbler and whip-poor-

will. Several management prescriptions identify the need to provide large enough patches of early successional habitat for area-sensitive early successional species.

2). Creation of structural diversity in mature stands to enhance conditions desirable for species such as the cerulean warbler, worm-eating warbler, and wood thrush. Mesic oak and mixed mesophytic stands can be evaluated for addition of canopy gaps and vertical structure through group selection and commercial thinning harvest programs.

3). Protection and maintenance of northern hardwood/spruce-fir forests is a priority.
The potential for restoration needs to be evaluated. This type is protected where it occurs and the potential for restoration of additional acres needs to be evaluated.

Alternative 1
This alternative responds to the first two key conservation issues associated with migratory birds within the Ridge and Valley region. The thinning of 161 acres of mesic oak will create conditions and structural diversity that understory species such as the wood thrush and veery find desirable. This includes the thinning of Units 1 and 2, which is considered beneficial to improving stand conditions desired by cerulean warblers. The stands are too dense and crown development is hampered by the presence of co-dominant crowns. The oaks with the largest crowns will be the trees identified as leave trees. Guidelines and management strategies identified in Cerulean Warbler Management Guidelines for Enhancing Breeding Habitat in Appalachian Hardwood Forests (2013) will be used to promote conditions desired by this species within these two thinning areas.

The regeneration of 360 acres, creation of open woodland habitat, and the use of prescribed fire will provide opportunities for early successional species to occupy the project area.

Alternative 2
The no action alternative does not respond to the first two key conservation issues in a direct manner. Cerulean warbler habitat would continue to be considered marginal to poor without the ability to thin the stands.

Alternative 3
This alternative responds to the first two key conservation issues associated with migratory birds within the Ridge and Valley region, but not to the extent of Alternative 1. The thinning of 119 acres of mesic oak will create conditions and structural diversity that understory species such as the wood thrush and veery find desirable. In this alternative Units 1 and 2 identified in Alternative 1 would not be thinned, thus improvement of cerulean warbler habitat would not occur as based on the recent published guidelines.

In addition, the regeneration of 240 acres will provide opportunities for early successional species to occupy the project area, but at approximately 67% of the level of Alternative 1. Prescribed burn acres would be reduced, thus reducing potential for small gaps/patches of early successional habitat to develop,

Alternative 4
This alternative responds to the first two key conservation issues associated with migratory birds within the Ridge and Valley region. The thinning of 161 acres would produce the same results identified in Alternative 1. Improvement of cerulean habitat would also occur. In addition, the regeneration of 305 acres will provide opportunities for early successional species to occupy the project area, at approximately 86% of the level of Alternative 1. Prescribed fire impacts would be the same to those of Alternative 1.

Cumulative Effects of the Alternatives:
The maintenance of the area in a forested cover of different age classes provides future habitat for many migratory species. As local agricultural areas are converted to commercial and residential land use, the national forest system lands in this area will become even more important in providing habitat to migratory species.

The thinning of stands that contain marginal cerulean habitat will potentially increase the potential for this species to exist on the national forest in this area. The addition of 8 acres of open woodland habitat and 57 acres of grape arbor enhancement on the east end of Fork Mountain will also provide habitat for a variety of migrant bird species.

Fisheries and Aquatic Habitat

Issue Related to the Resource:
1. POTTS CREEK and STONY CREEK WATERSHEDS IMPACTS– There is concern that the commercial harvesting, system road construction, herbicide use, bladed skid and temporary road construction and prescribed burning activities may adversely impact water and aquatic resources, in a cumulative manner, within the Potts Creek and Stony Creek watersheds.

INDICATORS:

a. Cumulative estimated sediment yield from project activities in both Potts Creek and Stony Creek watersheds.

b. Whether or not the alternative would have significant impacts on the water and aquatic resources of Potts and Stony Creeks.

Scope of the Analysis:
The analysis area for fisheries and aquatic habitat is the same that is described in the Hydrology section of this EA. The analysis area is the watershed of Stony Creek down to and including its North Fork (19.2 square miles, or 12,315 acres) and the watersheds of North Fork Potts Creek and South Fork Potts Creek down to their confluence (19.6 square miles, or 12,523 acres). This portion of the Stony Creek watershed is approximately 98% forested and only 1% developed (including roads). The watersheds of North Fork Potts Creek and South Fork Potts Creek are 89% forested, 3% developed, and 8% is in pasture or hay.

Existing Situation:
The headwaters of the Stony Creek and Potts Creek watersheds drain the project area. The North Fork of Stony Creek and the North and South Forks of Potts Creek are perennial streams containing brook trout populations. Fish species that occur in North Fork of Stony Creek include brook trout, rainbow trout, fantail darter, blacknose dace, white sucker, rosyside dace, longnose dace, creek chub, bluehead chub, and mottled sculpin. Brook trout were found in North Fork of Potts Creek in the summer of 2012. Wild trout are the Management Indicator Species (MIS) for cold water habitats. Water chemistry indicates both the North Fork of Stony and North Fork of Potts Creeks are impacted by acidic conditions.

Aquatic macroinvertebrate communities integrate the physical, chemical and biological components of the riparian ecosystem, and have been successfully used as bioindicators to monitor change and impacts (EPA 1989). A Macroinvertebrate Aggregated Index for Streams (MAIS) (ranging from a score of 0 to 18) incorporates nine ecological aspects (metrics) of the aquatic macroinvertebrate community to evaluate the current condition of a stream relative to others within the same ecological section (Smith and Voshell 1997). It also establishes a baseline to evaluate effectiveness of standards, guidelines and mitigation measures in preventing changes and impacts to the aquatic community. Sample sites were selected downstream of management activity areas to monitor the impacts on stream health of projects including but not limited to timber sales and prescribed burns. Other samples were collected to create a baseline of stream conditions within the forest. Only samples collected from March through the first week in June were compared to minimize seasonal variability in structure of macroinvertebrate communities. Across the Forest, 1857 samples were collected, analyzed and assigned an overall MAIS score (0-18). Of these samples, 76% were in the “good” and “very good” categories. An analysis of benthic and water quality data by Smith and Voshell (2013) indicated that the macroinvertebrate condition is significantly correlated to ANC and pH, and that several specific benthic metrics (Ephemeroptera taxa, Percent ephemeroptera, Percent scrapers and HBI) are responding to changes in ANC and pH. The greatest values of the benthic metrics tend to

occur at ANC values that are 20 or greater. As described above, roughly 20% of the sites had trends in ANC and pH; except for limed streams the majority of those trends were decreasing. These sites with low ANC or pH would have "poor" or "fair" MAIS scores.

Smith and Voshell (2013) also compared pre-activity macroinvertebrate metrics with post-activity metrics for streams located below timber harvests and prescribed burns at various locations across the Forest and concluded that "management practices are successful at reducing effects on aquatic organisms" from these activities. The results showed no decline in macroinvertebrates following timber sales or prescribed burns.

Within the project area, macroinvertebrate samples have been collected from North Fork Stony Creek and North Fork Potts Creek. Both streams have MAIS scores that place them in the Good category for streams in the ecological Section (Rapid Bioassessment Reports 8070 and 8180, GWJNF 2014), although species sensitive to acidification are reduced.

Water quality samples were likewise collected from these streams to evaluate the current conditions of water chemical properties and to monitor changes over time. Nine chemical parameters associated with the effects of acid deposition and nutrient loading are measured in each sample, including pH, acid neutralizing capacity (ANC), and nitrate (NO_3^-). Over 25 years of quarterly water samples in North Fork Stony indicate acidic conditions, with pH often less than 6, and sometimes under 5, and ANC values near zero or negative. Similarly, water samples from North Fork Potts Creek indicate acidic conditions with pH around 5.0 and negative ANC values.

Direct and Indirect Effects of the Alternatives:

Alternative 1

Impacts to downstream aquatic species will be related to water quality issues addressed in the Hydrology section. The most likely effects to aquatic species from timber harvest, road construction, or prescribed burning would be from sedimentation from ground disturbing activities within the riparian corridor. These potential impacts will be negligible since, under all alternatives, a buffer zone will be left along each stream. The width of this zone depends on the size/characteristics of the stream and is consistent with the Forest Plan direction for riparian corridors. The primary function of this zone is to manage the area for riparian dependent resources. An additional function of this zone is to stabilize the stream bank, to moderate water temperature and promote the growth of desirable algae via shading, to provide soil/water contact area for biogeochemical processing of nutrients, and to contribute necessary organic detritus and LWD to the stream ecosystem. The proposed action would not increase the amount of LWD in any stream, other than potentially with the road decommissioning of FSR10481 and the north end of FSR 10521. However, protection of the riparian area would allow for the natural recruitment of LWD in the future. Future recruitment of LWD is expected to improve the amount and distribution of pool habitat in area streams in the future. The hydrology effects section of the EA states that this alternative would not have a significant effect on soil or water resources and that predicted sediment increases are below 1 percent for the proposed action, which is well within the expected variability of sediment from year to year (interannual variability). In addition, there would be no change in the streambed composition or in aquatic habitat quality or complexity from sediment related to the project. Thus, there would be no measurable or observable direct, indirect, or cumulative effects to aquatic species. Based on this, the indicators related to the Issue identified for Aquatic resources show no significant impacts upon the Potts Creek or Stony Creek watersheds.

The use of Best Management Practices and avoidance of impacts in riparian areas would result in negligible impact to aquatic species. These conclusions are supported by the discussion of impacts to fisheries as a whole in Appendix J of the Forest Plan 2004 FEIS and these analyses are hereby incorporated by reference (pages J-7 through J-10, 2004 FEIS). In addition, the riparian standards of the Plan are considered sufficient to protect aquatic threatened and endangered species (Kirk and Huber 2004); thus no impacts are expected upon aquatic species.

Use of herbicides has the potential to impact aquatic species. Under Alternative 1, individual invasive plants (either non-native invasive species or other unwanted woody vegetation that competes with important wildlife forage species or forest regeneration) scattered over the 498 acres proposed for

control would be treated with the use of glyphosate and triclopyr herbicides. These herbicides would be applied directly to individual plants scattered over the entire 498 acres. Triclopyr would be applied either by hand to cut surfaces or as a thinline treatment to un-severed stems, using backpack sprayers. Glyphosate would be applied by hand to cut surfaces or as a low volume spray from backpack sprayers. There would be no broad application of herbicide with the proposed actions.

Glyphosate was selected for use in accomplishing these objectives because of its low risk to water quality. In addition, with use of a 30-foot no herbicide treatment buffer along stream channel and measures restricting treatment weather (FW-100, Plan p. 2-29) would reduce the potential for impact to ground or surface water quality. Herbicide mobility depends on water solubility and absorption tendency. Glyphosate is soluble in water, with a half-life of 60 to 65 days. It degrades primarily through microbial action and not by sunlight. It has low potential for subsurface movement into streams due to moderate persistence offset by extreme absorption ability. The Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains (VMAM EIS, Appendix A) discloses acute, chronic and cumulative herbicide effects on aquatic species. Glyphosate is considered practically nontoxic to aquatic organisms.

Triclopyr is metabolized by bacteria and photodegrades rapidly, resulting in a moderate half-life of 10 to 46 days with an average 30-day half-life. It has a moderately low toxicity and is relatively nontoxic to fish. In addition, the use of a 30-foot no herbicide treatment buffer along stream channel and measures restricting treatment weather (FW-100, Plan p. 2-29) would reduce the potential for impact to ground or surface water quality.

With the mitigation measures in place, the risk of ground or surface water pollution from herbicide application would be minimal. There would be no significant direct or indirect impacts on water quality or aquatic life. The effects of this alternative upon wild trout, an MIS identified with stream acidification and stream impairment, would include the following:

Wild Trout MIS – Local wild trout populations are expected to be unaffected by the proposed action as Forest Standards and guidelines will protect the water quality and stream habitat of North Fork Potts Creek and North Fork Stony Creek. The trout populations of these streams are most affected by acidic water quality conditions controlled by acid deposition and the lack of buffering capacity by the underlying geology.

Alternative 2
There would be no potential impacts upon aquatic resources with selection of this alternative. There would be no potential to impact fish populations downstream of the project area.

Alternative 3
No road construction is proposed within the North Fork of Potts Creek watershed under this alternative. In addition, no silvicultural treatments associated with the proposed harvest units would occur. Consequently, the ground disturbing activity and potential source of sedimentation in the North Fork Potts Creek watershed is less. The same effects to the North Fork of Stony Creek identified above or in the Hydrology section would apply.

Alternative 4
Similar effects to those identified for Alternative 1.

Cumulative Effects of the Alternatives:
Given design criteria and mitigation measures contained in that environmental assessment and the herbicides proposed for use, no detrimental cumulative effects are anticipated to the fisheries or aquatic resources.

Threatened, Endangered, Sensitive and Locally Rare Species

Issue Related to the Resource:
1. POTTS CREEK and STONY CREEK WATERSHEDS IMPACTS– There is concern that the commercial harvesting, system road construction, herbicide use, bladed skid and temporary road construction and

prescribed burning activities may adversely impact water and aquatic resources, in a cumulative manner, within the Potts Creek and Stony Creek watersheds.

INDICATORS:

a. Cumulative estimated sediment yield from project activities in both Potts Creek and Stony Creek watersheds.

b. Whether or not the alternative would have significant impacts on the water and aquatic resources of Potts and Stony Creeks.

Scope of the Analysis:
The analysis area for TES fisheries and aquatic organisms is the same that is described in the hydrology section of this EA. It is the watershed of Stony Creek down to and including its North Fork (19.2 square miles, or 12,315 acres) and the watersheds of North Fork Potts Creek and South Fork Potts Creek down to their confluence (19.6 square miles, or 12,523 acres).

The entire George Washington and Jefferson National Forests serve as the geographic scope for effects concerning the Indiana Bat, *Myotis sodalis.* The Indiana bat is not being considered as a significant issue in this environmental assessment because the analysis area is not situated within an Indiana bat cave protection area (Indiana bat cave protection areas are defined in the Forest Plan). This issue has already been decided and the effects disclosed by this agency through the NEPA analysis and documentation by the U.S. Fish and Wildlife Service by its Biological Opinion (BO) of January 13, 2004. The BO issued constitutes compliance with Section 7 requirements of the Endangered Species Act (ESA) regarding the Indiana Bat and therefore no further consultation with the USFWS is necessary. The BO also contains an incidental take statement that provides for "taking" (as identified in ESA) of individual bats and habitat modifications thus allowing for implementation of forest management activities within the Terms and Conditions and will not violate Sections 4 (d) and 9 of ESA. However, to meet Endangered Species Act, (ESA) Statutory and National Forest Management Act (NFMA) requirements, Indiana bat requirements from the Forest Plan, as applicable to the proposed project and reiterated in the BE or BO, also become part of the design of the project level alternatives. Thus, these requirements for protection of the Indiana bat are included in this environmental assessment.

In addition, the eastern small-footed bat, *Myotis leibii*, and the northern long-eared bat, *Myotis septentrionalis*, are now considered in the analysis. The eastern small-footed bat is a recent addition to our Sensitive list and the northern long-eared bat is currently proposed for federal endangered status.

The scope of analysis for the sweet pinesap, butternut, rock skullcap, Bentley's coralroot, persius duskywing, and Diana fritillary is the entire project area.

Existing Situation:
The Forest Plan identifies Upper Potts Creek as a Priority Watershed possessing outstanding aquatic biodiversity because of the presence of the James spinymussel. The James spinymussel, a federally endangered freshwater mussel occurs in the South Fork of Potts Creek and Potts Creek proper, downstream of the project area. Stony Creek is also identified as a Priority Watershed, due to the candy darter, a sensitive fish species occurs in Stony Creek, downstream of the project area.

The area contains potential Indiana bat, a federally endangered species, Eastern small-footed bat, a sensitive species, and northern long-eared bat, a proposed species for federal listing, summer roost habitat.

No caves that could provide wintering habitat for the federally-endangered Indiana bat are known in the project area. Habitat for the bat does exist across the Eastern Divide Ranger District although there is no critical habitat (as defined in the Endangered Species Act) for the Indiana bat on the GWJNFs or adjacent to the national forest in Virginia, West Virginia, or Kentucky. The project area is

not within any primary or secondary cave protection areas surrounding hibernacula since it is not within 2 miles of any hibernaculum. The closest hibernaculum is approximately 20 miles away. The project area also does not contain any fall foraging and swarming habitat since it is not within 2 miles of any hibernaculum. The project area contains potential summer roost sites, summer foraging habitat, and potential maternity sites for the Indiana bat.

The Diana fritillary, a sensitive butterfly, is known to exist in the project area; and it is possible the persius duskywing, another sensitive butterfly (found in boggy wet areas) could occur in the project area. Bentley's coralroot, a sensitive plant, has been found along the edge of the project area but was not seen within any proposed activity area. One butternut, a sensitive tree species, was found near a proposed harvest unit. In addition, parts of the area are potential habitat for sweet pinesap and rock skullcap, both sensitive plant species.

A Biological Evaluation (BE) of the proposed project has been completed, and is contained in the project files at the Eastern Divide Ranger District office in Blacksburg.

Direct, Indirect and Cumulative Effects of the Alternatives:
Alternative 1
The endangered James spinymussel is located downstream of the project area in Potts Creek. Ground disturbing activities can increase the amount of sediment delivered to streams and this may have negative effects to mussels and fish. To address these concerns the "Federally Listed Endangered and Threatened Mussel and Fish Conservation Plan" (Conservation Plan) was developed by the Forest in close coordination with the U.S. Fish and Wildlife Service. The Conservation Plan includes specific conservation measures to be implemented at the project level to protect water quality and habitat for aquatic species. As long as Forest Plan and Conservation Plan standards are being followed for projects conducted on the JNF, a determination of "not likely to adversely affect" is appropriate for federally listed mussels or fish, and no further consultation with the FWS is necessary.
This project will follow the Conservation Plan and all appropriate conservation measures will be employed as mitigation measures into the project.

The water quality, quantity, and cumulative effects analysis in the Hydrology section of the EA states that no alternative would have a significant effect on soil or water resources when viewed in conjunction with past, present, and future activities and the effect of sediment on the beneficial use of Stony Creek or Potts Creek will be immeasurable or insignificant.

In terms of impacts to Indiana bat habitat, the retention of some snags, shag bark hickory, and hollow trees in this sale area would allow potential Indiana bat roost sites to be conserved. Decreasing canopy closure in the harvest units would increase the degree of exposure of some potential maternity roost trees to solar radiation, providing improved thermal conditions for raising young. Harvest units would create insect rich foraging areas and flight corridors leading to potential roost trees. Harvesting would create a mosaic of regeneration areas intermixed with mature and late successional forest. This will indirectly provide feeding areas since bats are known to forage within the canopy openings of upland forests, over clearings with early successional vegetation, and along the borders of croplands, wooded strips (fence rows), and over ponds.

For the Indiana bat this project will be in compliance with the BO issued by the USFWS on January 13, 2004 and therefore constitutes compliance with ESA Section 7 requirements. Since implementation of this project will be in compliance with the BO that was issued as a result of formal consultation and it provides both specific Plan and project level direction, plus no new information has been identified as of this date, a finding of the effect to the Indiana bat for this proposed project is: no effect, beyond that which is already disclosed in the Revised Land and Resource Management Plan of March 2004 and by the USFWS in the BO of January 13, 2004.

The northern long-eared bat (NLEB) was considered because it is currently proposed for listing under the Endangered Species Act mainly due to population declines caused by White Nose Syndrome (WNS). The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In Virginia the NLEB has been known to occur in every county

of the state, and in every county of West Virginia. Northern long-eared bats spend winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USFWS Fact Sheet 2013).

The USFWS 12-month Listing Package for the northern long-eared bat states: "Predominantly due to the emergence of WNS, the northern long-eared bat has experienced a severe and rapid decline in the Northeast, estimated at approximately 99 percent (from hibernacula data) since the disease was first discovered there in 2007. Summer survey data in the Northeast have confirmed rates of decline observed in northern long-eared bat hibernacula data, post-WNS, with rates of decline ranging from 93 to 98 percent. This disease is considered the prevailing threat to the species, as there is currently no known cure" (Federal Register 10/02/2013, 78 FR 61045 61080). In response to the WNS threat the Forest has closed all caves and mines to public use per an annually renewed Southern Region closure order that began May 21, 2009, to reduce the potential for WNS to be spread via human use of caves. Caves on the Forest that are currently gated will remain closed with gates locked year-round. The 12-month listing identifies prescribed burning, timber harvest, and other forest management as activities that alone do not have significant effects, but which cumulatively with the effects of WNS, may further impact the northern long-eared bat. Literature cited in the 12-month listing and other recently published research (Johnson et al. 2009) shows that the northern long-eared bat responds favorably to vegetation practices that provide a range of successional stages in the forest. This response is reflected in the range of tree species preferred for day roosts where the northern long-eared bat prefers black locust and sassafras snags and live trees with cavities (these trees are both early successional, shade intolerant species which require disturbance and open conditions to regenerate and become suppressed in the understory as forest canopies age and close with the lack of disturbances such as fire). There is also considerable evidence which shows female northern long-eared bats choose day roosts that have increased solar radiation and are often along edges of gaps and openings in the forest canopy. Recent studies of northern long-eared bat home range and habitat use analysis indicate northern long-eared bat selects forest stands for foraging which have been partially harvested more so than un-cut or open areas such as fields and along road corridors. This indicates that northern long-eared bat favors a structurally complex mosaic of closed and open forest canopy gap conditions across the landscape. The George Washington Forest Plan and the Jefferson Forest Plan each contain management direction for the protection of caves and bats. Both of these plans require that the majority of the forest remain in mature forest (stand ages greater than 70 years) and both have objectives to create early successional habitat through vegetation management to create a diversity of structure in the forest. In addition, both promote potential summer roost trees during timber harvest with requirements to protect trees such as shagbark hickory with furrowed and exfoliating bark and to leave most existing snags or cavity trees.

Effects to eastern small-footed bat (*Myotis leibii*) were considered in this EA because habitat features found in the project area could be utilized by this species. This species has been documented on the Eastern Divide Ranger District in Craig County and is known from winter hibernacula and summer foraging surveys. This species is known or likely to occur in 32 Virginia counties, including Giles, and in Monroe County in West Virginia, and ranges from New England south to northern Georgia and west to Oklahoma. During the winter this species hibernates in caves; however, there are no caves known within or adjacent to the proposed project area. During the late spring, summer, and early fall eastern small-footed bats forage at night in forest and open woodland habitat, usually along ridge crests, and roost during the day in crevices of exposed large rock outcrops and cliffs (also in manmade structures such as expansion- joints of concrete bridges). Therefore, eastern small-footed bats are potentially present and roosting during summer months wherever large rock outcrops or cliffs are present. No small-footed bats were seen during field surveys, but potential habitat consisting of large ridgetop rock outcrops exist in portions of the project area. Timber harvest and road/skid trail activities will not

destroy any of these potential rock outcrop roost sites, although outcrops will be immediately adjacent to roads and harvest units from project implementation. Large rock outcrops and cliffs also serve as potential habitat for other rare species such as Appalachian woodrats *(Neotoma magister).*
On January 21, 2010 the U.S. Fish and Wildlife Service (USFWS) received a petition requesting that the eastern small-footed bat be listed as threatened or endangered and that critical habitat be designated under the ESA due to impacts and reduced population numbers from the effects of the non-native fungal pathogen white nose syndrome (WNS). On June 29, 2011 the USFWS published in the Federal Register a 90-day petition finding that these bats may warrant federal protection as threatened or endangered species. On October 2, 2013, the Service published in the Federal Register a combined proposed rule and 12-month findings on the 2010 petition to list the eastern small-footed bat. The Service found that listing the eastern small-footed bat as threatened or endangered is not warranted. For the Forest Service, this bat remains as a sensitive species. There are no known impacts that should result from implementation of this project that would adversely impact species viability nor result in a trend towards federal listing of this species under the Endangered Species Act. Implementation of the proposed action should have no direct or cumulative impacts on eastern small-footed bat populations or potentially suitable habitat on the Forest.

In Virginia, the candy darter is generally distributed only in Big Stony Creek, perhaps solely above the gypsum plant at Kimbalton; extremely localized in Laurel Fork of the Wolf Creek system; limited range in the New River. It has also been collected from Reed, Big Walker, Little Stony, and Sinking Creeks, and Spruce and Pine Runs, but there are no recent records from these streams (Burkhead and Jenkins 1991). It is found in rocky, typically clear, cold to warm, small to large creeks; adults generally occur in unsilted runs, riffles, and swift pockets of current in and around large rubble and boulders (Burkhead and Jenkins 1991, Jenkins and Burkhead 1994). It is listed because of its small range in the New River drainage, Virginia and West Virginia, loss of suitable habitat, and low abundance. Threats include siltation, stocked trout, and habitat disturbance by anglers (Nature Serve 2005). Effects to this Forest Service sensitive species were considered because the project area contains existing habitat downstream from the project area. The hydrological report determined that there would be no measurable or observable direct, indirect, or cumulative effects upon water quality as a result of the proposed activities. The riparian Standards of the Forest Plan are considered sufficient to protect aquatic threatened and endangered species (Kirk and Huber 2004) from the activities proposed; thus no impacts are expected upon candy dater populations.

Effects to the Diana fritillary were considered because the project area contains potential habitat. They nectar in adjoining open lands and can be found along roadsides. Larvae feed on violets and adults feed off milkweed and other nectar producing flowers. It is possible that individuals may be crushed or burned as a result of proposed activities, but the Fork Mountain and Peters Mountain area contains thousands of acres of potential habitat. Thus, any impacts to local populations(s) are expected to be minimal when compared to numerous potential populations elsewhere in the Stony Creek and Potts Creek watersheds and across the Forest. Potential negative impacts would be short-lived. Long-term impacts are positive because habitat would be created that would support nectar plants beneficial to the butterfly. No individuals were observed within the project area, but if present, individuals of these species may be impacted as a result of proposed activities, but this will not lead to Federal listing, or loss of species viability (Biological Evaluation for Sensitive Species, December 5, 2003 for the Forest Plan). There are no significant cumulative effects anticipated.

The persius duskywing was considered present because when suitable habitat exists within the home range of a species we consider the species present even though the species was not observed. In this particular case, this species was considered to exist within the prescribed fire treatment area of Burn Block 2, but not in any of the harvest areas as riparian guidelines protect these habitats. However, due to the wet nature of the habitat required it is not likely that fire will burn in these wet areas that could be potential habitat. Thus, no direct, indirect, or cumulative effects are expected.

Effects to Bentley's coralroot were considered because the project area contains known populations/individuals. The known population is along West Virginia State Route 17, and is not close to any activity areas. Proposed harvest and road locations were checked and no new

populations found. There will be no direct, indirect or cumulative effects upon this species as a result of the proposed action, and the overall viability of this species on the Forest will not be affected due to the numerous other populations that exist within the Stony Creek watershed and in adjacent Monroe County, West Virginia, as well as in Bath County, Virginia. It also occurs in Alleghany County, Virginia and Pocahontas County, West Virginia.

Effects to butternut were considered because the project area contains known populations/individuals. One individual was observed near a proposed shelterwood with reserves unit, but was upslope and will not be impacted by proposed timber harvest activities. Thus, there will be no direct, indirect or cumulative effects upon this species as a result of the proposed action, and the overall viability of this species on the Forest will not be affected due to the numerous other populations that exist.

Effects to sweet pinesap were considered because the project area contains potential habitat. It is possible that individuals of sweet pinesap may be destroyed during road construction or harvest activities on the south side of Peters Mountain, but the Peters Mountain area contains thousands of acres of potential habitat. Thus, any impacts to local populations(s) are expected to be minimal when compared to numerous potential populations elsewhere in the watershed and across the Forest. No individuals were observed within the project area, but if present, individuals of these species may be impacted as a result of proposed activities, but this will not lead to Federal listing, or loss of species viability (Biological Evaluation for Sensitive Species, December 5, 2003 for the Forest Plan). There are no significant cumulative effects anticipated.

Effects to the rock skullcap (*Scutellaria saxatilis*) were considered in this EA because the species is known to occur in Giles County and potential habitat occurs in the project area; however, none were observed during field surveys. It is conceivable that individuals of this species may have been inadvertently missed during field surveys and field work. This skullcap is known to occur in 32 Virginia counties and ranges from New Jersey and Pennsylvania west to Indiana and south to Georgia and Alabama. Rock skullcap typically grows in nutrient rich, dry to mesic ridge top woods in well-drained soil often in rocky mixed mesophytic woods, on talus slopes, and steep bluffs, usually over a sandstone substrate. Fires often burned in this vegetation type and this habitat is likely maintained by periodic fire. Fire would release nutrients and help maintain a more open forest condition. As the tree canopy and understory vegetation thickens, herbaceous forest vegetation is often shaded-out. The direct effects of fire on this species are unknown. Because rock skullcap would likely respond positively to some shrub and subcanopy clearing, prescribed fire that eliminates the shrub layer of the forest should improve the habitat for this species. If rock skullcap occurs in the project area, the prescribed fire should benefit the species by favoring open forest and woodland conditions.

Alternative 2
Under Alternative 2, there are no management activities and therefore, there would be no potential impacts to the threatened, endangered or sensitive species in this area.

Alternative 3
Similar effects to those identified for Alternative 1, except little or no effect upon the Potts Creek watershed; thus even less impact potential on the James spinymussel.

Alternative 4
Similar effects to those identified for Alternative 1.

Cumulative Effects of the Alternatives:

Alternatives 1-4
Given design criteria and mitigation measures contained in that environmental assessment, no detrimental cumulative effects are anticipated to the threatened, endangered, and sensitive species resulting from this proposed action.

In regard to the James spinymussel, the Mountain Valley Pipeline could affect individuals and habitat for the species due to increased sedimentation in North Fork Potts Creek and South Fork Potts Creek.

The section of this EA about Water Resources addresses the potential for cumulative effects from pipeline construction and operation on water quality. As discussed in that section, it is speculative as to whether or not this pipeline would be constructed in the Potts Creek watershed. Should the analysis of the pipeline move forward, the Forest Service would assess the effects of the pipeline on water quality as part of the FERC Environmental Impact Statement for the pipeline. At the time the EIS is prepared, the pipeline proposal, along with all required erosion control practices, would be clearly defined and the cumulative effects of the pipeline and the Fork Mountain projects can be better evaluated. At that time the potential impacts of the changes in water quality or stream condition can be evaluated in terms of impacts to the James spinymussel.

Direct, Indirect and Cumulative Effects of the Alternatives:

For the Indiana bat, this project will be in compliance with the BO issued by the USFWS on January 13, 2004 and therefore constitutes compliance with ESA Section 7 requirements. Since implementation of this project will be in compliance with the BO that was issued as a result of formal consultation and it provides both specific Plan and project level direction, plus no new information has been identified as of this date, a finding of the effect to the Indiana bat for this proposed project is: no effect, beyond that which is already disclosed in the Revised Land and Resource Management Plan of March 2004 and by the USFWS in the BO of January 13, 2004.

The northern long-eared bat (NLEB) was considered because during the development of this project, it was proposed for listing under the Endangered Species Act mainly due to population declines caused by White Nose Syndrome (WNS). On April 2, 2015, the USFWS listed the NLEB as a threatened species and identified an interim rule under the authority of section 4(d) of the Endangered Species Act (ESA). The range of the northern long-eared bat includes much of the eastern and north central United States, and all Canadian provinces from the Atlantic Ocean west to the southern Yukon Territory and eastern British Columbia. In Virginia the NLEB has been known to occur in every county of the state, and in every county of West Virginia. Northern long-eared bats spend winter hibernating in caves and mines. They typically use large caves or mines with large passages and entrances, constant temperatures, and high humidity with no air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible. During summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees. Males and non-reproductive females may also roost in cooler places, like caves and mines. Northern long-eared bats emerge at dusk to fly through the understory of forested hillsides and ridges feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch while in flight using echolocation. This bat also feeds by gleaning motionless insects from vegetation and water surfaces (USFWS Fact Sheet 2013).

Based on the standards of Indiana bat management, the Forest-wide standards for Cave management in the Forest Plan, the closing of caves and mines to visitation by Regional Forester in June 2014 (Order Number FS-RO-08-01-2014), and the habitat objectives in the Plan to maintain a variety of successional classes within a matrix of a predominantly mature forest structure the management activities implemented as part of this project should not jeopardize the continued existence of the northern long-eared bat.

Additionally, while the species was proposed for listing as an endangered species, effects were discussed with the USFWS in a Conference Report prepared by the Forest Service on August 4, 2014 and the Service agreed on August 27, 2014 that continued implementation of conservation measures in place for the Indiana bat were sufficient for the northern long-eared bat and Forest management actions would not result in jeopardy to the species. The Forest Service is in the process of formally consulting with the US Fish and Wildlife Service on the northern long-eared bat and a Biological Opinion is expected this summer. If the Biological Opinion results in any changes to the project, this EA will be revised as needed.

The USFWS 12-month Listing Package for the northern long-eared bat states: “Predominantly due to the emergence of WNS, the northern long-eared bat has experienced a severe and rapid decline in the

Northeast, estimated at approximately 99 percent (from hibernacula data) since the disease was first discovered there in 2007. Summer survey data in the Northeast have confirmed rates of decline observed in northern long-eared bat hibernacula data, post-WNS, with rates of decline ranging from 93 to 98 percent. This disease is considered the prevailing threat to the species, as there is currently no known cure" (Federal Register 10/02/2013, 78 FR 61045 61080). In response to the WNS threat the Forest has closed all caves and mines to public use per an annually renewed Southern Region closure order that began May 21, 2009, to reduce the potential for WNS to be spread via human use of caves. Caves on the Forest that are currently gated will remain closed with gates locked year-round. The 12-month listing identifies prescribed burning, timber harvest and other forest management as activities that alone do not have significant effects, but which cumulatively with the effects of WNS, may further impact the northern long-eared bat. Literature cited in the 12-month listing and other recently published research (Johnson et al. 2009) shows that the northern long-eared bat responds favorably to vegetation practices that provide a range of successional stages in the forest. This response is reflected in the range of tree species preferred for day roosts where the northern long-eared bat prefers black locust and sassafras snags and live trees with cavities (these trees are both early successional, shade intolerant species which require disturbance and open conditions to regenerate and become suppressed in the understory as forest canopies age and close with the lack of disturbances such as fire). There is also considerable evidence which shows female northern long-eared bats choose day roosts that have increased solar radiation and are often along edges of gaps and openings in the forest canopy. Recent studies of northern long-eared bat home range and habitat use analysis indicate northern long-eared bat selects forest stands for foraging which have been partially harvested more so than un-cut or open areas such as fields and along road corridors. This indicates that northern long-eared bat favors a structurally complex mosaic of closed and open forest canopy gap conditions across the landscape. The George Washington Forest Plan and the Jefferson Forest Plan each contain management direction for the protection of caves and bats. Both of these plans require that the majority of the forest remain in mature forest (stand ages greater than 70 years) and both have objectives to create early successional habitat through vegetation management to create a diversity of structure in the forest. In addition, both promote potential summer roost trees during timber harvest with requirements to protect trees such as shagbark hickory with furrowed and exfoliating bark and to leave most existing snags or cavity trees.

PHYSICAL ENVIRONMENT

Water Resources (or Hydrology)

Issue Related to the Resource:

1. POTTS CREEK and STONY CREEK WATERSHEDS IMPACTS– There is concern that the commercial harvesting, system road construction, herbicide use, bladed skid and temporary road construction and prescribed burning activities may adversely impact water and aquatic resources, in a cumulative manner, within the Potts Creek and Stony Creek watersheds.

INDICATORS:

a. Cumulative estimated sediment yield from project activities in both Potts Creek and Stony Creek watersheds.

b. Whether or not the alternative would have significant impacts on the water and aquatic resources of Potts and Stony Creeks.

Scope of the Analysis:

It is the watershed of Stony Creek down to and including its North Fork (19.2 square miles, or 12,315 acres) and the watersheds of North Fork Potts Creek and South Fork Potts Creek down to their confluence (19.6 square miles, or 12,523 acres).

Existing Situation:

The Fork Mountain Vegetation Management Project is in the watershed of Stony Creek and the watershed of Upper Potts Creek. Annual precipitation over the project area averages 41.6 inches.

Both Stony Creek and Upper Potts Creek are identified in the Plan as Priority Watersheds possessing outstanding aquatic biodiversity because of the presence of the candy darter in Stony Creek and the James spinymussel in Potts Creek. The Watershed Analysis conducted for the Plan and documented in the Final Environmental Impact Statement determined that Stony Creek watershed has a Watershed Condition Rank (WCR) of "average" and Upper Potts Creek has a WCR of "excellent".

The analysis area for water quality is the watershed of Stony Creek down to and including its North Fork (19.2 square miles, or 12,315 acres) and the watersheds of North Fork Potts Creek and South Fork Potts Creek (19.6 square miles, or 12,523 acres). This portion of the Stony Creek watershed is approximately 98% forested and only 1% developed (including roads). Annual sediment yield is estimated to be 961 tons. The watersheds of North Fork Potts Creek and South Fork Potts Creek are 89% forested, 3% developed, and 8% in pasture or hay. Annual sediment yield is estimated to be 1979 tons.

The Commonwealth of Virginia conducts an assessment of water quality every two years in accordance with Section 305(b) of the Clean Water Act. Virginia's 2012 305b assessment included a watershed load ranking for nitrogen, phosphorus, and sediment in each of three source categories – agriculture, urban, and forestry. Rankings of high, medium, and low were assigned. Watersheds were also ranked for population served by a public water supply. For stream-dependent living resources, an index of biological integrity was used to indicate the degree of aquatic biotic integrity and resource importance. Watersheds were also assigned rankings of high, medium, low, or none, based on the percentage of rivers and lakes that were impaired. The results of the assessment for the Stony Creek watershed are shown in Table 13.

Table 13. Stony Creek 2012 Water Quality Assessment

PARAMETER	RANK
Agriculture Nitrogen	LOW
Agriculture Phosphorous	LOW
Agriculture Sediment	LOW
Urban Nitrogen	LOW
Urban Phosphorous	LOW
Urban Sediment	LOW
Forest Nitrogen	LOW
Forest Phosphorous	HIGH
Forest Sediment	MEDIUM
Total Nitrogen	LOW
Total Phosphorous	LOW
Total Sediment	LOW
Riverine Impairments	None
Lacustrine Impairments	None
Modified Index Biological Integrity	VERY HIGH
Public Water Supply	None

North Fork Potts Creek on National Forest is designated by the State of West Virginia as Outstanding Natural Resource Waters.

Direct, Indirect and Cumulative Effects of the Alternatives:
Some sediment occurs naturally in all stream systems and is part of the natural geologic processes. Natural watershed disturbance regimes of fire, flood, insect, and disease result in a range of natural variability of sediment to which the stream channel has adjusted. However, human-caused soil disturbing activity such as road construction activities, log landings, skid roads, and skid trails can

produce volumes and rates of sediment delivery to streams that are in excess of the stream's ability to accommodate it. Excess sediment in streams can coat the stream bottom, fill pools, and reduce the carrying capacity of the stream for fish and stream insects. Fine sediment can fill the voids between gravel particles in the streambed, reducing the movement of aquatic insects, water and oxygen. The effects of sediment delivered to a stream channel diminish as watershed size increases. Most vulnerable are small sensitive headwaters catchments where concentrated timber harvest activity can have profound results.

In reality, there is a great deal of variability in a watershed's sediment yield between years (interannual variability). Sediment yield is much greater during high runoff years with more stormflow to erode and transport sediment. Conversely, sediment yield is much less during drought years when high flows may be less than bankfull. Data from the USGS gage on the Clinch River at Speers Ferry provides an expression of the variability of annual sediment yield. For the 62 years with flow and sediment data, each year's percent difference from the long-term mean ranges from + 143 percent to – 100 percent. A change of annual sediment yield of plus or minus 52 percent represents one standard deviation from the long-term mean, and values less than 52 percent are interpreted as being within the range of interannual variability.

Plan standards meet or exceed the Virginia and West Virginia Best Management Practices (BMPs) for forestry activities. To assess the effectiveness of these standards, aquatic macroinvertebrate monitoring is being used as an indicator of effects to water quality and the aquatic biological community. Nine ecological metrics of the aquatic macroinvertebrate community are derived from macroinvertebrate samples, and a Macroinvertebrate Aggregated Index for Streams (MAIS) (range of scores 0-18) is computed using the nine metrics. Smith and Voshell (2013) compared pre-activity macroinvertebrate metrics with post-activity metrics for streams located below timber harvests and prescribed burns at various locations across the Forest and concluded that “management practices are successful at reducing effects on aquatic organisms” from these activities. The results showed no decline in macroinvertebrates following timber sales or prescribed burns.

The Virginia Department of Forestry conducted water quality monitoring in association with timber harvests from 1989 to 1996 (Va. Dept. of Forestry, 1998). At sites in the mountains, Piedmont, and coastal plain, water temperatures were taken at 10-minute intervals, and water samples were collected automatically before, during, and after storm events, both upstream and downstream from logging. Aquatic macroinvertebrates were also sampled periodically. This monitoring showed that, when forestry BMPs are properly implemented, timber harvests can be accomplished without a large or persistent increase in sediment, an increase in stream water temperatures, or a shift in macroinvertebrate species composition.

The effect that naturally occurring forest fires or prescribed burns can have on increased sediment production within a watershed depends on burn intensity. Low intensity burns do not scorch the soil organic layers nor do they burn the roots of existing vegetation, which start to re-grow during the next growing season. No bare mineral soil is exposed as the result of the prescribed burn. Research on wildfire and prescribed burning indicates that low intensity or "cool" burns result in only minor increases in erosion and sedimentation. Beschta (1990) observes that

> *Where organic matter comprising the forest floor is only partially consumed by fire, the effects of fire upon surface erosion processes may be minimal.... Relatively "cool" burns should have little impact on erosion and sedimentation, regardless of general watershed slope.*

This observation from Oregon is supported by similar conclusions from Anderson and others (1976), Douglas and Van Lear (1983), Neary and Currier (1982), and Van Lear and others (1985). Prescribed burn fireline construction will result in only a small amount of soil disturbance and will generally be located far from stream channels. Thus there will be little potential for sedimentation from this activity. A sediment model was used to estimate the tons of sediment produced on each timber harvest unit, landing, temporary road, or prescribed burn fireline, and delivered to respective stream channels. Soil erosion was calculated using (1) erosion rates derived from research data from North Carolina and West Virginia (Swift, 1984; Kochenderfer and Helvey, 1984) and (2) the Universal Soil Loss Equation, as adapted to forest land (Dissmeyer and Foster, 1984). The Universal Soil Loss Equation includes

site-specific factors related to soil type and land slope. Erosion is expressed as tons per acre moved from the site. This unit rate is multiplied by the disturbed area in acres to obtain unmitigated erosion in tons. This figure is then adjusted for factors of geology and soils, road gradient, and mitigation to obtain an adjusted value of total erosion. Total erosion is then delivered to the stream channels based on aggregated sediment delivery ratios from the procedural guide 'An Approach to Water Resources Evaluation of Non-Point Silvicultural Sources' (1980). The sediment delivery ratio for each segment of soil disturbance is calculated using factors based on sideslope, soil texture, distance to the nearest channel or drainway, and factors of surface roughness, slope position, percent ground cover, and slope shape. These combined factors are translated into a Sediment Delivery Index that represents the portion of eroded material that is actually delivered to a stream. When multiplied by the calculated erosion, it gives an estimate of tons of sediment delivered to the adjacent stream channel. This sediment increase is compared with existing annual sediment yield from each watershed as determined by data from Patric, Evans, and Helvey (1984) and displayed as a percent increase over existing.

Rates of soil erosion and sedimentation are greatest at the time of soil disturbing activity and decrease as the soil stabilizes and vegetation begins to grow. This is reflected in Table 14 below.

Sediment modeling is based on a number of assumptions that may not be accurately reflected on the ground. The results provide very rough approximations of the changes in sediment delivery that might be expected as a result of proposed activities. Nevertheless, they allow a comparison of the impacts of various alternatives and provide a measure of relative risk to the aquatic ecosystem. The model assumes that Plan standards and guidelines as well as Virginia and West Virginia Best Management Practices for Forestry will be implemented. It assumes "normal" runoff and sediment years. Table 14 below displays the results of the sediment model by year and by action alternative in tons of sediment from the activity. The White Rocks Timber Sale (2013-2015) entails the harvest of 317 acres in the Stony Creek watershed and its impacts are also displayed Table 14.

Table 14. Sediment Production over Time from Soil Disturbing Activities (tons)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Potts Creek watershed										
Alternative 1	0.0	3.0	2.9	1.8	0.9	0.5	0.2	0.2	0.1	0.1
Alternative 3	0.0	0.0	0.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0
Alternative 4	0.0	3.0	1.8	1.3	0.5	0.4	0.1	0.2	0.1	0.1
Stony Creek watershed										
Alternative 1	0.7	2.3	1.4	1.5	0.7	1.1	0.4	0.1	0.1	0.0
Alternative 3	0.7	1.9	1.2	1.4	0.6	1.0	0.3	0.1	0.1	0.0
Alternative 4	0.7	2.3	1.4	1.5	0.7	1.0	0.3	0.1	0.1	0.0
White Rocks	0.6	1.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

The maximum predicted sediment increase to Potts Creek (North and South Forks) from Alternatives 1 and 4 is only 0.15 percent and from Alternative 3 only 0.02 percent. The maximum increase to Stony Creek from Alternatives 1 and 4 is only 0.24 percent and from Alternative 3 only 0.20 percent. Considered cumulatively with the White Rocks Timber Sale, the maximum increase to Stony Creek with Alternatives 1 and 4 is only 0.39 percent and with Alternative 3 only 0.34 percent. These are well within the expected variability of sediment from year to year (interannual variability). There would be no change in the streambed composition or in aquatic habitat quality or complexity from sediment related to the project. The predicted sediment increases to Stony Creek, North Fork Potts Creek, and South Fork Potts Creek would be insignificant and immeasurable, and well within the range of variability of annual sediment loads to the stream. Thus, there would be no measurable or observable

direct or indirect effects. There would be no effect on the characteristics of North Fork Potts Creek that qualify it for designation as Outstanding Natural Resource Waters.

South Fork Potts Creek from Ray Fork to its confluence with North Fork Potts Creek is included in West Virginia's 2010 list of impaired streams. The impairment cause is "fecal/bacteria". The Fork Mountain Project should have no significant effects related to this impairment. The project will not be a source of bacteria. The small sediment increases would be insignificant and immeasurable and should have no significant cumulative effects on the stream.

Cumulative Effects:
The scope of the analysis considered for cumulative effects to water for this project is the watersheds of North Fork Potts Creek and South Fork Potts Creek down to their confluence (19.6 square miles, or 12,523 acres).

Future activities:

- Construction of a pipeline in the Potts Creek watershed is speculative in that Mountain Valley Pipeline has only started the pre-filing process with the FERC and the proposal through Potts Creek is an alternative, not the proposed action. If the pipeline were to be constructed along the alternative route, it would remove cover and expose about 18 acres of land currently under forest cover on the Jefferson National Forest. It would likely expose another 46 acres of private lands. At this point in time the type of mitigation that would be used to reduce erosion and sedimentation are not fully developed. Depending upon the timing of the construction in relation to storms and the implementation of erosion control measures and the effectiveness of the control measures, the impacts of the construction on downstream water quality could range from short-term, minor increases in suspended sediment to substantial increases in sediment that remain in the stream system for longer periods of time.

  If the alternative route were to be constructed, it is likely that the construction of the pipeline would occur in the same time period as the timber sale that is located in the Potts Creek watershed. Since the predicted sediment increases to North Fork Potts Creek and South Fork Potts Creek from the Fork Mountain Project would be insignificant and immeasurable, and well within the range of variability of annual sediment loads to the stream, it is unlikely that this project would measurably increase the impacts of sedimentation from pipeline construction. In addition, the Forest Service is a cooperating agency in the FERC analysis of the pipeline and the Forest Service must make a decision to allow the crossing of National Forest System lands, before the pipeline could be constructed in the alternative route. Therefore, the Forest Service will assess the effects of the pipeline on water quality in the EIS. At the time the EIS is prepared, the pipeline proposal, along with all required erosion control practices, would be clearly defined and the cumulative effects of the pipeline and the Fork Mountain projects can be better evaluated.

Soils Resources

Issue Related to the Resource:
None.

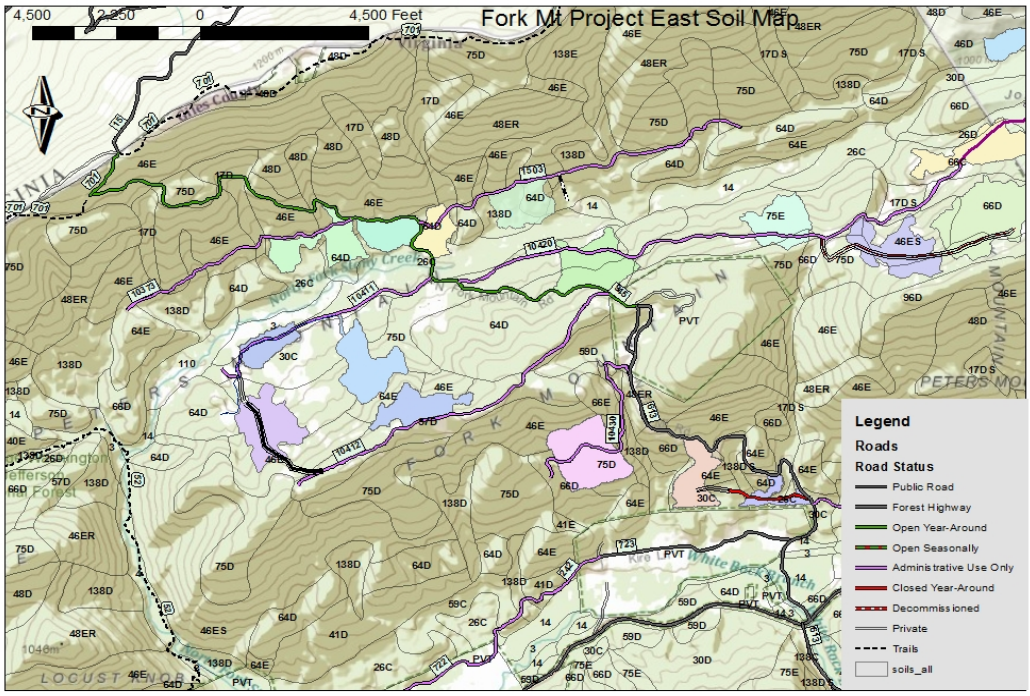
Scope of the Analysis:
The scope of the analysis for the impacts to soils will be the area contained within the *activity areas* for this proposed project. The *activity areas* are the treatment areas where there is potential for soil disturbance. These areas will be expected to produce biomass in the future. Examples are: prescribed burn areas, dozer constructed firelines, and timber harvest areas including log landings and corridors of temporary roads and bladed skid roads. *Activity areas* are smaller in extent than the entire proposed project area and are intended to include only the areas being treated by the proposed project alternatives. The table below shows the extent of all the *activity areas* for each project alternative along with the activities proposed. This will define the scope of the effects analysis each alternative and will be used as a basis for comparing the project action alternatives for their effects to the soil resource. Activities that are not expected to have negative effects to long-term soil productivity

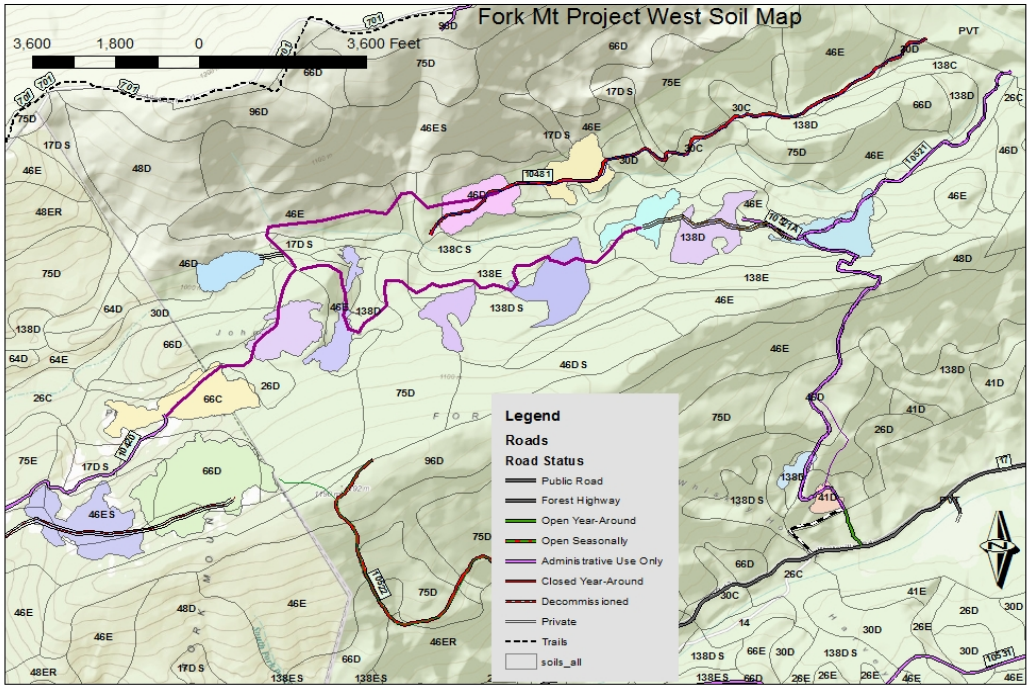
for Fork Mountain project alternatives are decommissioning roads, hand tool fireline construction, road maintenance, herbicide treatments, grape arbor enhancement, pre-commercial thinning, manual site preparation, tree planting and activity associated with creating open oak woodland conditions. New permanent road construction of 3.9 miles is not intended to be evaluated for impacts to soil productivity due to the dedication of these areas to a use other than supporting living biomass (Forest Service Handbook R8 2509.18-2003-2.2).

Table 15. Activity Areas by Alternative

Activity	Proposed Action Alternative 1	Alternative 3	Alternative 4
Prescribed burn acres (includes temporary road construction, system road construction, most timber harvest areas and log landings)	3,581 acres	890 acres	3,581 acres
Commercial timber harvest acres outside the above burn areas.	193 acres	146 acres	178 acres
Acres of temporary road construction outside the above burn areas	0.9 acre	0.9 acre	0.9 acre
TOTAL ACTIVITY AREA	3,775 acres	1,037 acres	3,760 acres

Existing Situation:
A detailed soil survey has been completed for the project area (see maps below). The information about the soils is obtained from the soil survey for Jefferson National Forest North, completed by the Forest Service as part of the National Cooperative Soil Survey. Fieldwork for this soil survey was done in the mid to late 1980s and early 1990s. The soils potentially impacted by this project are derived primarily from sandstone and shale bedrock geology and colluvial material from surrounding uplands. Soils occurring in this area are identified using the maps below. Soil survey spatial and tabular data may be obtained at USDA NRCS Web Soil Survey.


Fork Mt Project East Soil Map
4,500 2,250 0 4,500 Feet
Legend
Roads
Road Status
Public Road
Forest Highway
Open Year-Around
Open Seasonally
Administrative Use Only
Closed Year-Around
Decommissioned
Private
Trails
soils_all


Fork Mt Project West Soil Map
3,600 1,800 0 3,600 Feet
Legend
Roads
Road Status
Public Road
Forest Highway
Open Year-Around
Open Seasonally
Administrative Use Only
Closed Year-Around
Decommissioned
Private
Trails
soils_all

Fork Mountain Vegetation Management Project
Soil Map Legend

Soil names below are linked to official soil descriptions of theses soils.
Use http://soils.usda.gov/technical/classification/osd/index.html to obtain descriptions of the soils if this is a hard copy.

Map Symbol	Soil Name
1	Atkins loam, 0 to 3 percent slopes, frequently flooded
3	Craigsville cobbly sandy loam, 0 to 5 percent slopes, frequently flooded
14	Botetourt loam, 0 to 5 percent slopes, rarely flooded
17D	Sherando very cobbly sandy loam, 15 to 35 percent slopes
17DS	Sherando very cobbly sandy loam, 15 to 35 percent slopes, rubbly
26C	Jefferson loam, 3 to 15 percent slopes
26D	Jefferson loam, 15 to 35 percent slopes
30C	Laidig cobbly fine sandy loam, 3 to 15 percent slopes
30D	Laidig cobbly fine sandy loam, 15 to 35 percent slopes
41D	Berks-Weikert complex, 15 to 35 percent slopes
46D	Dekalb cobbly sandy loam, 15 to 35 percent slopes, very stony
46DS	Dekalb cobbly sandy loam, 15 to 35 percent slopes, rubbly
46E	Dekalb cobbly sandy loam, 35 to 60 percent slopes, very stony
46ER	Dekalb-Rock outcrop complex, 35 to 60 percent slopes, extremely stony
46ES	Dekalb cobbly sandy loam, 35 to 60 percent slopes, rubbly
48D	Calvin very channery loam, 15 to 35 percent slopes, extremely stony
48ER	Calvin-Rock outcrop complex, 35 to 60 percent slopes, extremely stony
57D	Clymer sandy loam, 15 to 35 percent slopes
59D	Gilpin channery silt loam, 15 to 35 percent slopes
64D	Brushy extremely gravelly loam, 15 to 35 percent slopes
64E	Brushy extremely gravelly loam, 35 to 60 percent slopes
66C	Bailegap sandy loam, 3 to 15 percent slopes
66D	Bailegap sandy loam, 15 to 35 percent slopes
75D	Lily gravelly sandy loam, 15 to 35 percent slopes
75E	Lily gravelly sandy loam, 35 to 60 percent slopes
96D	Dekalb-Dekalb, shallow complex, 15 to 35 percent slopes, very stony
110	Haplosaprists, high elevation bog, 0 to 3 percent slopes
138D	Oriskany very cobbly sandy loam, 15 to 35 percent slopes, very stony
138DS	Oriskany very cobbly sandy loam, 15 to 35 percent slopes, rubbly
138E	Oriskany very cobbly sandy loam, 35 to 60 percent slopes, very stony

Table 16. Soils within Activity Areas

PRESCRIBED BURN AREA	SOILS
Block 1	138D, 138DS, 75D, 46E, 66C, 26D, 66D, 46ES, 46E, 96D, 46DS, 138E, 48D, 17DS, 48ER, 64E, 59D, 26C, 3, 14, 138C, 26D, 64D, 30D, 46ER, 46D
Block 2	30C, 75D, 46E, 64E, 57D, 64D
Block 3	138D, 64D, 17D, 26C 3, 110, 26C, 64D, 138D,
Block 4	64E, 46E, 17D, 48D
HARVEST UNITS	**SOILS**
Whiskey Hollow	
U1	138D, 46E
U2	46E, 138D
U3	138D
U4	138CS, 138E, 138DS
Whiskey Hollow South	
U4a	138D
U4b	41D
Barton Road	
U1	75D, 64D
U2	75D, 75E
U3	66C
U4 (w/ 0.9 mi temp rd)	66D, 75D, 46ES
U5	75D, 46ES
Johnson Flats	
U1	66C
U2	46E, 138D
U3	138DS, 75D
North of Potts Creek	
U1	46E, 17DS, 46D, 138DS
U2	46D
U3 (w/ 0.1 mi temp rd)	46D
Salt Sulphur	
U1	64D, 138D
U2	64D, 26C
U3	46E, 64D, 26C
U4	64D, 26C
Warren Road	
U1(w/ 0.1 mi temp rd)	30C, 75D, 64E
U2(w/ 0.1 mi temp rd)	75D, 64D, 46E
U3 (Guthrie)	64E, 46E, 57D
U4	3, 26C, 30C
U5 (Patterson)	46E, 75D, 66D
U6 (Hermie 2 parts, w/ 0.2 mi temp rd)	66D, 46E, 64E, 30C, 17DS, 138DS

In the table above, there are some proposed harvest units that contain portions of soil map units with slopes 35-60%. The Virginia Department of Forestry Best Management Practices for Water Quality (State BMPs in Virginia) limit ground based harvest systems to slopes not exceeding 35%. The soil mapping used above was created at a scale of 1:24,000 and therefore will generally contain included areas of gentler slopes because they were too small to delineate at that mapping scale. Where there are small inclusions of steeper slopes in the harvest units, it will require winching logs to a skid road to mitigate the slope and avoid excessive road building. Winches will be required in the timber harvest contract. Also, the Forest Service has used slope as a critical factor in laying out the harvest units and has avoided most of the steeper slopes as directed by Virginia BMPs which recommend conventional

logging on slopes not greater than 35%. West Virginia does not have a BMP regarding slope and harvest systems in their Forestry BMPs. The Jefferson Forest Plan standard is less than 45% slope.

Hydric Soils Presence

Hydric soils (a wetland primary indicator) have been identified in an activity area for this project. Haplosaprists (soil map unit 110) soils are located along the upper reaches of the North Branch of Stony Creek in proposed Burn Block 4. No soil disturbance or activity that would change soil drainage is proposed within the area identified with hydric soils. This area of the proposed prescribed fire will burn cooler, if at all, due to the wetness of these soils.

Prime Farmland Soils Presence

Prime farmland soils have been identified in an activity area for this project. Botetourt soils (soil map unit 14) occur in Burn Block 1 White Rocks Branch and Stony Creek, near the intersection of VA State Route 635 and 613. No soil disturbing activity or change in land use is planned for the prime farmland area.

Desired Condition of the Soils

Soil productivity is maintained or enhanced while achieving multiple resource objectives. Soil erosion is within natural levels after a recovery period that allows for revegetation of erodible soil areas.

Direct and Indirect Effects of the Alternatives:

Alternatives 1, 3 and 4 have the potential to affect the soil resource as a result of the proposed actions of prescribed burning, timber harvesting and road building. The effects of these actions on soils in the activity areas can be described in terms of short- and long-term effects on the productivity of the soils. Short-term effects are those lasting three years or less, and are associated with the recovery period in which non-displaced disturbed soils become reestablished with vegetative cover. Short-term effects imply that the existing soil profile remains mostly intact. Surface disturbances, such as compaction and removal of vegetation are the primary impacts. In contrast, long-term effects are associated with activities that displace the upper portions of the soil profile (topsoil). Many years are needed for the soil to recover its original productivity when the upper layers are removed. Topsoil formation is a slow process and typically occurs at a rate of one inch per 200-600 years, and depends on local climatic and ecological factors.

There is an additional indirect effect to areas that receive the displaced topsoil from excavated areas, such as fill slopes along roads. With this added mineral soil material and organic matter, productivity on these areas will be improved by increasing soil depth, soil moisture holding capacity, organic matter and nutrients. This is not to say that excavated sites, which have long-term direct effects to soil productivity, are offset by these areas where topsoil is deposited. It is mentioned here as an indirect effect of excavation activities associated with Alternatives 1, 3 and 4. Topsoil deposition areas will not be used to offset any effects shown in the following analysis. It is an effect which is not easily estimated or displayed, but one that does occur.

Important factors considered in evaluating effects to soil resources from this project are: preliminary logging and burn plans, the extent of the activity areas and the extent of the area where long-term soil productivity has been reduced. Effects to the soils from this project are considered not significant when at least 85 percent of the activity area retains its soil productivity (Forest Service Handbook, R8, 2509.18.2.2, Soil Quality Standards).

Generally, timber harvest unit areas are expected to recover quickly. Research has shown that the upper few inches of soil recovers quickly from any compaction occurring, except for rutting. This is due to organic matter additions from logging debris, soil biota activity, freezing and thawing and plant root growth from existing and new vegetation. Recovery from compaction is slower in the 8 to 12 inch depth zone, but compaction is not expected at these depths unless rutting occurs. Log landings are expected to have a longer recovery period since these areas must recover from compaction and some soil displacement. Productivity loss on landings has both short- and long-term impacts to soil productivity from compaction and displacement of topsoil.

The extent and type of disturbance and the estimated short- and long-term effects to soils for Alternatives 1, 3 and 4 are displayed below. In conventional harvesting operations, the impacts of unbladed primary skid trails are considered to be short-term impacts to soil productivity. Alternative 2 is considered to have no effect upon the soil resources in the area, since no soil disturbing activities are proposed with this alternative. The proposed activities of planting, chainsaw and herbicide work, road maintenance, decommissioning roads, hand tool fireline construction, road maintenance, grape arbor enhancement, pre-commercial thinning, manual site preparation, and activity associated with creating open oak woodland conditions, proposed in Alternatives 1, 3 and 4 are not expected to produce any long-term effects to soil productivity. These activities will not be displacing or deeply compacting the soil occurring in these areas. Short-term exposure of bare soil created by proposed activities will be re-vegetated and the soil surface is not expected to erode after a recovery period.

The tables below display the estimated potential effects to soil productivity from the activities proposed in Alternatives 1, 3 and 4 considered in this environmental analysis. Assumptions used to estimate the effects are shown below the tables. The estimated extent of the effects in the activity areas is determined by using these assumptions and preliminary logging and burning plans.

System road construction proposed in Alternatives 1 and 4 is not considered in the impacts to soil productivity since the road will be part of the Forest transportation system and will not be expected to grow biomass in the future. Potential sediment effects from this work are considered in the water/hydrology section of this environmental assessment. The decommissioning of 6.5 miles of former system road put this area of approximately 15.75 acres back into the land base for producing biomass at a reduced level of soil productivity. The effects of creating this past disturbance will be considered in the cumulative effects, since these roads were built prior to the current proposed activities.

Table 17. Estimated Acreage of Potential Short- and Long-Term Effects to Soil Productivity by Alternative

ALTERNATIVE 1

ACTIVITY	SHORT-TERM EFFECTS	LONG-TERM EFFECTS	TOTAL EFFECTS
Bladed Skid Roads (4.1 mi.)	0	5.96 acres	5.96 acres
Primary Skid Trails (9.95 mi.)	12.06 acres	0	12.06 acres
Log Landings (31)	7.62 acres	7.63 acres	15.25 acres
Fireline construction dozer (0.5 mi.)	0.2 acre	0.6 acre	0.8 acres
Fireline construction hand (0.74 mi.)	0.45 acre	0	0.45 acre
Temporary road construction (1.4 miles)	2.55 acres	3.39 acres	5.94 acres
Open Oak Woodland site prep work	23 acres	0	23 acres
Totals	**45.88 acres**	**17.58 acres**	**63.46 acres**

ALTERNATIVE 3

ACTIVITY	SHORT-TERM EFFECTS	LONG-TERM EFFECTS	TOTAL EFFECTS
Bladed Skid Roads (3 mi.)	0	4.36 acres	4.36 acres
Primary Skid Trails (6.8 mi.)	8.2 acres	0	8.2 acres
Log Landings (18)	3.38 acres	3.37 acres	6.75 acres

Fireline construction dozer (0.5 mi.)	0.2 acre	0.6 acre	0.8 acres
Fireline construction hand (0.25 mi.)	0.15 acre	0	0.15 acre
Temporary road construction (1.3 miles)	2.36 acres	3.15 acres	5.51 acres
Open Oak Woodland site prep work	5 acres	0	5 acres
Totals	**19.29 acres**	**11.48 acres**	**30.77 acres**

ALTERNATIVE 4

ACTIVITY	SHORT-TERM EFFECTS	LONG-TERM EFFECTS	TOTAL EFFECTS
Bladed Skid Roads (3.9 mi.)	0 acres	5.67 acres	5.67 acres
Primary Skid Trails (9.1 mi.)	11.03 acres	0	11.03 acres
Log Landings (28)	7.12 acres	7.13 acres	14.25 acres
Fireline construction dozer (0.5 mi.)	0.2 acre	0.6 acre	0.8 acres
Fireline construction hand (0.74 mi.)	0.45 acre	0	0.45 acre
Temporary road construction (1.3 miles)	2.36 acres	3.15 acres	5.51 acres
Open Oak Woodland site prep work	23 acres	0	23 acres
Totals	**44.16 acres**	**16.55 acres**	**60.71 acres**

Assumptions used for above tables:

1. Bladed skid roads have 12 feet of bladed travel way (long-term impact).
2. Primary skid trails are unbladed, 10 feet wide, and a short-term impact.
3. Log landings have a 50% reduction in soil productivity due to blading and compaction and are 0.25 acre each, except Units 3, 8, 17 and 19 which have 2-acre landings.
4. Hand tool construction of fireline is a short-term impact to soil productivity due to the shallow depth of disturbance; handline is 5 feet wide.
5. Dozer line construction is a long-term impact due to soil displacement. Dozer line is 10 feet wide bladed area plus 3 feet of spoil on either side.
6. Temporary road has 35 feet of cleared right-of-way with 20 feet of travel way, including a cut slope. Temporary road has long-term effect on 20 feet of the cleared right of way.
7. Open Oak Woodland site preparation activity has short-term disturbance from grubbing stumps, piling stumps and slash, pile burning and soil scarification for seeding.

As shown in the above tables, Alternatives 1, 3 and 4 are expected to have impacts to soil productivity. To put the magnitude of these impacts into perspective, the estimated acres impacted by alternatives 1, 3 and 4 above is compared to the acres in the activity area for each alternative in the table below. This estimates the percentage of the activity area potentially impacted by the proposed activities.

Table 18. Estimated Percentage of the Activity Area Soils Affected by Alternative

Alternative	Extent of Activity Area	Short-Term Effects	Long-Term Effects	Percent of Activity Area Affected Long-

				Term
1	3775 acres	45.88 acres	17.58 acres	0.47 %
3	1037 acres	19.29 acres	11.48 acres	1.11 %
4	3760 acres	44.16 acres	16.55 acres	0.44 %

The table above shows that Alternatives 1, 3 and 4 will affect one percent or less of the activity area with long-term effects. Effects to the soils from this project are considered not significant when 85 percent of the activity area retains its pre-activity long-term soil productivity (Forest Service Handbook, R8, 2509.18.2.2, Soil Quality Standards).

Some soil compaction would occur on the log landings, temporary road construction and primary skid trails as a result of heavy equipment use with Alternatives 1, 3 and 4. Areas of concentrated use, such as log landings and skid roads are most affected. This compaction would increase the bulk density of the soils and result in a decrease in pore space, soil air and in the water holding capacity of the soils and would increase water runoff. These effects are considered detrimental to plant growth. The degree and depth of compaction depends on the number of passes the equipment makes and the moisture content of the soil at the time the passes are made. Changes in pore space do not normally occur on well-drained soils, such as those that occur over most of the project area, until three or more passes have occurred. Heavily compacted areas are ripped and seeded to help minimize the effects of compaction and to promote revegetation.

Soil movement (erosion) can occur on long unimpeded slopes with grade, where mineral soil material is exposed to raindrop impact and overland water flow. Soil movement can affect soil productivity when soil is transported by water offsite. Soils on upper slopes can lose productive topsoil as it moves down slope with water. Soil erosion may occur where bare soil is exposed on a slope as a result of equipment tracking difficulties (spinning wheels), bladed roads and landings, or where logs are dragged across the soil repeatedly. The placement of the landings on gentle slopes prevents long unimpeded erosion surfaces. The presence of a natural organic surface layer covering the soil and logging debris, which is commonly found on harvested areas, would also prevent long unimpeded erosion surfaces. However, areas of soil impacted by log landings, skid trails and skid roads will increase the potential for soil movement.

Management practices for minimizing soil movement pertain primarily to log landings, primary skid trails and skid roads. The use of logging slash, waterbars and establishment of vegetation to check the flow of water down the travel way also interrupts the long unimpeded slopes referred to above. The potential for soil movement is also expected to be temporary and limited to a recovery period time of approximately 1 to 3 years. Prompt seeding of the disturbed areas will help prevent continued soil movement after sale closure.

Soil moisture content in the harvested areas is expected to increase initially during the post-harvest period with Alternatives 1, 3 and 4. Soil moisture would return to pre-harvest levels as the vegetative canopy recloses and evapotranspiration increases. The initial higher soil moisture, created by removing vegetation, would benefit all vegetation growing on the sites by contributing more available moisture to plants during the growing season. It will also increase germination of seeds present onsite. Surface soil temperatures during the growing season would also increase until canopy closure. Short-term increases of 25 to 40 degrees F would be expected in the upper two inches of the organic layer with complete canopy removal. Conversely, surface soil temperatures would be lower than normal during the winter months as a result of canopy removal. No changes would be expected below a depth of six inches. The degree of change in soil moisture and temperature would be a function of the extent of vegetative removal. Shading by leave trees would reduce temperature extremes. Surface soil temperatures are not expected to reach levels lethal to plant growth with any of the proposed alternatives. Soil moisture and temperature effects would be temporary impacts, as canopy closure is expected to occur within ten years after harvest.

An initial surge of available plant nutrients would occur as the vegetative canopy is opened. The increase in soil moisture, surface soil temperatures and organic debris would produce ideal conditions for accelerated organic matter decomposition. This would result in the increased availability of nutrients in the upper part of the soil profile. The existing root systems, along with new plant germinations, would take advantage of the increased availability of nutrients. A surge of plant growth would occur. Likewise, many soil-borne organisms, such as detritovores, and predatory animals further up the food chain would take advantage of the increased nutrient availability, temperature, and soil moisture availability. Burrowing animals, however, would be adversely impacted by the expected compaction. Possible losses of nutrients to groundwater through leaching and volatilization are expected to be offset by additions of nutrient-rich leafy material and small woody debris left onsite after harvest. Nutrient cycling would continue in the project area, with some expected loss from tree stem removal or nutrient leaching. Due to the rapid regrowth of the vegetation on the treated areas, these losses would be minimized.

Soil Effects from Fire

Many physical, chemical, mineralogical, and biological soil properties can be affected by forest fires. The effects are chiefly a result of burn severity, which consists of peak temperatures and duration of the fire. Climate, vegetation, and topography of the burnt area control the resilience of the soil system. Low to moderate severity fires, such as most of those prescribed in forest management, promote renovation of the dominant vegetation through elimination of undesired species and a transient increase of pH and available nutrients. No irreversible ecosystem change occurs, but the enhancement of hydrophobicity can render the soil less able to soak up water and more prone to erosion. However, despite common perceptions, if plants succeed in promptly recolonizing the burnt area, the pre-fire level of most properties can be recovered and even enhanced. The extent and duration of these effects depend first upon fire severity, which, in turn, is controlled by several environmental factors that affect the combustion process, such as amount, nature, and moisture of live and dead fuel, air temperature and humidity, wind speed, and topography of the site (Certini 2005). Infrequent use of fires of light to moderate severity and the resilience of southern forest ecosystems to fire would suggest adverse effects on the soil are minor (Lear et al. 2002). Soil changes are most pronounced during the first year after burns, but these properties usually revert to their preburn level within a few years (Alban 1977).

Physical

Although the aerial parts of subordinate forest vegetation are temporarily eliminated by fire, the underground stems and roots are not usually damaged (Scott and Van Wyk 1990). In general, most fires do not cause enough soil heating to produce direct changes in soil structure (Hungerford et al. 1990).

Soil Chemistry

Cations are generally increased in the soil following their oxidation from burning the surface organic matter. Potassium (K), calcium (Ca), magnesium (Mg), and phosphorus (P) were either increased or unchanged by underburns in ponderosa pine (Hungerford et al. 1990). Low-intensity prescribed fires may improve soil fertility. Long-term prescribed burning studies in the southern Coastal Plain showed that available phosphorus, exchangeable calcium, and organic matter of mineral soil on periodically burned plots were higher than those on unburned plots. However, nitrogen was lost from the forest floor due to volatilization. Calcium and phosphorus were also lost from the forest floor but were partially leached into the mineral soil, thus remaining in the ecosystem (Lear et al. 2002). Most studies suggest a consistent pattern that fire can increase the availability of soil ammonium (NH4+) and nitrate (NO_3^-). The increases in soil NH4+ and NO_3^- have been attributed to the burning of organic material, increased N mineralization, and the leaching of N from the forest floor into the soil after fire (Wiuix and Pakkinson 1974).

Nitrogen inputs from precipitation approximating 5 lb/ac/yr have been measured in the southern Appalachians and in the upper Piedmont. Over time, it would appear that these inputs could balance nitrogen losses from burning. Nitrogen is continually being added to southern ecosystems (Lear et al. 2002; Hubbard et al. 2003; Elliott and Vose 2005). The post-fire flush of inorganic nitrogen is not solely due to the physical breakdown of plant and animal tissues by fire. It is also a function of the enhanced activity of microbes in the warmer and more alkaline soil of a recently burned forest. The

soil ammonium pool can increase twofold immediately after fire, gradually declining to the pre-fire level within one year. In sum, a short-lived pulse of plant-available nitrogen can be expected after forest fires. This pulse will encourage the development of nitrogen-rich plant growth for at least a year post-fire (Elliott and Vose 2005).

Losses of P through volatilization or leaching are small. Burning converts the organic pool of soil P to orthophosphate, the sole form of P available to biota (Certinia 2005). Burning has its most pronounced effect on the forest floor in which carbon (C), nitrogen (N), and sulfur (S) are volatilized, and calcium (Ca), magnesium (Mg), potassium (K), phosphorus (P), and other elements are left as ash. This ash is leached by rains into the mineral soil which increases its base saturation and pH. These changes also may have important effects on the microbial population of the soil. Such soil changes are most pronounced during the first year after burns, but these properties usually revert to their preburn levels within a few years. The ash is leached by rains into the mineral soil which increases its base saturation and pH (Alban 1977).

Erosion

Fires which burn completely to mineral soil may accelerate soil erosion in steep terrain. Such losses have not been documented in the South. Low-intensity burns have little, if any, adverse effect on soil erosion, even on relatively steep slopes. Only minor soil losses have been seen following single prescribed burns in the Piedmont. Two low-intensity burns prior to harvest had no effect on nutrient or sediment concentrations in ephemeral streams in the Piedmont of South Carolina. Others failed to detect significant soil movement in established gullies following moderately intense backing fires in mature loblolly pine stands in the South Carolina Piedmont (Lear et al. 2002). In the US Southern Coastal Plain erosion and leaching losses due to prescribed fire are usually negligible (Cartera and Foster 2003).

Although the aerial parts of subordinate forest vegetation are temporarily eliminated by fire, the underground stems and roots are not usually damaged (Scott and Van Wyk 1990). Prescribed understory burns normally remove only part of the forest floor (Lear et al. 2002). In the southern Appalachian Mountains of North Carolina, the residual forest floor was resistant to erosion over the range of burn intensities in their fire treatments, and sediment was prevented from leaving the site by unburned brush and undisturbed forest floor at the lower margins of the treatment areas (Elliott and Vose 2005). No significant differences in root mat weight after burning were detected. The root mat provides a matrix of living and dead organic material that physically binds the mineral soil against the erosive action of precipitation (Van Lear and Danielovich 1988). Soil loss following treatment was within the normal range of soil loss for an uncut forest in the south (Field et al. 2003).

Organic Matter and Carbon

A principal effect of burning is the redistribution of the organic matter in the soil profile and not in any reduction. The results of several prescribed burning studies throughout the southeast concluded that burning generally resulted in a decrease in the forest floor but an increase in soil C in the top 5 to 10 cm within the first 10 years (Johnson 1992). Some found no significant differences in soil organic matter 25 years after broadcast burning (Johnson 1992). The quantity of organic matter decreases immediately after a fire, but in the long-run generally exceeds the pre-fire level (Certini 2005).

Soil Biota

The immediate effect of fire is to reduce the numbers of bacteria in the soil, this effect being due to the direct effect of heat. This returns to normal after 12 to 14 months. After rain the post-fire numbers of bacteria rise above the numbers in control (unburned) plots, due to the effects of nutrient release Wiuixs and Pakkinson 1974). The lack of difference in litter decomposition between burned and unburned areas implies a rapid recovery of soil organisms following fire. Numbers of both bacteria and fungi are known to increase rapidly during the first growing season following an early-season fire in a jack pine forest in northeastern Minnesota (Grigal and McColl 1977).

Water

Most studies have shown that burning without cutting does not affect stream water quality in southeastern, U.S. ecosystems (Knoepp et al. 2003). Nutrient concentrations of lake waters and input

streams were unaffected by the fire, due to immobilization of nutrients in the soil and to uptake by prolific post-fire revegetation and microbial (McColl and Grigal 1977).

With respect to cited recent research and relevant science, no negative effects to long-term soil productivity from the prescribed burning proposed in Alternatives 1, 3 and 4 are anticipated. Parameters established within the burn plan for the burning action will help avoid severe burn intensity, minimize fireline containment work in riparian ecosystems and utilize natural and existing fuel breaks to prevent escape and minimize the need for new fireline construction.

Cumulative Effects:
The scope of the analysis considered for cumulative effects to soils for this project is the project area. The project area is about 11,714 acres and is identified on project location maps (shown in Map 1 in Appendix A). The project area gives a good estimate of the effects to soils from past, future and proposed actions for this area of the Jefferson National Forest.

Cumulative effects to soils will consider past and future planned activities and their effects on soil productivity within this project area, combined with the proposed actions. Old temporary roads and bladed areas are considered not to be recovered from soil displacement, as soil displacement takes a long time to recover.

Past and Future Actions in this Project Area:

Past activities impacting soils in the project area are:

- 15.75 acres of decommissioned Forest Service road proposed to be returned to production of biomass, long-term effect, proposed in Alternatives 1, 3 and 4 above. These acres have not recovered from past soil displacement which occurred during construction. These acres include the road treadway and cutslope which have been impacted by soil displacement.
- 3.1 miles of past impacts from previously decommissioned roads, old trails, parking areas, old landings, old skid trails and an unauthorized road in Compartments 7037, 7038, 7041, 7042, 7048, 7050. These impacts result in an estimated 8 acres of long-term effect to soil productivity.

Future activities:

- Possible gas pipeline construction/installation on 13.2 acres in the Mountain Valley Pipeline (MVP) proposed corridor

Table 19. Estimated Cumulative Effects to Long-term Soil Productivity by Alternative

Project Alternative	Past Actions, Old timber harvests and roads	Proposed Actions	Future Actions	Total Acres with a Long-term Impact	% of the Proposed Project Area (11,714 acres)
1	23.75 acres	14.2 acres	13.2	37.95 acres	0.32%
3	23.75 acres	10.36 acres	13.2	34.11 acres	0.29%
4	23.75 acres	12.8 acres	13.2	36.55 acres	0.31%

Assumptions for estimating cumulative effects:

1. This project area is 11,714 acres.
2. Average width of past long-term impacts to soil productivity associated with 3.1 miles of various effects is 20 feet.
3. Past effects are estimated from field observations.
4. Future actions of the MVP proposal alternative are speculative at this time. However, the Mountain Valley Pipeline alternative through project area impacts 13.2 acres. This includes a 125' wide construction width. This impact is considered a short-term effect due to the affected soil remaining on site and not being displaced to another area and compaction

reduced over a short time from organic additions, freeze-thaw, root growth and macro organisms. Erosion potential is short-term as erosion control structures and seeding/vegetation take effect during a recovery period.

The above table shows that when proposed, past and future actions are considered, soil productivity will be reduced on a small percentage of this project area. Cumulative effects to soil productivity are well within the Forest Plan standard (Soil Quality Standards, Forest Service Handbook, R8, 2509.18.2.2, Soil Quality Standards). The standard is that 85% of an area will retain its potential long-term soil productivity. The estimated cumulative effects to soil productivity above show this standard will be met in this area of the Forest for the proposed project alternatives in this analysis.

Air Resources

Issue Related to the Resource:
None.

Scope of the Analysis:
The geographic bounds for this analysis include the airshed in the vicinity of the project area and any potentially smoke sensitive areas within this airshed such as schools, hospitals, nursing homes, and roadways. The temporal bounds include the period of time between prescribed fire ignition and when all smoke is dissipated.

Existing Situation:
Air pollution is the presence in the atmosphere of one or more contaminants of a nature, concentration, and duration to be hazardous to human health or welfare (Sandberg et al. 1999). Air quality is a measure of the presence of air pollution. Ambient air quality is defined by the Clean Air Act as the air quality anywhere people have access, outside of industrial site boundaries. National ambient air quality standards (NAAQS) are standards of air quality designed to protect human health or welfare and are applied to six criteria pollutants. Although the proposed Fork Mountain Vegetation Management Project includes commercial harvest of certain acreage, construction of landings, construction of new permanent and temporary roads, road maintenance activities, decommissioning of certain roads, and conducting prescribed burning on certain acreage, not all proposed activities result in air emissions. Impacts from heavy-duty equipment used in timber harvest and road building and log trucks is negligible. Thus, this air analysis will only focus on the one proposed activity, prescribed burning, that results in an increase in air emissions. The airshed surrounding the project is considered a Class 2 area, with no significant air quality concerns.

Direct, Indirect and Cumulative Effects of the Alternatives:
Emissions from wildland fire include carbon dioxide, water, carbon monoxide, particulate matter, hydrocarbons or volatile organic compounds, and nitrogen oxides. Carbon monoxide is the most abundant pollutant emitted from wildland fire. It is of concern to human health, because it binds to hemoglobin in place of oxygen and leads to oxygen deprivation and all of the associated symptoms, from diminished work capacity to nausea, headaches, and loss of mental acuity. Carbon monoxide concentrations can be quite high adjacent to the burn unit, but they decrease rapidly away from the burn unit toward cleaner air. Carbon monoxide exposure can be significant for those working the line on a prescribed fire, but due to rapid dilution, carbon monoxide is not a concern to urban and rural areas even a short distance downwind. Nitrogen oxide emissions from wildland fires are very small, and hydrocarbon emissions are moderate. Alone they are not very important to human health, but they are precursors to the criteria pollutant, ozone. Ozone is formed in the atmosphere when nitrogen oxides and hydrocarbons combine in the presence of sunlight. Fire-related nitrogen oxides (NO_x) and hydrocarbon emissions become more important to ozone levels only when other persistent and much larger pollution sources already present a substantial base load of precursors. The most important pollutant from wildland fire emissions is fine particulate matter ($PM_{2.5}$) due to the amount emitted and the effects on human health and visibility (Hardy et al. 2001). The term fine particulate refers to particulate matter 2.5 microns or less in diameter.

The criteria pollutants of most concern on the Jefferson National Forest are particulate matter and ozone. Fine particulate matter is the leading cause of regional haze (also known as visibility

impairment), while ozone can harm sensitive vegetation within the forest. Additionally, at elevated concentrations these two pollutants can impair the health of both employees of and visitors to the national forests. Virginia and West Virginia state air regulators monitor ozone and fine particulate matter at several locations near the proposed project. Specifically, ozone monitoring is conducted in Giles, Roanoke and Wythe Counties in Virginia, and in Greenbrier County, West Virginia. Fine particulate matter monitoring is conducted in Roanoke County and City, Virginia and in Raleigh County, West Virginia. None of these monitors has measured values greater than the air quality standards (NAAQS) set by EPA. Additionally, it should be noted that neither of the counties where this project is proposed are designated nonattainment for any criteria pollutants, including ozone and particulate matter.

While air quality monitoring describes ambient pollution levels, emissions inventories provide information on the contribution of various pollution sources to total emissions for specific geographic areas. Emissions from prescribed fires are unlikely to be a significant contributor to ozone. In much of the rural South, ozone formation tends to be NO_x-limited and prescribed fires are usually not a major NO_x source when compared to others, such as vehicles. Also, the amount of NO_x and volatile organic compounds (VOC) coming from forestry activities is small compared to other sources. And most importantly, weather and climate conditions in this area tend to preclude prescribed burning from becoming a significant contributor to ozone formation. Most ozone events occur in mid-spring through late summer when hot temperatures and high-pressure air masses may stagnate over an area, and pollution is not dispersed. Prescribed burning is not typically conducted under these types of weather conditions because of the smoke dispersion issues.

Conversely, fine particulate matter is emitted from prescribed fires and is a contributor to ambient levels of this pollutant. Within the counties where burning is proposed, prescribed fire emissions currently account for 5.9 percent of all fine particulate emissions. In the counties within 40 miles of the proposed project, prescribed fire emissions account for 9.6% of all fine particulate matter emissions. Other sources of fine particulate emissions include fuel combustion and operations at industrial facilities, waste disposal and recycling operations, construction, and agricultural activities. Calculations of emissions from the proposed units show that the resulting emissions increase as a result of this project range from 11–29% in the two counties where the project is proposed, and just 1–2% in the counties within 40 miles of the proposed project.

All prescribed burning activities on the Jefferson National Forest, including those proposed in this action, are conducted in accordance with the Region 8 Smoke Management Guidelines in order to alleviate the smoke related impacts outlined above. Smoke management planning in accordance with the Region 8 Smoke Management Guidelines has been successful in protecting health and safety during past activities. The Guidelines require that smoke dispersion modeling be conducted for all burn units that will consume more than four tons per acre to ensure that the smoke management objectives previously set forth are met; if modeling shows potential impacts, adjustments or mitigations will be necessary in order to go forward with the burn. Each burn unit will be planned in accordance with the Guidelines such that specific parameters are met, including wind speeds and directions. While Burn Block 1 has the potential to transport smoke beyond the National Forest, potential impacts will be mitigated by burning with a wind direction that avoids nearby smoke-sensitive locations.

The proposed project is designed to ensure that the Regional Smoke Management Guidelines are followed, and as such does not threaten to lead to a violation of any Federal, State or Local law or regulation related to air quality. However, there may be times when smoke from the proposed prescribed fires causes short-term respiratory discomfort, is a nuisance, or reduces visibility of those near the burn units. Although burns are planned to minimize these impacts to smoke sensitive areas and nearby residents, there is the potential for the smoke plume to change direction and temporarily affect those in its path. These impacts are short-lived and last less than 24 hours. Impacts may also occur some distance downwind depending on the weather conditions. This is particularly the case for burn units that may contain higher than normal fuel loads due to insect and storm damage, and lack of regular fire treatments. Burn Blocks 1, 2 and 3 all have known areas with higher than normal fuel loads. As stated previously, backing burns will primarily be employed to meet silvicultural and wildlife objectives and to more easily alter or suspend burning operations should a sustained wind change

occur. For these reasons, smoke management planning is an integral part of each prescribed burn operation.

Based on existing air quality information, no long-term adverse impacts to air quality standards are expected from the proposed Fork Mountain Vegetation Management Project. All anticipated impacts, direct, indirect, and cumulative from the proposed prescribed burning in Alternatives 1, 3, and 4 are minor, with Alternative 3 having the least potential impact since it has only 890 acres of prescribed burning versus 3,581 acres in Alternatives 1 and 4. Given that Alternative 2 has no activities, it has no potential effect on air resources.

For more information, see the Fork Mountain Vegetation Management Project Air Report (Pitrolo, 2014) in the project file.

SOCIAL ENVIRONMENT

Recreation and Scenic Resources

Issue Related to the Resource:
None.

Scenic Resources. There is a concern that timber harvesting activities and road construction may adversely impact the visuals from key observation points along the Appalachian National Scenic Trail and Hanging Rock Shelter. Units 25, 26a and 26b on Fork Mountain lie on the top and south side of the mountain and can be seen from the Appalachian Trail. A small portion of Unit 17 lies within the viewshed as well. The stands proposed for treatment in these locations may have an impact on the scenic resource when viewed from Hanging Rock Shelter. There was general public concern about the look of the area post-activity.

Scope of the Analysis:
The geographic bounds for this scenic analysis will include all of these scenic travel corridors, views from Wind Rock and Hanging Rock Overlook and views from Glen Alton Recreation Area, and from trails in the area. Assessment of impacts to the visual resource was done during the most visible conditions.

The time period for this analysis will include projects occurring up to 10 years in the past and into the future. This time period is based on the concept that the greatest harvesting impacts on visual quality generally last about 10 years at which time the treated units are not as easily discernible to the casual observer.

Existing Situation:
The primary recreational use in this project area is hunting. There are several developed recreation sites in the vicinity of the project area as well as a scenic road corridor near the base. Since wildlife and scenic viewing are primary goals of people in the adjacent recreation areas, impacts to both the scenery and recreational resources will be analyzed concurrently.

This project area is accessed by VA 635/WVA 17/VA 600 along the southern boundary and a portion of VA 613 north of VA 635. Other Forest roads in the area are Concern Level 3 related to scenic resources. Allegheny Trail runs along the crest of Peters Mountain to the north of the project area. Potts Rail Trail is located south of the project area. The project area is in the vicinity of Hanging Rock Raptor Observatory, Glen Alton Recreation Area and the Appalachian Trail at Wind Rock. Fork Mountain project area is located in a Roaded Natural classification of Recreation Opportunity Spectrum (ROS) recreational settings. Within this project area, recreational activities are primarily dispersed. The sights and sounds of other visitors and motorized vehicles are normally present in the Roaded Natural setting. Visitors are expected to feel comfort and security while experiencing the outdoors but feelings of deep solitude, challenge, and risk are not to be expected.

Definitions

Scenic Class is a system of classification describing the importance or value of a particular landscape or portions of that landscape. The values in this classification system range from 1 (highest value) to 7 (lowest value). Scenic Class related to each prescription in the Forest Plan determines the Scenic Integrity Objectives of the area. The Forest Plan specifically provides direction as related to each prescription, the Scenic Class and its associated Scenic Integrity Objective.

Scenic Integrity Objectives (SIOs) are developed as measurable standards for the visual management of public lands. These SIOs are mapped and established as part of the Forest Plan. In managing scenery, degrees of integrity are defined as very High to Low. Under the High SIO management activities are not visually evident. Under the Moderate SIO activities remain visually subordinate to the landscape character. Under the Low SIO management activities may visually dominate the original landscape character; however they must be in scale with the surrounding area.

Concern Levels are a measure of people's concern for the scenic quality of the National Forests. Three concern levels are employed, each identifying a different level of user concern for the visual environment. Level 1 is the highest concern and includes all seen areas from primary travel routes and use areas. Level 2 is of moderate concern and includes secondary roads, and use areas and Level 3 is of lowest concern and includes all seen areas from where less than ¼ of the Forest visitors have a major concern for scenic qualities.

Distance Zones are divisions of a particular landscape being viewed. They are used to describe the part of the landscape that is being evaluated. The three distance zones are Foreground, Middleground and Background. Foreground is within ¼ to ½ mile of the observer. Normally individual boughs of trees can be discerned at this distance. Middleground is from the Foreground zone to 3-5 miles from the observer. At this distance tree cover tends to appear very uniform and individual tree forms are only discernible in very open areas. Background extends from Middleground to infinity. Texture in stands is generally very weak or non-existent at this distance.

For additional explanation of these and other terms associated with the Visual Management System please refer to the forest plan or *Agriculture Handbook Number 701, Landscape Aesthetics, A Handbook for Scenery Management.*

The Concern Level 1 route in the analysis is VA 635/WVA 17/VA 600, which was recently designated by Virginia and West Virginia as Whistlestop Scenic Byway. Views of the project area from this road are within the Middleground distance zone and are primarily obstructed by foreground terrain and vegetation. The project area is not visible from Glen Alton Recreation Area, Cherokee Flats, or White Rocks Campground.

The Appalachian Trail is a Concern Level 1 route in the analysis area. Views from the Trail are in the Middleground distance zone and are obstructed by foreground terrain and vegetation. Wind Rock is a key observation point along the Appalachian Trail and is also a popular day hike. From this overlook, a large portion of the project area is obstructed by Middleground views of Fork Mountain. From this vantage point, a portion of the project near the town of Kire is visible.

Hanging Rock Overlook, a key observation point, also provides a partially obstructed view in the direction of the project area. Foreground vegetation in that section of the overlook block views of the north side of Fork Mountain. Other portions of the project area are completely obscured by terrain.

The Concern Level 2 routes in the analysis include the Allegheny Trail. The project area is not visible from Potts Rail Trail, Virginia's Walk Trail or from existing or proposed trails on the Glen Alton property.

The Inventoried Scenic Class for this project area is Scenic Classes 2 and 3. There are also small portions of Scenic Class 5 in the project area; these areas are not seen from any travel way or observation point.

Management Prescriptions Outlined in the Forest Plan

Scenic Class related to each prescription determines the Scenic Integrity Objectives of the area. As the prescription for each area of land varies, the Scenic Integrity Objective may also vary. The Forest Plan specifically provides direction as related to each prescription, the inventoried Scenic Class and its associated Scenic Integrity Objective.

Scenic Integrity Objectives (SIOs) in the project area range from High to Medium. Areas with High Scenic Integrity Objective are coincident with areas that have Management Prescriptions 6.C, 6.B Old Growth Communities and 9.F-Rare Communities. There are no proposed management activities in these areas.

All other areas are within the Medium Scenic Integrity Objective and are within the 8.C-Black Bear Habitat Management Prescription. These areas provide a variety of dispersed recreation opportunities, improve the settings for other outdoor recreation and enhance visitor experiences. Management activities are designed to meet or exceed the Scenic Integrity Objective of Moderate.

Direct and Indirect Effects of the Alternatives:

Alternatives 1, 3, and 4

Most of the proposed activity is not visible from the Whistlestop Scenic Byway. Thinning the forest in a manner that favors dominant existing trees and contributes to fall color variety will enhance the scenic experience of the visitor. This will result in fewer but larger trees and will improve wildlife viewing and forest songbird habitat. Long-term hunting opportunities would be improved by all action alternatives as they enhance hard and soft mast production in the project area, with Alternative 1 providing the greatest change. Short-term visual impacts are associated with the prescribed burns but these effects are generally limited to the time period from the burn to "green up" in the spring. No long-term negative impacts hiking old roads for pleasure would be created by these actions.

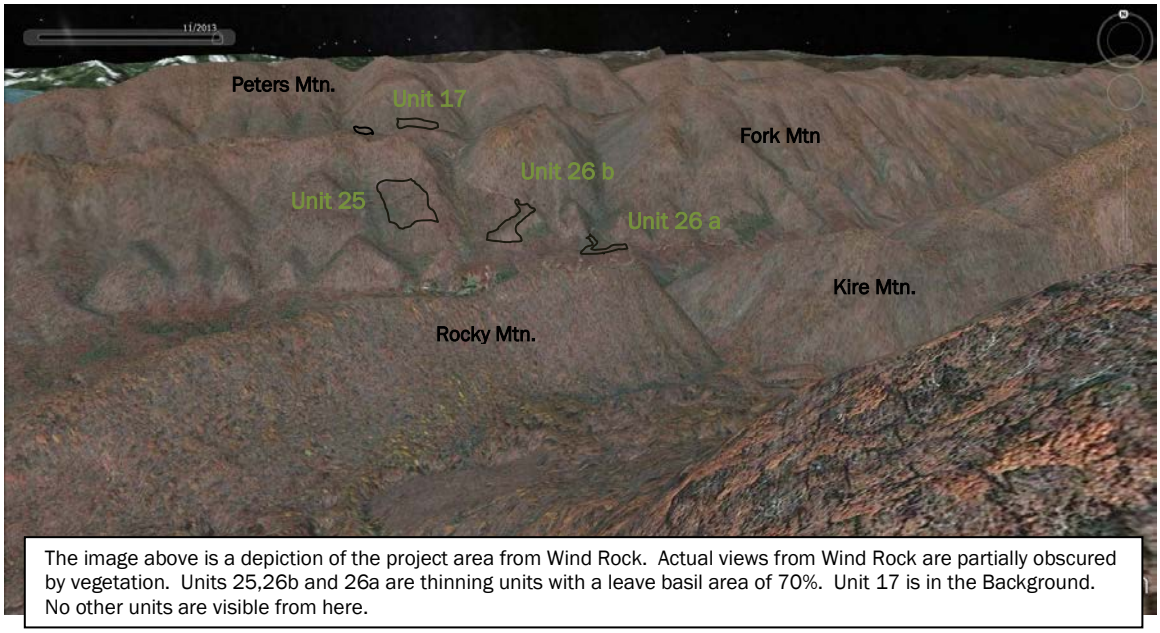
The road decommissioning of FSR 10522 and FSR 10521 from the south end near VA State Route 635 up to the point where it hits the proposed new road construction will be done in a way that walking these old road beds will not be a problem. Only the decommissioning of FSR 10481 and the section of FSR 10521 in the drainage near the private land on the northeast corner of the project area will be done in a way that blocks access by placing large vegetation in the roadway.

Short-term impacts to hunter use are expected during active timber operations or prescribed burning. However, these activities rarely occur during hunting seasons, with the exception of perhaps spring gobbler season. The proposed road extensions in Alternatives 1 and 4 will improve walk in access for all types of recreation activity.

Due to the remote location of the area, no measurable increase in public use is anticipated. Increased illegal vehicle traffic is not a concern because these road extensions are over 2 miles in, behind a locked gate that has not been breached for over 10 years. Most illegal vehicle traffic in this project area was coming from adjacent private land to the north and east of the project area. Law enforcement efforts about 5 years ago ended this problem.

The propose management activities pose no negative impacts to future development at Glen Alton or along the Whistlestop Scenic Byway. Proposed activity would meet the Scenic Integrity Objective of Moderate for the area and are consistent with the Roaded Natural recreation experience.

A portion of the project area is in the Middleground distance zone of the Appalachian Trail, a Concern Level 1 travel route and Wind Rock Overlook, a key observation point. Units 25, 26a, 26b are visible from Wind Rock. These units are thinning units that are proposed to have 70% of the canopy in this area left after the management activity is complete. A small portion of Unit 17 is also within the viewshed. From this distance and viewing angle management activity is at a scale that would not be evident to the casual observer. Proposed activity would meet the Scenic Integrity Objective of Moderate and is consistent with 8.C Black Bear Habitat Management Prescription as outlined in the Forest Plan.



The image above is a depiction of the project area from Wind Rock. Actual views from Wind Rock are partially obscured by vegetation. Units 25,26b and 26a are thinning units with a leave basil area of 70%. Unit 17 is in the Background. No other units are visible from here.

Alternative 2 (No Action)

Under the no action alternative, no short-term changes would occur to the recreation and scenic resources in the area. However, over the long-term with additional oak mortality, hunting conditions would continue to decline as the favorite winter food for bear, deer, and turkey (acorns) will be less abundant. The increased amount of downed wood in the forest would provide firewood but it would also increase the risk of fire danger, due to increased fuel loading in the nearby forest.

The scenic views to the travelers along Whistlestop Scenic Byway, and people visiting White Rocks, Glen Alton or Hanging Rock would include oak mortality as trees succumb to gypsy moth devastation. This kind of oak mortality is already evident on parts of Whistlestop Scenic Byway and is not a desirable scenic condition.

Cumulative Effects of the Alternatives:
All cumulative actions meet the Scenic Integrity and Recreational Objectives of the area. No significant cumulative impacts to the recreation experience or scenic resources are expected to result from this action because it is coupled with past and reasonably foreseeable actions in the viewshed.

Future activities:

- Mountain Valley Pipeline, LLC is proposing to construct and operate approximately 286 miles of a natural gas pipeline referred to as the Mountain Valley Pipeline. MVP has pre-filed with the Federal Energy Regulatory Commission (FERC) under Section 7(c) of the Natural Gas Act. Should MVP file an application to construct a pipeline, FERC will be the lead agency and will conduct an in-depth environmental analysis prior to deciding on the need for the pipeline. A portion of the proposed pipeline would cross National Forest System lands on the Jefferson National Forest. If FERC would determine the pipeline is needed, the Forest Service would make a separate determination whether to issue a right-of-way permit to construct, operate, and maintain a natural gas pipeline on the JNF. MVP has identified an alternative route that would cross the Jefferson National Forest just east of the Fork Mountain Vegetation Management Project. The effects of the pipeline could overlap the effects of the Fork Mountain Project in the areas of vegetation changes and on the visual resources as seen from Hanging Rock and Wind Rock.

Heritage Resources

Issue Related to the Resource:
None.

Scope of the Analysis:
The geographic scope of the analysis is the areas proposed for new ground disturbing activities (such as roads, log landings, and fire lines). Past ground disturbing activities are not included in the analysis, as any potential damage to cultural resources that might have existed cannot be evaluated or recovered.

Existing Situation:
A Phase 1 reconnaissance archeological survey was performed in the project area in May of 2014. The survey covered all proposed cutting units and activities within these areas (bladed skid roads, landings), system road construction, temporary road construction, and fire line construction. One cultural resource site was found and the project was modified to avoid this site. The project has been cleared of cultural resources concerns.

Direct and Indirect Effects:
Alternatives 1, 3 and 4
Since there are no cultural or historic sites within the proposed boundaries of the activities, there would be no impacts on heritage resources in the area.

Alternative 2
With no ground disturbing activities proposed under this alternative, there would be no impacts on heritage resources in the area.

Cumulative Effects:
No other reasonably foreseeable future ground disturbing activities are planned for the area, and there would be no cumulative effects to heritage resources under any alternative.

Access or Roads

Issue Related to this Resource:

2. NEW SYSTEM ROAD CONSTRUCTION –There is a concern that new road construction would create an increase in erosion causing sedimentation, especially of Potts Creek as discussed above, and would increase illegal vehicle traffic in the area.

INDICATORS:

a. Whether or not the alternative would have significant impacts on the soil, water, recreation and/or road management resources in the existing watersheds.

b. Whether or not the proposed road prism is in an acceptable location to construct a system road.

Scope of the Analysis:
The spatial bounds of the analysis of effects are limited to national forest lands in the contiguous Rx 8C block (including the embedded Rx 6B, 6C and 9F blocks) within compartments 7042, 7048, and 7050. The temporal bounds include past harvest activities that affect the current vegetation condition in the project area and any foreseeable vegetative manipulation within the next 10 years.

Existing Situation:
The project area includes portions of the Potts Creek and Stony Creek watersheds. See Appendix A, Map 2-Alternative 1 Overview of Commercial Harvests for all existing and proposed roads and the road decommissioning projects. The west side of the project area is accessed by Virginia State Route (VA) 613 which turns into Forest System Road (FSR) 945 (Salt Sulphur Turnpike) just above the private land inholding (private land is outlined in olive green on Map 2). Off of VA613 or FSR 945 are the following FSRs: 10432 (Hermie Road), 10430 (Patterson Road), 10412 (Guthrie Road), 10411 (Warren Road), 10373 (Southside Peters Mountain), 1503 (Monroe Line Road), 10420 (Barton Road). The east side is accessed FSR 10521 (Whiskey Hollow Road) and FSR 10522 (Fork Mountain Road), both begin off West Virginia State Route (WV) 17 (Waiteville Road). FSR 10481 (N. Fork Potts Creek) accesses the northeast section of the project area from a road on private property. All FSRs, with the exception of FSR 945, are gated and closed to public vehicle traffic yearlong. FSR 945 is open yearlong.

Table 20. Existing Forest System Roads within the Project Area

Road Name	Road Number	Total Road Length in Project Area (Miles)	Total Road Length within Rx 8C Area (Miles)	Operational Maintenance Level	Traffic Service Level	Public Motorized Use Status
Hermie	10432	0.4	0.4	2	D	Closed
Patterson	10430	0.95	0.95	2	D	Closed
Guthrie	10412	1.31	1.31	2	D	Closed
Warren	10411	1.22	1.22	2	D	Closed
Southside Peters Mtn.	10373	1.04	1.04	2	D	Closed
Monroe Line	1503	1.49	1.49	2	D	Closed
Barton	10420	2.33	2.33	2	D	Closed
Keffer	10434	0.62	0.62	2	D	Closed
Whiskey Hollow	10521	2.85	2.6	1	D	Closed
Fork Mountain	10522	2.2	2.2	2	D	Closed
North Fork Potts	10481	2.0	2.0	1	D	Closed

Bob	10492	1.2	0.8	2	D	Closed
Salt Sulphur Turnpike	945	3.05	3.05	3	C	Open

Operational Maintenance Level 1 roads are four-wheel drive vehicles. Operational Maintenance Level 2 roads are maintained for high clearance vehicles; Level 3 roads are suitable for passenger car travel. Traffic Service Level describes a road's design for speed, travel time, traffic interruptions, freedom to maneuver, safety, driver comfort and convenience. Traffic Service Level C roads are designed for 'flow interrupted – use limited traffic' and are roads that are usually open to public vehicle traffic; Level D roads are for 'slow flow or may be blocked traffic' and are usually closed to public vehicle traffic.

Forest Service roads that are open to public use are counted toward the calculation of open road density. In addition, half the length of open public roads inside or adjacent to the project area count toward open road density. The Forest Plan objective in Rx 8C (8C-OBJ4) is to maintain an open road density at or below 0.8 miles per square mile. The open road density for this Rx 8C is 0.4 miles per square mile (6.9 miles of open system road within Rx 8C divided by 18.3 square miles in the project area).

System roads that would be utilized during commercial vegetation management activities are in acceptable condition and at acceptable grades and would receive some maintenance under each action alternative. Adequate vehicle access to the eastern half of this project area currently does not exist. All 3 current FSRs in this part of the project area are proposed for decommissioning in all action alternatives (See Map 2 in Appendix A). Of these 3 roads, FSR 10521 (Whiskey Hollow Road, 2.6 miles) and FSR 10522 (Fork Mountain, 2.0 miles) have road alignments that are way too steep and do not meet standards of system roads constructed today. FSR 10481(North Fork Potts Creek, 1.9 miles) runs in and out of a riparian area. Activities proposed to decommission these roads include: waterbarring steep segments, constructing earthen berms, ripping where needed, and seeding with native grasses. Only the decommissioning of FSR 10481 and the section of FSR 10521 in the drainage near the private land on the northeast corner of the project area will be done in a way that blocks access by felling trees and/or placing large vegetation in the roadway.

In order to provide appropriate vehicle access to the east half of the project area, approximately 3.9 miles of road construction are included in the Proposed Action (Alternative 1). These new road segments would come off of FSR 10420 and be built on grades that are 3 to 8%, with one short pitch of about 10% near the end of the proposed Barton Road Extension (in Alternative 1 and 4).

Road construction and decommissioning proposals were informed by a site-specific road analysis that is in the project file.

Direct and Indirect Effects:

Alternative 1

The commercial harvest activities proposed under this alternative would involve the following Forest System Roads: 10432 (Hermie Road), 10430 (Patterson Road), 10412 (Guthrie Road), 10411 (Warren Road), 10373 (Southside Peters Mountain), 1503 (Monroe Line Road), 10420 (Barton Road), 945 (Salt Sulphur Turnpike) and 10521 (Whiskey Hollow Road). No changes in these road designations, management objective levels, or use classifications are needed for this project with the exception of Whiskey Hollow Road. The operational maintenance level for this road would change from a 1 to a 2 for the first 0.2 miles. Most of the remaining length of the road is proposed for decommissioning; therefore, a change is not necessary for that remaining segment. Some minor road reconstruction is proposed for Warren Road. These activities would include replacing and/or upsizing culverts where needed, but would not include any road realignment.

Approximately 3.9 miles of new system road construction is proposed under this alternative. This new construction would originate off Barton Road (FSR 10420) approximately 2.3 miles up road FSR 10420 from FSR 945 and would occur in two segments. One segment on the south side of Potts Creek is called the Barton Road Extension and is approximately 2.8 miles long. The other segment

would spur off the Barton Road Extension near Johnson Flats and would access the north side of Potts Creek. This segment is called the Johnson Flats Spur and is about 1.1 miles long. Both new roads would follow 3 to 8% grades with one short pitch near the end of the Barton Road Extension that is about 10%.

These 3.9 miles would be contained within the contiguous block of Rx 8C but would have no impact on the open road density of the prescription area, as they would be closed to public vehicle traffic. This would maintain the current open road density of 0.4 miles per square mile and stay well within the Forest Plan objective to maintain an open road density at or below 0.8 miles per square mile. Both roads would be an Operational Maintenance Level 2 with a Traffic Service Level D. Both roads would be constructed to Forest standards with sustained grades less than 8%, with only one short segment of the Barton extension anticipated to be over 8% due to terrain restrictions. Permanent drainage features would be installed at each stream crossing including culverts and one ford construction. Roads would be primarily outsloped, using road ditches only where necessary. Broad-based dips will be installed at intervals of about 100 to 200' depending on slope to assure adequate long-term drainage.

Impacts to soil, aquatic, hydrology/watershed, and recreation resources from the road projects are addressed in each of those sections in this chapter. No substantial impacts are anticipated in any resource area. There are 6.5 miles of road decommissioning proposed and 3.9 miles of new construction in this alternative, leaving a net decrease of 2.6 miles of Forest System Roads in the project area.

Alternative 2

Under the No Action Alternative, no roads would be maintained by management activities, no new road construction would occur, and no roads would be decommissioned. Road conditions of existing roads would slightly deteriorate due to lack of maintenance, although this effect over the span of this analysis would be minor as roads in this area are stable.

Alternative 3

The commercial harvest activities proposed under this alternative would involve the following Forest System Roads: 10432 (Hermie Road), 10430 (Patterson Road), 10412 (Guthrie Road), 10411 (Warren Road), 10373 (Southside Peters Mountain), 1503 (Monroe Line Road), 10420 (Barton Road), 945 (Salt Sulphur Turnpike) and 10521 (Whiskey Hollow Road). No changes in these road designations, management objective levels, or use classifications are needed for this project with the exception of Whiskey Hollow Road. The operational maintenance level for this road would change from a 1 to a 2 for the first 0.2 miles. Most of the remaining length of the road is proposed for decommissioning; therefore, a change is not necessary for that remaining segment. Some minor road reconstruction is proposed for Warren Road. These activities would include replacing and/or upsizing culverts where needed, but would not include any road realignment

No new system road construction would occur under this alternative, which would eliminate management activities in the eastern portion of the project area. The Plan recognizes the need for roads to create and maintain the habitat diversity desired in 8C management areas (Plan, p. 3-120).

There are 6.5 miles of road decommissioning proposed in this alternative, leaving a net decrease of 6.5 miles of Forest System Roads in the project area.

Alternative 4

The commercial harvest activities proposed under this alternative would involve the following Forest System Roads: 10432 (Hermie Road), 10430 (Patterson Road), 10412 (Guthrie Road), 10411 (Warren Road), 10373 (Southside Peters Mountain), 1503 (Monroe Line Road), 10420 (Barton Road), 945 (Salt Sulphur Turnpike) and 10521 (Whiskey Hollow Road). No changes in these road designations, management objective levels, or use classifications are needed for this project with the exception of Whiskey Hollow Road. The operational maintenance level for this road would change from a 1 to a 2 for the first 0.2 miles. Most of the remaining length of the road is proposed for decommissioning; therefore, a change is not necessary for that remaining segment. Some minor road

reconstruction is proposed for Warren Road. These activities would include replacing and/or upsizing culverts where needed, but would not include any road realignment.

Approximately 2.8 miles of new system road construction is proposed under this alternative. This new construction would originate off Barton Road (FSR 10420) approximately 2.3 miles up road FSR 10420 from FSR 945 and access the south side of Potts Creek. It is called the Barton Road Extension. This road ailment would follow 3 to 8% grades with one short pitch near the end that is about 10%.

These 2.8 miles would be contained within the contiguous block of Rx 8C but would have no impact on the open road density of the prescription area, as it would be closed to public vehicle traffic. This would maintain the current open road density and stay well within the Forest Plan objective to maintain an open road density at or below 0.8 miles per square mile. The road would be an Operational Maintenance Level 2 with a Traffic Service Level D. Permanent drainage features would be installed including culverts at each stream crossing and broad-based dips to assure adequate drainage.

Impacts to soil, aquatic, hydrology/watershed, and recreation resources from the road projects are addressed in each of those sections in this chapter. No substantial impacts are anticipated in any resource area. There are 6.5 miles of road decommissioning proposed and 2.8 miles of new construction in this alternative, leaving a net decrease of 3.7 miles of Forest System Roads in the project area.

Cumulative Effects:
There would be no change in the open road density in any alternative. As stated in all the resource sections that dealt with the road projects presented here, no substantial impacts are anticipated in any resource area because of the road construction proposed in any alternative. No additional timber management activities are planned to occur in the next 10 years.

Economics

Issue Related to the Resource:
None. “Will the sale of the timber resource support the construction of the proposed new Forest System roads and related required vegetation treatments?”

Scope of the Analysis:
The spatial scope of the economic analysis includes the area within a 60-mile radius of the Fork Mountain project area. Sixty miles is a common limit for hauling of timber and/or roundwood. The temporal scope will be limited to the life of the 3 to 5 timber sales developed from the Fork Mountain vegetation management project. In addition, the scope of the economic analysis is limited to a comparison of the expenditures and revenues associated with the commercial timber sale components of the project, as well as an estimation of the cost associated with implementing the other vegetative treatments in each alternative. The cost of analyzing the no action alternative is also considered. It is important to note that not all effects can be quantified monetarily. It is difficult to reduce the benefits and costs of a proposed management action on wildlife, soil, water, visuals, recreation or other non-market resources to a single dollar amount. There is no single accepted methodology for such an evaluation, and it is considered beyond the scope of this analysis. The environmental effects of the alternatives on these resources are described and disclosed in the previous sections of this chapter.

Existing Situation:
Demand for timber products is good in the 60-mile radius surrounding the proposed activities. There are approximately three sawmills and one pulpwood concentration yard located within a 60-mile radius of the area. These outlets provide an important source of employment and revenues for the area.

The project area is located in a region that is primarily rural in character. The largest towns in Giles County, VA and Monroe County, WV are Pearisburg and Peterstown, respectively. According to the

2010 Census, there are 17,124 people that live in Giles County and 13,534 living in Monroe County. The portion of the Commonwealth of Virginia that includes Giles County has a manufacturing and agriculture economic base providing 30% of the jobs and $138 million in products. Tourism is also a significant component of the area's economy due to scenic beauty and ease of accessibility from two major interstate systems. Monroe County claims that their economic basis has always been farming and timber harvesting.

There is one paper mill in the area that uses pine and hardwood pulpwood from the National Forest. The demand for pulpwood from National Forest lands is much greater than the supply. The Mead Westvaco paper mill is located in Alleghany County. The demand for sawtimber is also strong in the area and there are a number of sawmills that use National Forest timber as a source of raw material for lumber production. There is one sawmill near the project area in Covington, VA located approximately 40 miles northeast of the project area. The sawmills and the pulp mill provide an important source of employment and revenues for the area. Local monetary benefits arise primarily from harvesting, primary processing, and transportation.

Table 21. Project Cost Estimates

Costs	Alt. 1 13,428 ccf (390 acres)	Alt. 2 0 ccf (0 acres)	Alt. 3 9,538 ccf (274 acres)	Alt. 4 12,153 ccf (339 acres)
Project Planning Cost*				
-Inventory and Prescriptions $3.50/CCF)	$ 46,998	$ 46,998	$ 33,383	$ 42,536
-NEPA (EA & Specialists $5.00/CCF	$ 67,140	$ 67,140	$ 47,690	$ 60,765
Total	**$114,138**	**$114,138**	**$ 81,073**	**$103,301**
Timber Sale Implementation Cost				
-Sale Preparation $7.00/CCF	$ 93,996	$0	$ 66,766	$ 85,071
-Sale Administration $4.00/CCF	$ 53,712	$0	$ 38,152	$ 48,612
Total	**$147,708**	**$0**	**$104,918**	**$133,683**
Roads Cost				
New Road Construction	$151,320	$0	$ 0	$122,600
Road Reconstruction	$ 17,944	$0	$ 17,944	$ 17,944
Total	**$169,264**	**$0**	**$ 17,944**	**$140,544**
Regeneration Costs				
-Site Preparation $130/acre (regeneration acres only)	**$ 50,700**	**$0**	**$ 35,620**	**$ 44,070**
Total Project Related Costs:	**$481,810**	**$114,138**	**$239,555**	**$421,598**

*Project planning costs, except for Roads engineering costs, are calculated based on the original estimated volume of the proposed action and do not vary by alternative. Roads engineering costs will vary somewhat depending on how much road reconstruction/construction is needed in the selected alternative.

Table 22. Economic Efficiency by Alternative

Economic Comparison	Alternatives			
	1	2	3	4
Timber Volume, *Total (CCF)*	13,428	0	9,538	12,153
Volume, *Per Acre (CCF)*	21.3	0	21.3	21.3
Sawtimber vol. (%)	60	0	60	60
Pulpwood vol. (%)	40	0	40	40
$ per ccf sawtimber	$88.00	n/a	$88.00	$88.00
$ per ccf pulpwood	$10.00	n/a	$10.00	$10.00
Stumpage Value, *Total*	**$762,710**	**$0**	**$541,758**	**$690,290**
Total Project Related Costs:	($481,810)	($114,138)	($239,555)	($421,598)
Economic Efficiency	**$280,900**	**($114,138)**	**$302,203**	**$268,692**
*Value Added, Virginia's Economy	$31,892,532	$0	$22,656,319	$28,867,927

* *Virginia's Forests Our Common Wealth*, published by the Virginia Department of Forestry in 2006, indicates the average of $41.82 worth of total value added to Virginia's economy for every dollar paid to landowners for stumpage.

Direct and Indirect Effects of the Alternatives:
The above economic efficiency table presents the costs and returns associated with the alternatives. The values presented are estimates based on the most recent stumpage and unit cost estimates of activities on the forest. The numbers given do not represent the actual numbers that will be found under any given alternative, but rather show the relative change between alternatives for comparison purposes.

The Forest Service strives to reduce the cost of sale preparation and administration of all timber sales while still complying with all state and federal laws and regulations. On page 2-30 of the Plan, it states that timber sales are used as a cost-effective method of achieving other ecological, biological and aesthetically desired conditions. Forest product outputs contribute to the social and economic well-being of the people living in the area.

As stated in Chapter 1 of this environmental assessment, that while the production of forest products is part of the purpose and need for this project, the driving purpose is to move toward the objectives of the 8C management prescription in the Plan. So, while the agency strives to avoid losing money on a timber sale, it certainly does not implement timber harvesting projects to solely generate revenue. Thus, the determination of which and how many trees to harvest is driven by the need to achieve the Desired Future Condition for the project area rather than the timber market value of the tree(s) themselves.

Non-monetary benefits, or "normally unquantified" costs, by their very nature are difficult to quantify or even agree upon. In the final analysis, there are trade-offs. By minimizing the negative impacts (costs) on some resources, while achieving benefits in other resource areas, the Forest Service believes there is an overall net gain in non-monetary benefits. Thus, overall we believe that more good would result from the actions proposed in the Fork Mountain project than bad, in terms of non-monetary costs and benefits. While economic viability is a consideration in selecting an alternative for implementation, it is not the sole factor. Maximizing net value is not the primary purpose of this project. The point of the activities proposed here is to move the area toward the desired condition described in the Plan.

Alternative 1: The estimated direct benefit/cost ratio for alternative 1 is calculated at 2.72. Approximately $763,000 in stumpage would be directly generated by alternative 1.

The Forest Service strives to reduce the cost of sale preparation and administration of all timber sales while still complying with all state and federal laws and regulations. On page 2-30 of the Forest Plan, it states that timber sales are used as a cost-effective method of achieving other ecological, biological and aesthetically desired conditions. Forest product outputs contribute to the social and economic well-being of the people living in the area. The value of wood products in this project is above average when compared to other areas on the Ranger District.

While economic viability is a consideration in selecting an alternative for implementation, it is not the sole factor considered. Maximizing net value is not the primary purpose of this project. As stated in Chapter 1 of this environmental assessment, that while the production of forest products is part of the purpose and need for this project, an equally important purpose is developing a desired age class distribution in the project Area. Therefore, while the agency strives to avoid losing money on a timber sale, it certainly does not implement timber harvesting projects to solely generate revenue. Thus, the determination of which and how many trees to harvest is driven more by the need to achieve the Desired Future Condition for the project area rather than the value of the tree(s) themselves.

Alternative 2: The estimated direct benefit/cost ratio for alternative 2 cannot be calculated since there is no direct monetary benefit to input into the numerator. It is estimated that approximately $114,000 would be spent on planning and coordination. No income would be directly generated by alternative 2 and no value added benefit to the area or regional economy would result.

Alternative 3: The estimated direct benefit/cost ratio for alternative three is calculated at 1.79. Approximately $542,000 in stumpage would be directly generated by alternative three.
Alternative 4: The estimated direct benefit/cost ratio for alternative four is calculated at 2.57. Approximately $690,000 in stumpage would be directly generated by alternative 4.

Cumulative Effects on Economics:
Impacts of forest service timber sales on privately held timber are expected to be minimal. Thus, the impact of this and other cumulative timber sale activity on the supply side of the economic situation is minor. Ultimately, the price of National Forest Service timber is established by the market through a competitive bidding process. Timber sales on the Ranger District within the 60-mile radius of this sale usually receive from 1-3 bids per sale. Competition is fair. Therefore, we do not believe or expect National Forest Service timber to “undercut” the value of the timber market or privately held timber values.

There are no other past or reasonably foreseeable future activities planned in the project area that, when combined with either of the alternatives, would have a cumulative effect on the economics

Climate Change

Issues Related to the Resource
None.

Scope of the Analysis

Existing Situation

Direct, Indirect and Cumulative Effects
Climate change can affect the resources in the Fork Mountain project area and the proposed project can affect climate change through altering the carbon cycle. Climate models are continuing to be developed and refined, but the two principal models found to best simulate future climate changed conditions for the various regions across the country are the Hadley Centre model and the Canadian Climate Centre model (Climate Change Impacts on the United States 2001). Both models indicate warming in the southern region of the United States. However, the models differ in that one predicts little change in precipitation until 2030 followed by much drier conditions over the next 70 years. The

other predicts a slight decrease in precipitation during the next 30 years followed by increased precipitation. These changes could affect forest productivity, forest pest activity, vegetation types, major weather disturbances (droughts, hurricanes), and streamflow. These effects would likely be seen across the Forest, though some sensitive areas (such as high elevation communities) may be affected sooner than others. The proposed treatment areas do not have any high elevation sites.

It is not expected that any of the action alternatives would substantially alter the effects of climate change in the project area. The regeneration in the areas to be harvested would provide more structural diversity to the area, and establish young, vigorous stands of timber that may be more resilient to the changes in climate. Under the No Action Alternative, there would be no change from the current condition; forested stands would be expected to be less resilient to possible climate change impacts such as changes in productivity or insect and disease compared to the action alternatives.

Alternatives 1, 3 and 4 would alter the carbon cycle, greenhouse gases and ultimately, climate change. They would remove biomass because of timber harvest. This would reduce the amount of carbon stored in the treated stands. A portion of the carbon removed would remain stored for a period in wood products. However, overall forestry practices (including harvesting and prescribed burning) have been shown to act as a net carbon sink (EPA 2001).

Regeneration harvests would reduce existing carbon stocks at the harvest sites. The harvest of live trees, combined with the likely increase in down, dead wood would temporarily convert stands from a carbon sink that removes more carbon from the atmosphere than it emits, to a carbon source that emits more carbon through respiration than it absorbs. These stands would remain a source of carbon to the atmosphere until carbon uptake by new trees and other vegetation exceeds the emissions from decomposing dead organic material. The stands would likely remain a carbon source for several years, and perhaps for more than a decade, depending on the amount of dead biomass left on site, the length of time before new trees become reestablished, and their rate of growth once reestablished. As the stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive. Similarly, once new trees are established, carbon stocks would accumulate rapidly for several decades. The rate of accumulation would slow as the stands age. Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Recent scientific literature confirms this general pattern of changes in net ecosystem productivity (NEP)[1] and carbon stocks over the period of forest stand development. Most mature and old stands remained a net sink of carbon. Pregitzer and Euskirchen (2004) synthesized results from 120 separate studies of carbon stocks and carbon fluxes for boreal, temperate, and tropical biomes. They found that in temperate forests NEP is lowest, and most variable, in young stands (0-30 years), highest in stands 31-70 years, and declines thereafter as stands age. These studies also reveal a general pattern of total carbon stocks declining after disturbance and then increasing. The increase is rapid during intermediate years and then at a declining rate, over time until another significant disturbance (timber harvest or tree mortality resulting from drought, fire, insects, disease or other causes) kills large numbers of trees. This mortality again converts the stands to a carbon source where carbon emissions from decay of dead biomass exceeds that amount of carbon removed from the atmosphere by photosynthesis within the stand.

The impacts of the action alternatives on global carbon sequestration and atmospheric concentrations of CO_2 would be miniscule. However, the forests of the United States significantly reduce atmospheric concentrations of CO_2 resulting from fossil fuel emissions. The forest and wood products of the United

[1] Net ecosystem productivity, or NEP, is defined as gross primary productivity (GPP) minus ecosystem respiration (ER) (Chapin et al. 2006). It reflects the balance between (1) absorbing CO_2 from the atmosphere through photosynthesis (GPP) and (2) the release of carbon into the atmosphere through respiration by live plants, decomposition of dead organic matter, and burning of biomass (ER). When NEP is positive, carbon accumulates in biomass. Ecosystems with a positive NEP are referred to as a carbon sink. When NEP is negative, ecosystems emit more carbon than they absorb. Ecosystem with a negative NEP are referred to as a carbon source.

States currently sequester approximately 200 teragrams[2] of carbon per year (Heath and Smith 2004). This rate of carbon sequestration offsets approximately 10% of CO_2 emissions from burning fossil fuels (Birdsey et al. 2006). U.S. forests currently contain 66,600 teragrams of carbon. The short-term reduction in carbon stocks and sequestration rates resulting from the proposed project are imperceptibly small on global and national scales, as are the potential long-term benefits in terms of carbon storage.

The currently large carbon sink in U.S. forests is a result of past land use changes, including the re-growth of forests on large areas of the eastern U.S. harvested in the 19th century, and 20th century fire suppression in the western U.S. (Birdsey et al. 2006). The continuation of this large carbon sink is uncertain because some of the processes promoting the current sink are likely to decline and projected increases in disturbance rates such as fire and large-scale insect mortality may release a significant fraction of existing carbon stocks (Pacala et al. 2007; Canadell et al. 2007). Management actions, such as those proposed, that improve the resilience of forests to climate-induced increases in frequency and intensity of disturbances such as fire, and utilize harvested trees for long-lived forest products and renewable energy sources may help sustain the current strength of the carbon sink in U.S. forests (Birdsey et al. 2007).

The release of stored carbon may be an obvious concern for all action alternatives; however, the contribution of the project area to the carbon cycle is extremely small. When combined, the carbon from these projects has minimal cumulative effects not only at the local level, but at the larger level.

Health and Safety

Issue(s) Related to this Resource:
There is a concern that herbicide use could impact water resources in the project area and water supply/wells in the local community.
The local community also raised a concern about the safety of the logging truck traffic that would be created by the Fork Mountain project.

Scope of the Analysis:
The geographic scope is based on the contiguous Rx 8C area project area and its main access roads of VA 613 and VA 635 and WV 17. The temporal bounds of this analysis include past management activities that have shaped current habitat conditions within the area, and any foreseeable future management activities for the area.

Existing Situation:
Herbicide Use –
Herbicides have been applied to national forest lands within the project area along some of the Forest Service roads. The herbicides proposed here (triclopyr and glyphosate) are widely used, including use by the Forest Service and have been used in the project area.

According to Environmental Protection Agency (EPA) fact sheets, triclopyr was registered with the EPA for use on rangeland and permanent grass pastures about 30 years ago and about 20 years ago was registered for use on rice to control broadleaf weed species. Triclopyr tolerances levels for human consumption have been established for grass forage and hay, meat, meat byproducts, milk and eggs, and rice. It is an auxin mimic or synthetic auxin. This type of herbicide kills the target weed by mimicking the plant growth hormone auxin (indole acetic acid), and when administered at effective doses, causes uncontrolled and disorganized plant growth that leads to plant death.

Glyphosate is a non-selective herbicide registered for use on many food and non-food crops as well as non-crop areas where total vegetation control is desired. When applied at lower rates, it serves as a plant growth regulator. According to the EPA, the most common uses include control of broadleaf weeds and grasses in: hay/pasture, soybeans, field corn; ornamentals, lawns, turf, forest plantings, greenhouses, rights-of-way. EPA data also shows that glyphosate is among the most widely used

[2] 200 teragrams, or Tg, equals 196,841,306 US tons.

pesticides by volume (for home, garden, industrial, commercial and governmental market sectors. In 1986, an estimated 6,308,000 pounds of glyphosate was used in the United Sates. Usage in 1990 was estimated to be 11,595,000 pounds. It ranked eleventh among conventional pesticides in the US during 1990-91. In recent years, 13 to 20 million acres were treated with 18.7 million lbs.
On October 15, 2014 the EPA released the following statement concerning a newly registered herbicide that combines 2, 4-D and glyphosate:

> *The EPA is registering the herbicide, Enlist Duo with first-time ever restrictions to manage the problem of resistant weeds. The pesticide is for use in controlling weeds in corn and soybeans genetically-engineered (GE) to tolerate 2,4-D and glyphosate. The agency's decision reflects a large body of science and an understanding of the risk of pesticides to human health and the environment.*
>
> *The herbicides 2,4-D and glyphosate are two of the most widely used herbicides in the world for controlling weeds. Dozens of other countries including Canada, Mexico, Japan and 26 European Union Members have approved these pesticides for use on numerous crops and residential lawns. Last year, Canada approved the use of Enlist Duo for the same uses that EPA is authorizing.*
>
> *EPA scientists used highly conservative and protective assumptions to evaluate human health and ecological risks for the new uses of 2,4-D in Enlist Duo. The assessments confirm that these uses meet the safety standards for pesticide registration and, as approved, will be protective of the public, agricultural workers, and non-target species, including endangered species.*
>
> *The agency evaluated the risks to all age groups, from infants to the elderly, and took into account exposures through food, water, pesticide drift, and as a result of use around homes. The decision meets the rigorous Food Quality Protection Act standard of "reasonable certainty of no harm" to human health.*

Log Truck Traffic – The project area is accessed by VA 635 and WV 17. Both these roads see regular large truck traffic, including log trucks. They are well marked but narrow state highways with few turnouts or passing lanes.

Direct and Indirect Effects:
Alternative 1
Herbicide Use –
Under the proposed action, the use of herbicide is proposed to manage vegetation as follows:

- Treat non-native invasive species along Forest System Roads, totaling approximately 55 acres using a low volume foliar spray of glyphosate (Rodeo) or triclopyr (Garlon 4) to control invasive woody species, such as Tree-of-Heaven, Autumn Olive, Royal Paulownia, and Multi-flora Rose.
- Treat non-native invasive species over approximately 135 acres in five stands ranging from 26 to 43 years of age. Treatment by basal bark application would utilize triclopyr with an adjuvant to control invasive woody species such as Tree-of-heaven, Autumn Olive and Royal Paulownia in these stands.
- Treat approximately 33 acres of hay-scented fern in harvest units located along FSRs 10411 and 10420 where found. Prior to harvest, it is not entirely certain where this fern is likely to flourish and impede forest regeneration, but it is likely to expand along these roads. This would involve using a low volume foliar spray of glyphosate to control this species.
- Treat approximately 275 acres with a basal bark herbicide application of triclopyr with an adjuvant to control non-native species, red and striped maple and other undesirable species throughout the thinning stands and open oak woodland areas. This activity will help maintain, enhance and restore the diversity and complexity of the native vegetation in the project area.

These four bullet items total 498 acres; however, it is important to point out that 498 acres represent the total area or the boundaries of potential treatment areas. Within this acreage figure, only individual invasive plants (either non-native invasive species or other unwanted woody vegetation that

compete with important wildlife forage species or forest regeneration) scattered over the 498 acres would be treated. For example, the 55 acres along roads represents all the acreage along the road, but only individual non-native invasive species would be treated if found along these road acres. The same applies for the rest of the proposed treatment acres – herbicide would be applied directly to individual plants scattered over the treatment area.

Two herbicides that are widely used are proposed for application here. They are glyphosate and triclopyr. The chemical and dosage were chosen because they minimize impacts to non- target organisms. The information presented in this section is from Risk Assessments prepared for the Forest Service by Syracuse Environmental Research Associates, Inc. (SERA), unless otherwise referenced. SERA Risk Assessments for individual herbicides may be found at: *http://www.fs.fed.us/foresthealth/pesticide/risk.htm*. Glyphosate would be applied by hand to cut surfaces or as a low volume foliar spray from backpack sprayers. Triclopyr would be applied either by hand to cut surfaces or as a thinline treatment to un-severed stems, using backpack sprayers. There is no broad application of herbicide with the proposed actions.

The herbicide glyphosate would be used to kill some of the non-native invasive woody species along the road and will be used for spot control on the hay-scented ferns. Glyphosate was selected for use in accomplishing these objectives because of its low risk to water quality. Typical Forest Service usage rate is two lbs. of acid equivalent (a.e.) per acre. Glyphosate has a low toxicity. In addition, the use of a 30-foot no herbicide treatment buffer along stream channel and measures restricting treatment weather (FW-100, Plan p. 2-29) would reduce the potential for impact to ground or surface water quality. Herbicide mobility depends on water solubility and absorption tendency. Glyphosate is soluble in water, with a half-life of 60 to 65 days. It degrades primarily through microbial action and not by sunlight. It has low potential for subsurface movement into streams due to moderate persistence offset by extreme absorption ability. The Final Environmental Impact Statement for Vegetation Management in the Appalachian Mountains (VMAM EIS, Appendix A) states that glyphosate is considered practically nontoxic to aquatic organisms. There would be little likelihood of it entering surface water by direct application or drift. Because it strongly adsorbs to soil particles and organic matter, it remains in the upper soil layers and is extremely unlikely to leach out of the soil profile and enter ground water.

The use of triclopyr with an adjuvant is proposed for basal bark application for the control of red and striped maple and other undesirable species such as Tree-of-heaven, Autumn Olive and Royal Paulownia. Triclopyr is metabolized by bacteria and photodegrades rapidly, resulting in a moderate half-life of 10 to 46 days with an average 30-day half-life. It has a moderately low toxicity and is relatively nontoxic to fish. In addition, the use of a 30-foot no herbicide treatment buffer along stream channel and measures restricting treatment weather (FW-100, Plan p. 2-29) would reduce the potential for impact to ground or surface water quality.

The design criteria that are a part of the proposed action are designed to minimize human health risks. Following all handling, application and safety instructions further reduces risks. Forest users may come into contact with herbicide-treated areas as they visit the forest. The area will be signed during treatment and will discourage use until the herbicides break down.

Forest workers actually applying the herbicides are exposed for longer periods and to more volume of herbicide than a casual forest visitor. At the typical Forest Service use levels the SERA Risk Assessments for glyphosate and triclopyr state that there is little potential risk to the health of workers and the general public. Glyphosate and triclopyr are rated low in toxicity to mammals.

There is no evidence of carcinogenic effect for Glyphosate, and it is classified as non-irritating or only slightly irritating to the skin and eyes. In tests for Glyphosate, birth defects have not been observed in test animals. Glyphosate in formulations without surfactant such as Accord is low in toxicity to terrestrial animals and birds, relatively non-toxic to bees, and low to moderately toxic to fish.

With the design criteria in place, the risk of ground or surface water pollution from herbicide application would be minimal. There would be no significant direct or indirect impacts on water quality from this herbicide use.

Log Truck Traffic –
FSR 945, VA State Routes 613 and 635, and WV State Route 17 would be signed that logging is occurring to alert forest users and area residents to expect logging truck traffic. Public safety would also be emphasized in the pre-operations meeting with the Purchasers of the timber sales.

Alternative 2
Under the no-action alternative, current management would continue. There would be no increased health hazard to forest users or workers beyond those hazards associated with recreating and working in a wildland environment and no potential for increased vehicle collisions due to additional logging traffic on the roads.

Alternative 3
Direct and indirect effects would be the similar in this alternative as for Alternative 1. However, there would be a reduction in post-harvest thinning acres treated by basal bark application of triclopyr from 275 acres to 215 acres.

Alternative 4
Direct and indirect effects would be the same in this alternative as for Alternative 1.

Cumulative Effects:
Alternative 1, 3 and 4
Only those herbicide treatments analyzed in the direct and indirect effects are planned on these project areas during the scope of this analysis. With the required Plan standards and guidelines regarding use and application, no herbicide is expected to leave the project area boundaries, and none is expected to enter these project areas from other projects. Cumulative effects to human health are not expected.

Alternative 2
There would be no cumulative effects to human health with the no action alternative.

CHAPTER 4 – PROJECT CONSULTATION AND COORDINATION

A. AGENCIES & ORGANIZATIONS CONSULTED

The Forest Service consulted the following Federal, state, and local agencies and organizations during the development of this EA:

Appalachian National Scenic Trail, National Park Service
Appalachian Trail Conservancy
Cherokee Nation
Eastern Band of Cherokee Indians
Giles County, VA, County Administrator
Monroe County, WV Commissioners
Shawnee Tribe, Tribal Historic Preservation Officer
United Keetoowah Band of Cherokee
U.S. Fish and Wildlife Service, Southwest Virginia and Virginia Field Offices
U.S. Fish and Wildlife Service, Division of Ecological Service, Elkins WV
Virginia Department of Game and Inland Fisheries
Virginia Department of Conservation & Recreation, Division of Natural Heritage
West Virginia Department of Natural Resources

B. FOREST SERVICE INTERDISCIPLINARY TEAM MEMBERS (* DENOTES THE CORE TEAM MEMBERS, MOST HEAVILY INVOLVED IN THIS ANALYSIS)

Tom Bailey, Soils Scientist*
Dave Bostic, Fire Management Officer
Erin Brown, Archaeologist
Fred Huber, Botanist
Bill Jackson, Air Resource Specialist
Dawn Kirk, Fisheries Biologist*
Sheryl Lyles, Landscape Architect/Recreation Manager
Mike Madden, Archeologist
Russ MacFarlane, Silviculturist
Mark Miller, Forester/Timber Management Assistant*
Ron Nixon, Fuels Specialist
Jesse Overcash, Wildlife Biologist*
Karen Overcash, Planner
Angela Parrish, Engineer*
Richard Patton, Hydrologist*
Melanie Pitrolo, Air Quality Specialist
Cindy Schiffer, District Ranger
Barb Walker, Editor

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