



United States  
Department of  
Agriculture

Forest  
Service

National Forests in North Carolina  
Pisgah National Forest  
Appalachian Ranger District  
Burnsville Station

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File Code: 1950-1

Date: October 3, 2008

Dear Interested Members of the Public and Forest Users:

Enclosed is the environmental assessment (EA) my staff has assembled to-date evaluating the Harmon Den Project on the Appalachian Ranger District, Pisgah National Forest. The project is located in Haywood County in the Harmon Den analysis area. Three alternatives have been developed and are currently being analyzed in detail; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. A decision will be made that selects one of these alternatives or a modification of one. While Alternative C has been identified as the preferred alternative, a final decision has not been made yet. I am seeking your input on this EA before I reach a decision.

In accordance with 36 CFR 215.6(a)(3), individuals or organizations wishing to be eligible to appeal must provide the following information: 1) Your name and address; 2) Title of the Proposed Action; 3) Specific substantive comments (215.2) on the proposed action, along with supporting reasons that the Responsible Official should consider in reaching a decision; and 4) Your signature or other means of identification verification. For organizations, a signature or other means of identification verification must be provided for the individual authorized to represent your organization.

In accordance with 36 CFR 215.6(2)(4), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizen-Times*. Oral or hand-delivered comments must be received within normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: [comments-southern-north-carolina-pisgah-appalachian@fs.fed.us](mailto:comments-southern-north-carolina-pisgah-appalachian@fs.fed.us); regular mail to: Appalachian Ranger District, Attn: District Ranger, PO Box 128, Burnsville, NC 28714; or faxed to 828-682-9179.

Please contact Michael Hutchins, Interdisciplinary Team Leader at 828-682-6146, or Ted Oprean, Project Leader at 828-877-3350 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

*/s/ Tina R. Tilley*

TINA R. TILLEY  
District Ranger

Enclosure





United  
States  
Department  
of  
Agriculture

Forest  
Service

October  
2008



# Environmental Assessment

## Harmon Den Project

Appalachian Ranger District, Pisgah National Forest  
Haywood County, North Carolina

# Harmon Den Project

## Environmental Assessment

Location of Action: Appalachian Ranger District  
Pisgah National Forest  
Haywood County, North Carolina

Lead Agency: USDA Forest Service

Responsible Official: Tina R. Tilley  
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Send Electronic Comments to: [comments-southern-north-carolina-pisgah-appalachian](mailto:comments-southern-north-carolina-pisgah-appalachian)

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# CHAPTER 1 – PURPOSE AND NEED

## 1.1 Background

This proposal is located in the 9,501 acre Harmon Den Forest Plan Analysis Area (AA) 19, which includes Compartments 451, 459, 460, 461, 470, 471, 472, 473, and 474 (acres derived by GIS). The Harmon Den AA is about 14 miles southwest of Hot Springs, North Carolina and about 25 miles northwest of Asheville, North Carolina (see Figure 1-1, Vicinity Map). There are several ways to access the AA: (1) via Interstate 40 to the Cold Springs Road (Forest Service Road – FSR) 148; (2) via Interstate 40 to North Carolina State Road 1338, to State Road 1334, to State Road 1182, and to FSR 148; or (3) from Hot Springs, North Carolina via State Road 209 to State Road 1175, to State Road 1881, and then to FSR 148. The Harmon Den AA is bounded by the Appalachian Trail and the North Carolina/Tennessee state boundary on the north, FSR 148 on the south and east, and Interstate 40 on the west. Additional project-level maps of proposed actions are located at the end of this Environmental Assessment (EA).

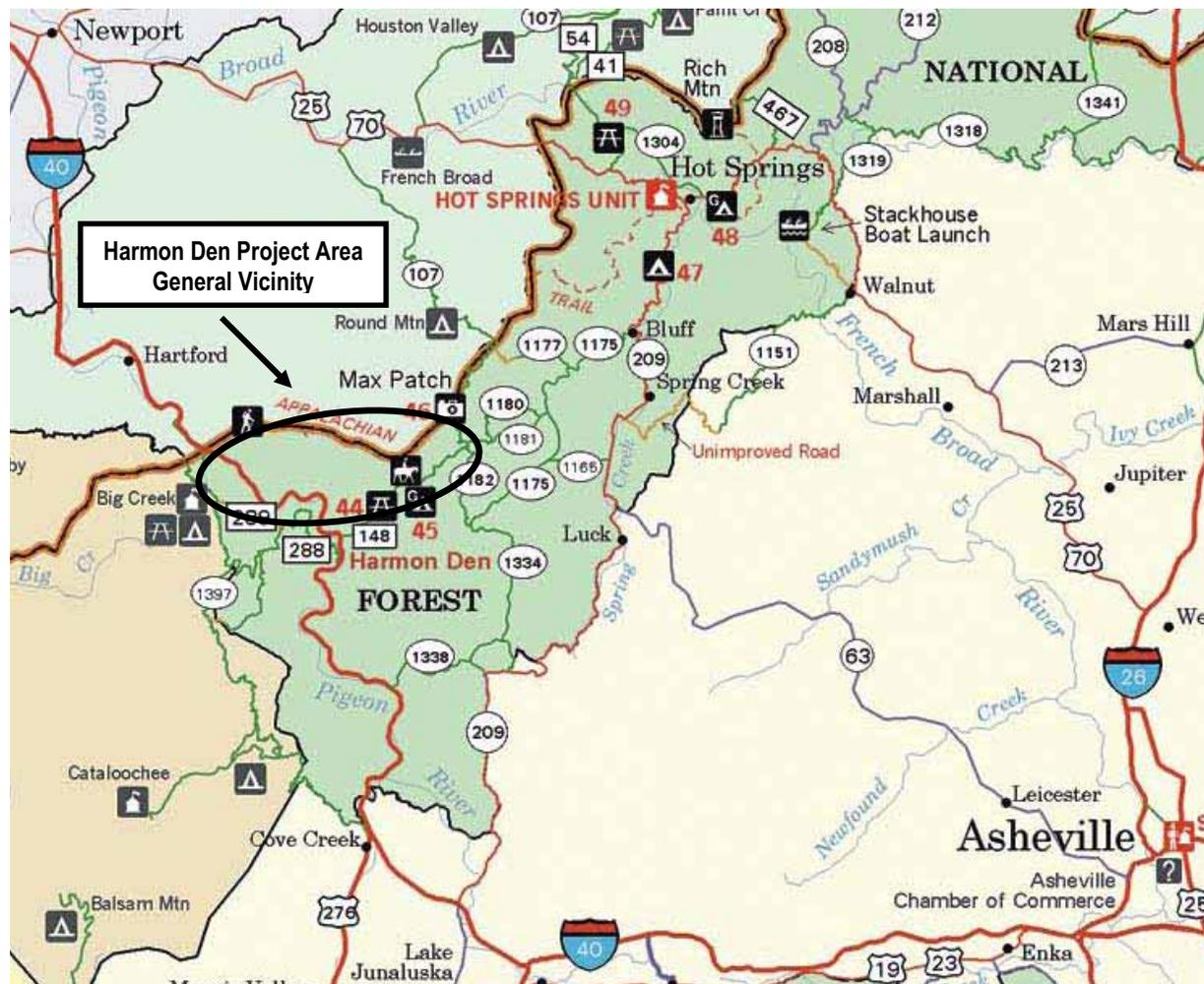


Figure 1-1: General Vicinity Harmon Den Project Area

### 1.1.1 Project Record

This EA tiers (40 CFR 1502.20) to the Final Environmental Impact Statement (FEIS) for the Nantahala and Pisgah National Forest Plan. This EA also incorporates by reference (1502.21) the project record. The project record contains specialist reports and other technical documentation used to support the analysis and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Nantahala and Pisgah Management Indicator Species (MIS) Report. This report along with Monitoring and Evaluation Reports for the National Forests in North Carolina contains the most current information about Forest population trends for MIS species.

### 1.2 Alternative B – Proposed Action

The Proposed Action (Alternative B) was developed to meet the Purpose and Need (Section 1.3 below). Maps of the proposal are located at the end of the EA. The following table summarizes harvest-related information for the Proposed Action:

**Table 1-1: Harmon Den Project Alternative B Harvesting Proposal**

Stand Number	Ac	Avg. Stand Age (CISC) <sup>1</sup>	Treatment (average reserve ft <sup>2</sup> of basal area/acre)	Harvest System <sup>2</sup>
451-7a	28	101	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Cable
451-7b	14	101	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Cable
451-12	39	101	Two-age (15-20 ft <sup>2</sup> )	Cable
451-22	12	80	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
459-10	15	79	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
459-12	38	83	Two-age (15-20 ft <sup>2</sup> )	Cable
460-6	25	82	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
460-10	25	82	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
461-2	31	81	Two-age (15-20 ft <sup>2</sup> )	Ground based
461-30	40	79	Two-age (15-20 ft <sup>2</sup> )	Cable
<b>Total Two-age</b>	<b>267<sup>3</sup></b>			
451-19	39	17	Overwood Removal (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
<b>Total Overwood</b>	<b>39<sup>3</sup></b>			

1 Continuous Inventory of Stand Conditions

2 Ground based includes tractor and/or rubber tired skidder

3 Harvesting would include developing about 12¼ acres total of log landings and skid roads within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested). Existing log landings and skid roads would be used where available. Skid roads and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction. Skid trails would be used where appropriate, but are different than skid roads because they do not have a blade used to cut into the soil – see definitions at end of Appendix A.

In addition, Alternative B would:

- Regenerate approximately 267 acres in Management Areas (MA) 2A, 3B, and 4D by the two-age harvest method (15-20 ft<sup>2</sup> basal area retained per acre and 25-30 ft<sup>2</sup> per acre in places for scenery) in (Compartment # - Stand #): 451-7a, 451-7b, 451-12, 451-22, 459-10, 459-12, 460-6, 460-10, 461-2, and 461-30. Two-age harvesting removes most trees, leaving some overstory trees so that two distinct ages of trees are maintained on the same site.

Overstory trees left should be long-lived since they may be expected to live 40 to 60 years or more.

- Stand 451-19 would be harvested by the overstory removal method (15-20 ft<sup>2</sup> basal area retained per acre). Overstory removal is a cut to release established regeneration from competition with the overwood.
- Use and maintain existing classified (system) roads through reconditioning and reconstruction which would include replacing undersized or damaged culverts, widening curves and improving drainage structures.
- Replace a damaged culvert on the Cold Springs Road (FSR 148) and Cherry Creek. Reintroduce brook trout above the culvert if rainbow trout are not identified in that reach of stream (completed in September 2008 under separate letter of direction). Other streams in the analysis area would be assessed during field review for potential brook trout reintroduction.
- Move the gate currently behind a wildlife field off the Cold Springs Road in Compartment 459 up to the Cold Springs Road.
- Add six existing non-system roads (about 3 miles) to the Forest's transportation system as D1 roads; add one existing non-system road (about 1/5 mile) to the Forest's transportation system as a D3 road; and add one existing non-system road (about 1/4 mile) to the Forest's transportation system as a D5 road (see Roads Analysis, Appendix G).
- Develop about 0.3 miles of temporary roads for harvest-related activities—following harvest-related activities it would be disked, seeded, and closed.
- Decommission two existing unclassified (non-system) roads in Compartments 460 and 461 for about 1/3 mile total.
- Decommission the Rube Rock Trail (TR 314) and the Groundhog Creek Trail (TR 315) between Interstate 40 and Skiffley Creek Road (FSR 357). The portions of the two trails between the Skiffley Creek Road and the Appalachian Trail would not be decommissioned.
- Close, decommission, and relocate dispersed campsite(s) between Cold Springs Creek and the Cold Springs Road to less sensitive area(s), where available. Close existing dispersed site in wildlife field near FSR 148 day-use parking area.
- Relocate the Cherry Creek Trail (TR 300) out of the riparian area to reduce potential for impacts to aquatic resources.
- Control/manage non-native invasive plant species (including garlic mustard) along roads with herbicides (Glyphosate and/or Triclopyr) and manual treatment (about 5 acres total).
- Perform Timber Stand Improvement (TSI) on approximately 694 acres of natural hardwood regeneration to ensure desired stocking density, species variety, and to control non-native invasive species in 23 stands with hand tools and herbicide using Triclopyr amine and ester formulations applied with the cut surface and streamline applications to release crop trees—non-native invasive species would be treated too.
- Site preparation for natural regeneration with herbicide and hand tools on an estimated 267 acres of regeneration harvest using Triclopyr ester and amine formulations with the cut stump and streamline application methods to ensure establishment of a satisfactory stand within five years after final harvest. All regenerated stands would be monitored for desired stocking density and species variety with a stocking survey conducted 3-5 growing seasons following site preparation. Small enrichment plantings with blight resistant American chestnuts or oaks may occur within hardwood regeneration areas on suitable sites if seedlings

become available. Grape arbors, if present ranging in size from 0.1 – 0.5 acres per 10 acres would be retained during the site preparation.

- Release natural regenerated hardwoods on an estimated 306 acres regenerated using a 20% Triclopyr ester formulation by streamline application method 1-3 years following site preparation to control stump sprouts and non-native invasive plants.
- Designate at least 51 acres of small patch old growth communities in Compartment 460.
- Prescribe burn about 500 acres between Cherry Creek, The Max Patch Road (SR 1182), and the Cold Springs Road in the eastern portion of the analysis area.
- Prescribe burn a 50 acre stand in Compartment 470 off the Skiffley Creek Road previously harvested in the Preacher Timber Sale. The stand was burned in 2005.
- Develop several ½ acre to 2 acre group selection openings in Stand 451-8 to enhance cerulean warbler habitat. Basal area would be thinned down to 50 ft<sup>2</sup> per acre in the rest of the stand.

### **1.3 Purpose and Need**

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There is a need to develop early successional habitat (ESH) for wildlife in the analysis area (AA) and a diversity of habitat for wildlife species, including cerulean warblers. Forest Plan standards are to provide at least 5% not to exceed 10% ESH in Management Area (MA) 2A; at least 5% not to exceed 15% ESH in MA 3B; and not to exceed 10% in MA 4D (Forest Plan, page III-31). Currently there is 0% ESH in MAs 2A, 3B, 4D from previous harvesting. The purpose of the approximately 306 acres of regeneration harvesting is to develop additional ESH in the project area and increase the amount of hard mast producing tree species (oaks and hickories). Related to harvesting for wildlife habitat development, there is also a need to schedule harvesting on regular intervals in each of these MAs to also provide for a sustainable supply of timber products (Forest Plan, pages III-68, III-75, and III-85). The last timber harvest project in the project area was more than eight years ago. The harvest of approximately 306 acres would produce timber products for local and regional economies. The purpose of developing several small group select openings in Stand 451-8 is to enhance cerulean warbler habitat.

There is a need to effectively and efficiently control/manage competing vegetation in stands regenerated with this proposal because competing vegetation reduces vigor and amount of desired tree species. The purpose of using hand tools and herbicides is to reduce competing vegetation and perform timber stand improvement within regenerated stands and improve vigor and growth of desired tree species, especially the oak and hickory hard mast species.

There is a need to efficiently and effectively control/manage populations of non-native invasive plants. Currently there are non-native invasive plants in the analysis area, including garlic mustard. The purpose of the herbicide and manual treatment of non-native invasive plants is to reduce potential for spread of them in the analysis area.

There is a need to improve water quality and aquatic habitat in the analysis area. Currently there are impacts to streams in the analysis area caused by recreation and roads. The purpose of decommissioning a non-system road; closing some dispersed campsites; replacing a culvert; reintroducing brook trout; moving a gate; placing some non-system roads onto the transportation system; and seasonally closing a trail to equestrian use is to improve water quality, stream bank stability, habitat, and species diversity.

There is a need to designate small patch old growth communities in Compartment 460 because no small patch old growth communities are currently designated in it. Currently there are 335 acres of large patch old growth community habitat (patch 17) and 133 acres of small patch old growth community habitat designated in the four compartments proposed for harvesting. The purpose of designating small patch communities in Compartment 460 prior to harvesting is to ensure there is a network of old growth communities across the Forest.

There is a need to reduce fuels and improve wildlife habitat diversity in the analysis area. Currently, excess fuel loads pose a threat to resources and wildlife habitat conditions are not being optimized in the analysis area. The purpose of prescribe burning up to about 550 acres in Compartments 451 and 470 is to reduce fuel loads and potential for future wildfires to burn with adverse impacts, while improving wildlife habitat diversity.

There is a need to ensure appropriate maintenance of approved trails occurs, users are able to safely access them, and impacts from trail use do not adversely affect aquatic resources. Currently there is access to the trails off Interstate 40 which is dangerous because the access is not approved for general public use. The purpose of decommissioning the portion of Trails 314 and 315 between Skiffley Creek Road and Interstate 40 is to reduce maintenance costs and remove the dangerous potential for accessing these trails from Interstate 40. Currently the Cherry Creek Trail (TR 300) is located very close to Cherry Creek, and erosion and sedimentation have been identified as a result. The purpose of relocating the Cherry Creek Trail away from Cherry Creek is to improve long-term aquatic resources.

### **1.3.1 Forest Plan Direction**

The Harmon Den proposal was developed to address management opportunities identified for timber, wildlife, aquatic, recreation, fire/fuels, and other forest resources within the analysis area. Management opportunities were identified through a comparison of existing conditions with desired future conditions defined by the General Direction and Standards for Management Areas (MA) 2A, 3B, 4D, and 18 in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (Forest Plan, USDA March 1994). The general direction and goals for MA 2A is to provide visually pleasing scenery, roads are generally open with adjacent forest land managed to provide a quality visual experience, and timber production is permitted (Forest Plan, page III-63). The general direction and goals for MA 3B is to emphasize a sustainable supply of timber with few open roads while permitting road construction for resource management and to manage habitat of mixed ages of forests primarily for wildlife species such as wild turkey, deer and other animals requiring similar environments (Forest Plan, pages III-63 and III-71). The general direction and goals for MA 4D is to emphasize high quality habitats for wildlife requiring older forests and freedom from disturbance from motorized vehicles. Small widely dispersed openings throughout the management area are allowed and most roads are closed to private motorized vehicles. In addition, early successional habitat is provided in conjunction with managing suitable timber land in these areas (Forest Plan, page III-78). Embedded within MAs 2A, 3B, and 4D is MA 18; which consists of the aquatic ecosystem, riparian ecosystem, and closely associated plant and animal communities and is actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems (Forest Plan, page III-179). Three other MAs are designated within the Harmon Den analysis area: MA 4C (visually pleasing scenery), MA 5 (backcountry recreation), and MA 14 (Appalachian Trail). No timber harvesting

is proposed in these MAs because they are not suitable for timber harvesting and no ground disturbing activities are proposed within them.

There are portions of two proposed North Carolina Natural Heritage Areas (NHA) in the Harmon Den analysis area: Pigeon River Gorge Macro Site and Snowbird Creek/Cedar Cliff. Harvesting is proposed in the eastern portion of the Pigeon River Gorge Macro Site proposed NHA, but not in the Snowbird Creek/Cedar Cliff proposed NHA. There are no Forest Plan Special Interest Areas, Inventoried Roadless Areas, or congressionally designated Wilderness or Wild and Scenic river designations in the analysis area.

## **1.4 Public Involvement**

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The proposal was listed in the January and April 2008 editions of the Schedule of Proposed Actions. The proposal was provided to the public and other agencies for comment during scoping beginning on February 26, 2008. An open house was hosted by employees of the Forest Service in Hot Springs, North Carolina on March 6, 2008.

Using comments received from the public, agencies, and organizations as well as internal review the interdisciplinary team (IDT) developed a list of issues to address, alternatives to analyze, and developed a new preferred alternative that responds to these issues.

## **1.5 Issues**

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Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, mitigation measures, or analyze environmental effects. The Forest Service separated issues into two groups: significant and other. All comments received have been reviewed and a determination on significance was made.

### **1.5.1 Water Quality and Aquatic Resources**

*Reconstructing roads and harvest-related activities may impact threatened, endangered, sensitive, Forest Concern, and Management Indicator aquatic species.*

- Non-significant because Forest Plan standards and best management practices (BMPs) would be implemented to reduce potential for adverse impacts and site-specific field verification. While effects to aquatic resources may occur, they are expected to be localized and minor and are not expected to result in impacts on population viability or a trend towards federal listing under the Endangered Species Act (ESA). The proposed culvert replacement and trout reintroduction is expected to improve fish habitat in the analysis area (AA).

### **1.5.2 Non-native Invasive Plants**

*Management activities may increase infestation of invasive exotic plants*

- Non-significant due to project design features. Based on previously completed projects of similar nature across the Pisgah National Forest, the design of the proposal (which includes treatments of non-native invasive plants) is expected to reduce the potential for additional non-native invasive plant infestations in the AA.

### 1.5.3 Botanical Resources

*Harvest related activities may have adverse impacts to threatened, endangered, sensitive, Forest Concern, and Management Indicator botanical species*

- Non-significant due to site-specific field verification. While effects to botanical resources may occur, they are expected to be localized and minor and are not expected to result in impacts on population viability or a trend towards federal listing under ESA.

### 1.5.4 Wildlife Resources

*Harvest related activities may impact threatened, endangered, sensitive, Forest Concern, and Management Indicator wildlife species and may not benefit cerulean warbler habitat*

- Non-significant due to site-specific field verification. While effects to wildlife resources may occur, they are expected to be localized and minor and are not expected to result in impacts on population viability or a trend towards federal listing under ESA.
- Significant – Alternative C has been considered that does not propose specific cerulean warbler habitat improvement (see Section 2.2.3, Chapter 2).

### 1.5.5 Cultural Resources

*Harvest related activities may impact cultural sites*

- Non-significant due to site-specific field verification and project design.

### 1.5.6 Soil Resource

*Harvest related activities may impact soils*

- Non-significant due to implementation of Forest Plan standards and guidelines and BMPs applied to soil mapping units identified with erosion hazard and project design.

### 1.5.7 Herbicide Use

*Herbicide use may impact wildlife, aquatic, botanical resources and humans*

- Non-significant – herbicides would be used under approved methods and in accordance with risk assessments and the vegetation management plan to reduce potential for adverse impacts to human health and safety, and the environment. Per Forest Plan direction, Alternative 2 that does not use any herbicides was considered (Section 2.3.2, Chapter 2).

### 1.5.8 Scenic Resources

*Harvest related activities may impact scenic resources, especially near the Appalachian Trail corridor*

- Significant – Alternative C has been developed to specifically address this issue (see Section 2.2.3, Chapter 2).

### 1.5.9 Old Growth Communities

*The proposal does not designate enough old growth communities in the analysis area*

- Significant – Alternative C has been developed to specifically address this issue (see Section 2.2.3, Chapter 2).

### **1.5.10 Prescribed Burning**

*The Cherry Creek prescribed burn may have unacceptable impacts to resources*

- Significant – Alternative 4 has been developed but not in detail that does not propose the Cherry Creek prescribed burn (see Section 2.3.4, Chapter 2).

### **1.5.11 Trail Use**

*The proposal to decommission the lower sections of the Groundhog Creek and Rube Rock Trails may adversely impact recreationists*

- Significant – Alternative C has been developed to specifically address this issue (see Section 2.2.3, Chapter 2).

### **1.5.12 Other Issues of Concern**

*Harvest activities may adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local law or requirements imposed for the protection of the environment*

- Non-significant – project does not propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment.

## CHAPTER 2 – ALTERNATIVES

### 2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.3), and by the issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more significant issue. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The IDT considered eight alternatives. Following internal review, three alternatives were considered in detail and five were eliminated from consideration in detail.

### 2.2 Alternatives Considered in Detail

#### 2.2.1 Alternative A – No Action

Under this alternative the proposed actions (Chapter 1, Section 1.2) would not occur. This alternative serves as the environmental baseline for analysis of effects.

#### 2.2.2 Alternative B – Proposed Action

A complete description of the Proposed Action can be found in Chapter 1, Section 1.2 above.

#### 2.2.3 Alternative C - Preferred

Alternative C was developed by the Harmon Den interdisciplinary team and members of the public in response to the scoping period. Alternative C proposes the following harvesting:

**Table 2-1: Harmon Den Project Alternative C Harvesting**

Stand Number	Ac	Avg. Stand Age (CISC) <sup>1</sup>	Treatment (average reserve ft <sup>2</sup> of basal area/acre)	Harvest System <sup>2</sup>
451-7a	21	101	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Cable
451-7b	11	101	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Cable
451-12	39	101	Two-age (15-20 ft <sup>2</sup> )	Cable
451-22	12	80	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
459-10	10	79	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
459-12	24	83	Two-age (15-20 ft <sup>2</sup> )	Cable
460-6	15	82	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
460-10	9	82	Two-age (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
461-2	31	81	Two-age (15-20 ft <sup>2</sup> )	Ground based
<b>Total Two-age</b>	<b>172<sup>3</sup></b>			
451-19	33	17	Overwood Removal (15-20 ft <sup>2</sup> – 25-30 ft <sup>2</sup> in places)	Ground based
<b>Total Overwood</b>	<b>33<sup>3</sup></b>			

<sup>1</sup> Continuous Inventory of Stand Conditions

<sup>2</sup> Ground based includes tractor and/or rubber tired skidder

<sup>3</sup> Harvesting would include developing about 8½ acres total of log landings and skid roads within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested). Existing log landings and skid roads would be used where available. Skid roads and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest

activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction. Skid trails would be used where appropriate, but are different than skid roads because they do not have a blade used to cut into the soil – see definitions at end of Appendix A.

Alternative C is similar to Alternative B with the following exceptions:

- 101 less acres would be harvested by the two-age method for resource considerations.
- Decommission the access on Interstate 40 (FSR 3522 in Compartment 461, about ¼ mile) to the Rube Rock Trail (TR 314) and the Groundhog Creek Trail (TR 315), and retain the Rube Rock Trail (TR 314) and the Groundhog Creek Trail (TR 315) between Interstate 40 and Skiffley Creek Road (FSR 357). Opportunities would be explored for volunteer recreation groups to maintain these sections of the trails.
- Site preparation for natural regeneration with herbicide and hand tools on an estimated 172 acres of regeneration harvest using Triclopyr ester and amine formulations with the cut stump and streamline application methods to ensure establishment of a satisfactory stand within five years after final harvest. All regenerated stands would be monitored for desired stocking density and species variety with a stocking survey conducted 3-5 growing seasons following site preparation. Small enrichment plantings with blight resistant American chestnuts or oaks may occur within hardwood regeneration areas on suitable sites if seedlings become available. Grape arbors, if present ranging in size from 0.1 – 0.5 acres per 10 acres would be retained during the site preparation.
- Release natural regenerated hardwoods on an estimated 205 acres regenerated using a 20% Triclopyr ester formulation by streamline application method 1-3 years following site preparation to control stump sprouts and non-native invasive plants.
- Develop a dispersed recreation site along FSRs 148 and 148H just east of the Harmon Den day-use parking area.
- Designate about 608 total acres of old growth communities in Compartments 459, 460, 461, 472, and 473 within Management Areas 3B (timber management), 4C (visually pleasing scenery), and 14 (Appalachian Trail Corridor) instead of the 51 acres proposed under Alternative B.
- The proposed development of cerulean warbler habitat would not occur.

## **2.3 Alternatives Considered but Eliminated from Detailed Study \_\_\_\_\_**

As per 40 CFR 1502.14(a), the following alternatives were considered but eliminated from detailed study:

### **2.3.1 Alternative 1 – Create Additional Early Successional Habitat**

This alternative proposed to develop additional early successional habitat than the proposed action as well as daylight around existing early successional habitat. This alternative was eliminated from detailed study because additional early successional wildlife habitat developed above that proposed in Alternative B is not necessary to meet resource objectives. In addition, daylighting around existing ESH would not provide high quality habitat because of existing equestrian use in the AA.

### **2.3.2 Alternative 2 – No Herbicide Use**

This alternative proposed to manage/control non-native invasive plants and competing vegetation without herbicides. It was considered because the Pisgah/Nantahala Forest Plan describes a

management requirement for considering an alternative that does not use herbicides (Forest Plan, page I-3). This alternative was evaluated and discussed by the Responsible Official and the ID Team. Instead of using herbicide to conduct timber stand improvement (TSI) and control/manage non-native invasive species, only mechanical slashing and/or manual treatment (e.g., hand-pulling) would be used. This alternative was not considered in detail because treatment with herbicide is known to be the most effective tool for TSI and non-native invasive treatments and typically requires one application. Mechanical slashing and manual methods, on the other hand, require repeated treatments and do not kill the targeted vegetation; this method of treatment is very expensive and has proven to be ineffective in controlling non-native invasives. Use of herbicides is necessary to effectively and efficiently control/manage non-native plants and competing vegetation (TSI or timber stand improvement). Use would be pursuant to product labels, Material Safety Data Sheets, and pesticide risk assessments. Effects of herbicide use are disclosed in Chapter 3 below.

### **2.3.3 Alternative 3 – Increase Prescribed Burning in the Western Portion of the Analysis Area**

This alternative proposed to prescribe burn additional acres in the western portion of the AA. It was eliminated from detailed study because safe implementation and control of prescribed fire in this portion of the AA is impossible due to excessively steep slopes, Interstate 40, private lands, and the Appalachian Trail (AT). Smoke management policies and logistics of using I-40 as a fire break are not practical. Past fuels reduction on 40 to 60 acres close to the interstate has proven to be inefficient for the cost. A wildfire in 1998 used I-40 as a fire break and proved to be very costly and unsafe. Using the interstate as a fire break would only work in emergency suppression situations and would require numerous resources.

### **2.3.4 Alternative 4 – No Prescribed Burning Near Cherry Creek**

This alternative did not propose prescribed burning near Cherry Creek due to concerns the burn is not suited to the ecology of the area; would have adverse impacts on scenery/aquatic habitat; and would put nearby landowners at risk. It was eliminated from detailed study because burning is necessary for habitat diversity and fuel reduction in the area. The proposed burning would not be “forced”. Fire would be applied in a backing formation (low intensity) from ridgetops downhill and during the dormant growing season. Low intensity, dormant growing season burns reduce tree mortality. It is expected that about 50% of the area would burn in a mosaic pattern due to mesic conditions—riparian areas are expected to have backing fire come down to them and go out. The nearby Max Patch area was prescribed burned in early April 2008 with minimal adverse impacts.

### **2.3.5 Alternative 5 – Retain Access to Trail 315 Along Interstate 40**

This alternative proposed to retain access to the Ground Hog Creek Trail (TR 315) along Interstate 40. Currently recreationists pull off of I-40 and park their vehicles while either accessing Trail 315 or entering the Ground Hog Creek culvert and pass under I-40 to access the Pigeon River. This alternative was eliminated from detailed study because of the increased risk of potential for death or serious injury of parking in an unauthorized area along I-40 and having recreationists accessing a culvert not intended for human use. Alternative C would ensure hiking recreationists can continue to access Trails 314 (Rube Rock) and Trail 315 from above. Fishing recreationists would be impacted from accessing the Pigeon River in this area, but other access

points to the river are available. The State Highway Patrol and Department of Transportation have both expressed concern about this access point off I-40. The Highway Patrol stated that within the I-40 Gorge: *[a]ny unauthorized uncontrolled access on any highway that requires controlled access to maintain a safe flow and transit for the public would add a bit of concern for safety of lives and property. We have a high amount of crashes in that area and do what we can to patrol the area with the limited resources available. The wall or crash barrier was placed there due to the protection of large truck crashes and to keep vehicles from crashing into oncoming lanes, thus, being unable to cross the median in that section to enforce speeding violations does hamper us somewhat to effectively reduce the speeding and crash factor, though we do place a trooper in the area to be seen as much as possible. I don't know how many years ago these pull offs were first designed, but considering the growing count of traffic that has increased on that portion of the I-40 Gorge in recent years has rated that section of Highway [Interstate] 40, one of the most deadliest section of interstate in the State of N.C. and possibly one of the deadliest sections of I-40 in the Nation. That area in the Gorge has certainly been rated the highest in Tractor Trailer crashes, which as you know present the largest cause of property damage and delay to the normal flow of traffic. In 2007 on I-40 in Haywood County there were 146 total crashes (2 fatal, 42 injured, and 102 with damage).*

## **2.4 Project Design Features and Monitoring**

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### **2.4.1 Project Design Features**

#### **Scenery (specific to Alternative C)**

1. 451-7a: drop portion in AT foreground
2. 451-7b: drop portion in AT foreground and retain at least 25 ft<sup>2</sup> basal area/ac in upper half of remainder
3. 451-19: leave no-cut buffer 150' each side of FSR 148 and Cherry Ridge Trail; no landings visible from road or trail in MA 2A foreground
4. 451-22: retain at least 25 ft<sup>2</sup> basal area/ac in MA 2A foreground
5. 459-10: move north and east boundary southwest of ridge where visible in AT foreground and retain at least 25 ft<sup>2</sup> basal area/ac in remainder of stand
6. 459-12: drop portion in AT foreground, and pull western boundary off ridge
7. 460-6: move northern boundary south of ridge and retain at least 30 ft<sup>2</sup> basal area/ac in remainder
8. 460-10: drop visible portions in AT foreground
9. 461-2: do not skid along Rube Rock Trail; cross in one location
10. Minimize improvements to system roads within the AT foreground, limit grading or cut/fill bank disturbance, and resurface with gravel only where roadbed is soft, wet, or unstable
11. In areas potentially visible from the AT or Cold Springs Road, coordinate locations of log and cable landings with Forest Landscape Architect

#### **Wildlife (Alternatives B & C)**

1. Priority for residual tree species is white oak, red oak, hickory, black oak, and chestnut oak where they occur
2. Retain two 12 inch diameter or greater black gum tree species for every 10 acres, where they occur

3. Retain approximately 70% of the canopy over boulder groups, defined as a minimum of 3 boulders that are each at least 5 feet in length within 5 feet of each other
4. Planning for the relocation of the Cherry Creek trail will involve the Forest Hydrologist, Pisgah Fisheries Biologist, and the Pisgah Wildlife Biologist
5. Retain ¼ acre grape arbors for every 10 acres of vegetation managed (harvesting, TSI, site preparation)

#### **Aquatics (Alternatives B & C)**

1. Trees accidentally felled across stream channels during harvesting (that prevent or block stream flow) would be lifted (when possible) away from the water. If this is not possible, each tree would be pulled away from the water where it fell and temporary decking would be used to support the weight of the tree as it is pulled across the channel. These removals would be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil would be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the stand is complete.
2. Skid roads would avoid stream crossings and paralleling perennial channels within designated riparian areas
3. Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement
4. Drainage on any temporary roads developed would be designed so water flows off the road bed and enters into vegetation rather than directly into activity area streams. In addition, silt fences, straw bales, or brush barriers would be placed along the length of the temporary roads where they parallel or cross a stream to control runoff and stream sedimentation.
5. Disc and seed all unsurfaced temporary roads, skid roads, and log landings following harvest activities

#### **Botany (Alternatives B & C)**

1. Known populations of *Miscanthus sinensis*, *Rosa multiflora* (multi-flora rose), *Ligustrum sinense* (Chinese privet), *Alliaria petiolata* (garlic mustard), and *Ailanthus altissima* (tree of heaven) would be controlled/managed prior to disturbance activities if funds are available to reduce possible adverse effect of invasive plant species (populations total less than 5 acres). Control of *Miscanthus sinensis*, *Rosa multiflora*, and *Ailanthus altissima* is most easily and effectively done by the use of herbicide (Glyphosate).
2. Native plants would be utilized in wildlife improvement and roadside erosion control

### **2.4.2 Monitoring**

The following monitoring is specific to Alternatives B and C:

1. Areas would be identified to monitor control/manage efforts as part of our efforts to meet national objectives of reducing impacts from non-native invasive species and improving the effectiveness of treating selected invasive species on the Nation's forests and grasslands. Survey areas would be identified before treatment, checked during treatment, and after treatment. Based on the monitoring results, follow-up treatments may be needed to meet objectives.

## 2.5 Summary Comparison of Actions by Alternative

The following table summarizes management activities within each of the alternatives analyzed in detail:

**Table 2-1: Comparison of Management Activities by Alternative**

Activity	Alternative A	Alternative B	Alternative C
Two-age harvest (acres)	0	267	172
Overstory removal harvest (acres)	0	39	33
Replace a damaged culvert on the Cold Springs Road (FSR 148) and reintroduce brook trout in Cherry Creek?	No	Yes	Yes
Move gate behind wildlife field on FSR 148 in Compartment 459?	No	Yes	Yes
Decommission two non-system roads (about 1/3 mile)	No	Yes	No
Decommission two non-system roads (about 1/3 mile) and system road 3522 off I-40 (about ¼ mile)?	No	No	Yes
Decommission Rube Rock Trail (TR 314) and Groundhog Creek Trail (TR 315) between I-40 and Skiffley Creek Road (FSR 3580)?	No	Yes	No
Close, decommission, and relocate where available dispersed campsites between FSR 148 and Cold Springs Creek as well as a dispersed site at a wildlife field?	No	Yes	Yes
Relocate Cherry Creek Trail (TR 300) out of riparian area?	No	Yes	Yes
New temporary roads to facilitate harvest-related activities (miles)	0	0.3	0.3
Place eight existing non-systems roads onto the Forest's transportation system (miles)	0	3.3	3.3
Designate old growth communities habitat (acres)	0	51	608
Control/manage non-native invasive plant species along roads with herbicides (Glyphosate and/or Triclopyr) and manual treatment (acres)	0	5	5
Perform timber stand improvement (acres)	0	694	694
Site prepare regeneration harvest stands with herbicide and hand tools within 5 years after harvest (acres)	0	267	172
Release natural regenerated hardwoods using herbicide (acres)	0	306	205
Prescribe burn between Cherry Creek and the Max Patch Road (SR 1182) (acres)	0	500	500
Prescribe burn a stand in Compartment 470 (acres)		50	50
Develop several ½ acre to two acre group selection openings in Stand 451-8 to enhance cerulean warbler habitat?	No	Yes	No

## CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

The following table displays past, present, and reasonably foreseeable future actions within and near the Harmon Den AA that would be accounted for in cumulative effects as appropriate by resource analysis (parameters for actions were determined by resource specialists for each activity):

**Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within the Harmon Den AA**

Activity	Description
<b>Timber Harvesting</b> (past/present/ foreseeable)	No timber harvesting in more than eight years (114 acres harvested under the Preacher Timber Sale 1999), none ongoing, and none proposed for at least 10 years after this proposal should it move forward
<b>Wildfire</b> (past)	Tunnel Ridge Fire, 127 acres in 1999
<b>Road Maintenance</b> (past/ present/ foreseeable)	General maintenance as needed every couple to few years (blading, ditch clearing, culvert cleaning)
<b>Private Lands</b> (past/present/ foreseeable)	None in the AA
<b>Special Uses</b> (present/ foreseeable)	Ongoing outfitter/guide activities include hiking, backpacking, llama trekking, and fishing. Several therapeutic "wilderness" camps throughout AA
<b>Recreation</b> (present/ foreseeable)	Hiking, bike riding, hunting, and horse back riding throughout the AA
<b>Habitat Improvement</b> (past/ present/foreseeable)	Mowing existing wildlife fields and linear openings (every few years)

### 3.1 Hydrology and Aquatic Habitat

#### 3.1.1 Existing Condition

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used as a historical reference. Project-specific surveys are conducted to obtain reliable data where none exists.

Substrate within the activity area waters (Table 3-2) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for proposed endangered, threatened, and sensitive (TES) species, management indicator species (MIS), as well as other aquatic organisms. Un-named tributaries are listed as (UT).

**Table 3-2: Forest Plan Watershed 32 (Pigeon River)**

Stream Name	Stand	Project Area (mi)	Analysis Area (mi)
Groundhog Creek			1.95
Chestnut Orchard Branch	460-10	0.36	1.43
UT 1	460-10	0.15	0.53
UT 2	460-10	0.15	0.60

Stream Name	Stand	Project Area (mi)	Analysis Area (mi)
UT 3	460-10	0.23	0.33
Rube Rock Branch	461-2		1.80
UT 1	461-2	0.30	0.83
UT 2	461-2	0.15	0.43
	461-30	0.30	
UT 3	461-2		0.20
Pounding Mill Branch	459-10	0.45	0.98
UT 1	459-10	0.30	0.38
	459-12	0.15	
Cold Springs Creek	451-22	0.45	7.05
UT 1	459-12		0.65
UT 2	451-12	0.38	0.98
	451-22	0.23	
UT 3	451-22	0.15	0.30
UT 4	451-12	0.15	0.38
	451-22	0.15	
UT 5	451-19	0.09	0.54
Cherry Creek	451-7A	0.23	1.88
UT 1			0.53
UT 2	451-7B	0.30	0.6
UT UT 2			0.15
UT 3	451-7B	0.23	0.30
<b>Total</b>		<b>4.9</b>	<b>22.82</b>

In the Harmon Den analysis area, landforms can be characterized as Valley Types I and II using the Rosgen (1996) classification. Typical for these valley types, the drainages in the area have predominantly stable stream types characterized as "A" and "B" depending on the valley type that they occur. These stream types are stable with a low sediment supply due to abundant stream side vegetation and gravel to boulder sized substrate.

Existing old roads and skid trails are existing potential threats to streams and drainages within the Harmon Den AA. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. In most cases, it is suspected that a majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams. In surveying the Harmon Den Project Area, the roads were generally in good, stable condition with a few exceptions. There were some drainage concerns on a few roads that would be corrected prior to haul activities. These include but are not limited to a drainage ditch concern on Forest Service Road (FSR) 148A; an undersized culvert with potential for undercutting on FSR 352; an undersized culvert in UT Cold Springs on FSR 3580A, which is emptying some water on to the road bed itself; another undersized culvert on FSR 3580A, which has water scouring under and around the existing pipe; and the spur road accessing Stand 451-22 which needs additional drainage culverts installed to correct standing water on the road.

A culvert located in Cherry Creek on the Cold Springs Road (FSR 148) is currently unstable and causing some erosion. The existing crossing is restricting non-native brown and rainbow trout from the upper reaches of Cherry Creek which is optimal as this creek has been identified for brook trout restoration (September 2008).

### 3.1.2 Effects Analysis

This discussion assumes all Forest Service timber sale contract clauses, North Carolina Best Management Practices (BMPs), and any other required management practices relating to water quality would be implemented successfully. Should an implemented contract clause or BMP fail during project implementation, immediate corrective action should be taken to reduce impacts to aquatic resources.

Effects are disclosed below for 1) access on aquatic resources; 2) timber harvest on aquatic resources, water quality, and riparian areas; and 3) effects of other resources (herbicide use, prescribed burning, trail relocation/decommissioning, dispersed campsite relocation/decommissioning, timber stand improvement (TSI), and site preparation).

#### 3.1.2.1 Effects of Access on Aquatic Resources

##### Alternative A – No Action

Implementation of the no action alternative would perpetuate the existing condition described above. Aquatic habitat quality, quantity, and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types.

##### Alternatives B & C

Alternatives B & C are discussed together because both alternatives require two stream crossing replacements.

**Direct Effects:** There are two existing stream crossings associated with access in Alternatives B & C. These include crossings to access Stand 451-22 in UT 2 Cold Springs Creek and Stand 461-2 in UT 1 Rube Rock Branch. Twenty-six linear feet of stream bed would be directly impacted by the installation of a pipe at each crossing (~50 feet total).

During culvert installations, there would likely be a temporary fluctuation of turbidity within the UTs to Cold Springs Creek and Rube Rock Branch. This turbidity would be minimized by the implementation of BMPs and Forest Practice Guidelines (FPGs). As a result, no measurable direct adverse impacts to aquatic habitat or organisms are expected to occur from the improvement of access into the area.

Drainage on any temporary roads developed would be designed so water flows off the road bed and enters into vegetation rather than directly into activity area streams. Following harvest activities, disc and seeding of all unsurfaced temporary roads, skid roads and log landings would occur.

**Indirect Effects:** A small quantity of sediments may enter UT 2 Cold Springs Creek and UT 1 Rube Rock Branch during culvert installation; however, these effects would not be measurable approximately 75 feet below the crossing or long-term. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installation would be immeasurable at the confluence with Cold Springs Creek and Rube Rock Branch respectively because the culvert installations would occur several hundred feet above the confluence. Additional culverts may be installed within aquatic AA waters as needed. The effects of these culverts would be the same as described for the culvert installations within UT 2 Cold Springs Creek and UT 1 Rube Rock Branch.

Sedimentation from culvert installations may reduce the quality of the coldwater streams habitats within the above mentioned tributaries by partially filling pools. These effects may persist until the next bank full flow event (the flow event which occurs approximately every 2.5 years). These impacts would affect approximately 0.06 miles of the 22.82 miles (0.26%) of coldwater streams within the aquatic AA.

During culvert installations, there would be a temporary fluctuation of sediment and turbidity. If needed, temporary stream crossings should be used across ephemeral channels to avoid the potential for sedimentation of aquatic resources down slope. These crossings could include the use of temporary bridges (e.g. simple log stringers or pre-fabricated decking), culverts, or channel armor (e.g. stone or brush). There may be off-site movement of soil into activity area waters from temporary road construction and drainage culvert placements.

Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas may temporarily be covered with sediments. This loss of individuals would be so minimal within the entire aquatic AA that it would not cause the decline of population trends and would not be a cause for viability to change across the National Forests. The project design features specific to aquatic resources for the Harmon Den Project (Section 2.4.1, Chapter 2) would minimize sedimentation; therefore, less mobile species that are affected by the implementation of this project would recolonize. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al.* 2001). Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Over time, these species would recolonize areas as habitat conditions improve. This usually occurs after vegetation has re-established and sediments are flushed through the system by storm events.

### **3.1.2.2 Effects of Timber Harvest on Aquatic Resources, Water Quality, and Riparian Areas**

#### Alternative A – No Action

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue.

#### Alternatives B, C, & D

**Direct & Indirect Effects:** Action alternatives B and C have been discussed together in regards to impacts to aquatic resources because riparian buffers have been delineated so that no impact to aquatic habitat will occur from harvest activities. In general, the greatest risk to aquatic resources is associated with access to the stands, which has been discussed above in Section 3.1.2.1.

North Carolina Forest Practices Guidelines (NC-FPGs) and Forest Plan standards (BMPs) would be implemented during harvest activities. Applications of Forest Plan standards are intended to meet performance standards of state regulations. Visible sediment derived from timber harvesting, defined by state regulations, should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures would be implemented as specified by state regulations. According to the NC Forestry BMP Implementation survey 2000 thru 2003: *[i]mplementation of BMPs is critical in protecting water quality.* Monitoring of BMP structures

on the English White Pine Project (on the Pisgah National Forest) occurred during a two inch rain event in the summer of 2007. Straw bales, mulching, and seeding had been installed two weeks prior to the event. The stream adjacent to the activity area was flowing clear and void of sediment from the associated activities; indicating that effective implementation of NC-FPGs and BMPs greatly reduces potential for adverse impacts on streams.

There is no plan to harvest within any 100 foot riparian area of perennial streams under the Harmon Den Project area. According to the Forest Plan: *Under these conditions, no increase in water temperature is anticipated under any of the alternatives. Since riparian-area treatment is not expected under any alternatives, availability of woody debris would be positively influenced if there was no harvest anywhere within the riparian zone on each streambank* (Vol. 1, page IV-36). The culvert installations for this project are associated with existing roads and therefore would not cause any disturbance to the existing riparian vegetation.

Water quality should not be adversely affected because Forest Plan standards and NC-FPGs are followed, and timber sale contract clauses are implemented. Stream temperatures would not be adversely affected because adequate shade would be maintained along perennial and intermittent streams. In the past, implementation of NC-FPGs has protected streams during similar actions. Long-term adverse impacts from these similar past actions have not been apparent. When failure of any BMP or NC-FPG has occurred it has been corrected immediately.

### 3.1.2.3 Effects of Other Activities

#### Alternative A

**Herbicide Use:** Exotic invasive plants will likely continue to invade riparian vegetation without the treatment of these species within the Harmon Den area.

**Prescribed Burning:** No prescribed burning will take place with Alternative A. Fuel loading would continue and could cause damage to riparian vegetation if a catastrophic wildfire occurred within the area.

**Trail Relocation/Decommissioning:** The existing Cherry Creek Trail (TR 300), Rube Rock Trail (TR 314) and Groundhog Creek Trail (TR 315) will remain open with Alternative A. This means the existing resource issues with these trails would continue. Cherry Creek Trail is the most impacting to aquatic resources at this time. A large portion of the existing trail is within the 100 foot riparian area of Cherry Creek. If Alternative A is selected, then the downslope movement of sediments from the trail would continue to deposit sediment into Cherry Creek.

Both the Rube Rock and Groundhog Creek trails have minor erosion issues however they both have long sections in riparian areas. The potential for these trails to cause erosion in Rube Rock Branch and Groundhog Creek would continue.

**Dispersed Campsite Decommissioning/Relocation:** Alternative A would retain the existing road side campsites along Cold Springs Creek open. Sites between Cold Springs Creek and Cold Springs Road (FSR 148) are currently compacted, void of vegetation and eroding into Cold Springs Creek. Sites would likely continue in this pattern releasing soil material into the stream during large storm events.

**Timber Stand Improvement (TSI) and Site Preparation:** No TSI work and/or site preparation will occur with alternative A. The existing condition described above would continue.

**Cerulean Warbler Habitat Enhancement:** Alternative A would not develop any wildlife or cerulean warbler openings. The existing condition of the proposed sites would continue.

### Alternatives B & C

Alternatives B and C will be discussed together as the majority of the “other activities” associated with the Harmon Den project are similar – amounts differ (Alternative C proposes additional road decommissioning, fewer harvested acres, fewer acres of herbicide, and no cerulean habitat developed as compared to Alternative B). If differences occur in the two alternatives in regards to impacts to aquatic resources they will be discussed. Timber Stand Improvement (TSI) work and site preparation does not occur within the 100 foot riparian area designated around perennial.

**Herbicide Use:** There would be no effects to coldwater streams community because the amount of herbicides in activity area waters would be immeasurable. In accordance with the Vegetation Management Final Environmental Impact Statement (VM-FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide Triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of Triclopyr can be lethal at concentrations of 91 ppm (VM-FEIS). Concentrations of Glyphosate at 24 ppm can be lethal to some aquatic organisms (VM-FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to Imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations  $\leq 0.0072$  ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in approximately 65 days (VM-FEIS). The 30 foot buffers would prevent the Estimated Environmental Concentrations of Glyphosate or Triclopyr from reaching the  $LC_{50}$  (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM-FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (33 feet) resulted in concentrations of  $\leq 0.0072$  ppm. These concentrations are too low to produce the lethal or sub lethal effects described above. Treatment area streams would be protected by a 30 foot buffer (minimum) which would prevent the concentrations of these herbicides from accumulating within the treatment area streams in measurable quantities.

**Prescribed Burning:** There are two prescribed burns planned for the Harmon Den Project. The Cherry Creek burn is approximately 500 acres and utilizes existing roads for containment. The other is a rotational prescribed burn off Skiffley Creek Road that uses natural features to minimize the need for line construction. Both burns are “rotational” which means they would occur as frequently as every three years. These burns would occur in the late winter to early spring season. These are usually low intensity burns, which do not destroy enough of the soil layer to produce large amounts of ash. Riparian areas are generally moist enough that the fire would burn out and riparian vegetation would not be destroyed. The fires are not expected to burn through the riparian areas to the edge of streams. This would provide buffer areas large enough to filter any off-site movement of ash.

Nutrient input may increase through groundwater in analysis area waters from the burned areas. This would be a short-term effect that could have a positive influence on the aquatic resource because cold water mountain streams are typically nutrient poor. The nutrients from the ash could boost aquatic insect communities within perennial streams within the treatment area.

**Trail Relocation/Decommissioning:** The existing Cherry Creek (TR 300), Rube Rock (TR 314), and Groundhog Creek Trails (TR 315) have resource concerns on portions of them, specifically within riparian areas. The action alternatives address these issues by either relocating them out of riparian areas (Cherry Creek Trail) or improving areas impacted and increasing maintenance on them (Rube Rock and Groundhog Creek trails). These actions would prevent any further movement of soil into activity and AA streams prior to re-establishment of vegetation.

Long-term, the benefits of relocating and/or improving sections of these trails would far outweigh any short-term impacts of the decommissioning and repair process. Especially in Cherry Creek where Cherry Creek Trail has many source areas for off-site movement of soil into the stream from equestrian use. By repairing or relocating these trails, habitat within Rube Rock Branch and its tributaries, Groundhog Creek and its tributaries, and Cherry Creek would improve as the riparian areas of these streams heal.

**Dispersed Campsite Decommissioning/Relocation:** The existing road side camping areas located between FSR 148 and Cold Springs Creek are heavily used. The sites on Cold Springs Creek are causing aquatic resource damage, primarily erosion of stream banks. Both action alternatives address this issue by closing and decommissioning sites that are causing resource damage. The new sites would be moved to areas that are at least 100 feet away from perennial streams, where there are reduced risks to aquatic resources. Habitat within Cold Springs Creek would improve as these sites re-establish vegetation and erosion issues cease.

**TSI and Site Preparation:** No TSI work and/or site preparation would occur within the 100 foot riparian area of any AA streams. Therefore, there would be no impacts from TSI or site preparation activities to aquatic resources within the area.

**Cerulean Warbler Habitat Enhancement** (specific to Alternative B): Proposed cerulean warbler openings would occur outside the 100 foot riparian area of perennial streams. As a result, there would be no risk to aquatic resources from this activity.

#### **3.1.2.4 Cumulative Effects**

Cumulative effects on aquatic species and habitat are the integration of any direct or indirect effects into the existing condition—and include past, present, and future actions, including those not occurring on NFS lands. Most often, cumulative effects are seen as either a degradation or improvement of an already impacted situation, but they can also be the first step in the degradation or improvement process. Cumulative effects on aquatic habitats and populations from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

##### Alternative A

As there are no direct or indirect effects with Alternative A, there would be no cumulative effects.

## Alternatives B & C

Expected cumulative effects should not be any greater than the direct and indirect effects disclosed above for each alternative and there should be no adverse cumulative effects to AA aquatic resources, based on the project's design features included in this analysis.

Remnants of the past timber activities where access was associated with the projects are in many cases on-going contributors to adverse impacts to aquatic resources. In general, undersized culverts and degraded stream crossings cause constant sources of problems for aquatic resources including unstable stream banks and channelization. Within the AA for Harmon Den, solutions to these problems have been addressed where they were discovered during field surveys. There are places within riparian areas of this project area that have historically been harvested. However, as these areas continue to grow older, conditions should improve as large woody debris input into analysis area streams returns to a more natural state.

Existing trails or roads with problems that are inside cutting units will be addressed with the Harmon Den project and roads being added to the system with this project will be repaired.

The closure and relocation of Cherry Creek Trail, the repair of some existing issues on the Harmon Den AA roads, and the closure of dispersed campsites along Cold Springs Creek may cumulatively improve aquatic habitat within the area. All of these projects will improve riparian area health along AA streams and will therefore benefit the stream systems.

## **3.2 Wildlife Habitat**

The wildlife effects were evaluated over Forest Plan AA 19 (9,501 acres). Additional analyses on wildlife are located in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)], and; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species] of this document. The following tables disclose existing forest habitat and age-class distribution in the AA.

**Table 3-3: Existing Forest Types within the Harmon Den Wildlife AA**

<b>Species/Forest Type</b>	<b>Acres (CISC)</b>	<b>% of AA</b>
White Pine	109 ac	1%
White Pine/Cove Hardwood	88 ac	>1%
Pitch Pine & Oak	47 ac	>1%
Virginia Pine & oak	135 ac	1%
Yellow Pine (pitch & Virginia)	62 ac	>1%
Cove Hardwoods/White Pine/Hemlock	113 <sup>1</sup> ac	1%
Yellow Poplar	39 ac	>1%
Yellow Poplar/White Oak/Red Oak	2,378 <sup>2</sup> ac	25%
White Oak	47 <sup>1</sup> ac	>1%
White Oak/ Red Oak/ Hickory	4,383 <sup>1</sup> ac	48%
Chestnut Oak/Scarlet Oak/Yellow Pine	583 <sup>1</sup> ac	6%
Scarlet Oak	152 <sup>1</sup> ac	1%

Species/Forest Type	Acres (CISC)	% of AA
Chestnut Oak/Scarlet Oak	680 <sup>1</sup> ac	7%
Sugar maple – Beech – Yellow Birch	181 ac	2%
Brush Species	15 ac	>1%
Non-forested <sup>3</sup>	316 ac	3%
<b>Total</b>	<b>9,328 ac<sup>4</sup></b>	<b>100%</b>

1 High quantity hard mast = 5,845 acres (63%)

2 Medium quantity hard mast = 2,491 acres (27%)

3 Non-forested acres include interstate I-40 and open, state roads

4 Acres are different than GIS acres due to undesignated acres in CISC

**Table 3-4: Age Class Representation and Proposed Change by Alternative**

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA
Non-forested acres <sup>1</sup>	316 ac	3%
0-10 age – Early Successional	0 ac	0%
11-20 age – Early Successional	392 ac	4%
21-39 age – Mid Successional	369 ac	4%
40-100 age – Mature Forest	7,143 ac	77%
101+ age – Old Forest	1,092 ac	12%
<b>Total</b>	<b>9,312 ac<sup>2</sup></b>	<b>100%</b>
Grass/forb habitat (High Quality <sup>3</sup> )	16.2 ac	>1%
Grass/forb habitat (Low Quality <sup>4</sup> )	29.9 ac	>1%

1 Non-forested acres include interstate I-40 and open, state roads

2 Acres are different than GIS acres due to undesignated acres in CISC

3 D5 road classification – hiking only

4 D1 & D3 road classification – horse and bike use allowed

## 3.2.1 Effects Analysis

### 3.2.1.1 Alternative A – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

Under this alternative, the early successional habitat (ESH; 0-10 years) would remain at 0 acres and the grass/forb openings would also remain at 0.49%. The Forest Plan standard for early successional habitat is at least 5% not to exceed 10% ESH in Management Area (MA) 2A; at least 5% not to exceed 15% ESH in MA 3B; and not to exceed 10% in MA 4D (Forest Plan, page III-31). The Forest Plan standard for grass/forb openings is 0.5% in these MAs (Forest Plan, page III-23). Under this alternative habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with other activities listed in Table 3-1 above.

### 3.2.1.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

The following tables disclose the forest types and age class distribution by action alternative (refer to Section 3.8 below for further discussion of effects to wildlife habitat and Appendix B for further discussion on age-class distribution):

**Table 3-5: Forest Type Proposed Changes by Action Alternative**

Species/Forest Type	Acres (CISC)	% of AA	Alt B	Alt C
White Pine	109 ac	1%	20 ac or 18%	
White Pine/Cove Hardwood	88 ac	>1%		
Pitch Pine & Oak	47 ac	>1%		
Virginia Pine & oak	135 ac	1%		
Yellow Pine (pitch & Virginia)	62 ac	>1%		
Cove Hardwoods/White Pine/Hemlock	113 <sup>1</sup> ac	1%		
Yellow Poplar	39 ac	>1%		
Yellow Poplar/White Oak/Red Oak	2,378 <sup>2</sup> ac	25%	93 ac or 4%	72 ac or 3%
White Oak	47 <sup>1</sup> ac	>1%		
White Oak/ Red Oak/ Hickory	4,383 <sup>1</sup> ac	48%	193 ac or 4%	133 ac or 3%
Chestnut Oak/Scarlet Oak/Yellow Pine	583 <sup>1</sup> ac	6%		
Scarlet Oak	152 <sup>1</sup> ac	1%		
Chestnut Oak/Scarlet Oak	680 <sup>1</sup> ac	7%		
Sugar maple – Beech – Yellow Birch	181 ac	2%		
Brush Species	15 ac	>1%		
Non-forested <sup>3</sup>	316 ac	3%		
<b>Total</b>	<b>9,328 ac<sup>4</sup></b>	<b>100%</b>	<b>306 ac (3.3%)<sup>5</sup></b>	<b>205 ac (2.2%)<sup>5</sup></b>

- 1 High quality hard mast = 5,845 acres (63%)
- 2 Medium quality hard mast = 2,491 acres (27%)
- 3 Non-forested acres include interstate I-40 and open, state roads
- 4 Acres are different than GIS acres due to undesignated acres in CISC
- 5 Percentage based on 9,312 CISC acres for Harmon Den AA

**Table 3-6: Age Class Representation and Proposed Change by Action Alternative**

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA	Alt B	Alt C
Non-forested acres <sup>1</sup>	316 ac	3%		
0-10 age – Early Successional	0 ac		+306 <sup>2</sup> ac/ 4.5%	+205 <sup>2</sup> ac /4%
11-20 age – Early Successional	392 ac	4%		
21-39 age – Mid Successional	369 ac	4%		
40-100 age – Mature Forest	7,143 ac	77%	- 228ac / 3%	-134 ac / 2%
101+ age – Old Forest	1,092 ac	12%	-78 ac / 7%	-71ac / 6.5%
<b>Total</b>	<b>9,312 ac</b>	<b>100%</b>	<b>306<sup>1</sup></b>	<b>205<sup>1</sup></b>
Grass/forb habitat (High Quality <sup>3</sup> )	16.2 ac	>1%	+6.4 ac	+6.8 ac
Grass/forb habitat (Low Quality <sup>4</sup> )	29.9 ac	>1%	No change	No change

- 1 Non-forested acres include interstate I-40 and open, state roads
- 2 Includes overstory acres of mature over 17 year regeneration
- 3 D5 road classification – hiking only
- 4 D1 & D3 road classification – horse and bike use allowed

Creation of ESH and Soft Mast Production

Alternative B creates about 306 acres of ESH, which equates to about 3.3% of the Harmon Den analysis area (AA). Alternative C creates about 205 acres of ESH, which equates to about 2.2% of the AA. Development of ESH moves habitat in the AA towards the desired future condition for white tailed deer, eastern wild turkey, ruffed grouse, and other wildlife species dependent on ESH. Alternative B creates about 101 more acres of ESH than Alternative C. Since Alternative

B creates more ESH, it best moves the AA towards the Forest Plan's desired future condition for ESH.

#### Creation of Grass/Forb Habitat

Alternative B would create 6.4 additional acres of grass/forb habitat, which equates to about 0.56% of the AA when combined with the existing 46.1 acres of grass/forb habitat. Alternative C would create 6.8 additional acres of grass/forb habitat, which equates to about 0.57% of the AA when combined with the existing 46.1 acres of grass/forb habitat. Alternative C better moves the AA towards the Forest Plan's desired condition for grass/forb habitat than Alternative B.

#### Hard Mast Production

The creation of ESH has the effect of setting back the age of the stands treated. Alternatives B and C regenerate mature forest – Alternative B regenerates about 101 additional acres over Alternative C. In the case of hard mast producing forest communities – those with abundant oaks and hickories – hard mast production would be reduced until the young, regenerating trees again reach mast producing age. Hard mast production in the AA would be temporarily reduced on about 306 acres in Alternative B and about 205 acres in Alternative C; however, the reduction would be minimized because project design features prioritize retention of available hard mast producing species (Section 2.4.1, Chapter 2).

#### **3.2.1.3 US Fish and Wildlife Service Species of Concern**

The approximate 4,945 acre forest interior patch #24 (bird patch) is located on the northwest portion of the AA. Neither action alternative would affect the interior quality of this patch by the proposed harvest on the eastern edge of patch #24. The US Fish and Wildlife Service (USFWS) has listed bird species of conservation concern within the Southern Blue Ridge physiographic area. There were eight birds of concern species recorded across this AA: wood thrush, Kentucky warbler, Swainson's warbler, worm-eating warbler, Louisiana water thrush, olive-sided warbler, whip-poor-will, and the Acadian flycatcher (see MIS Section 3.8 below for the Acadian flycatcher).

#### Olive-sided Flycatcher & Whip-Poor-Will

There is a recording of the olive-sided flycatcher in the AA, but it is presumed to be a misidentification because it was recorded once over 1,380 bird points and the willow flycatcher was commonly recorded at points across the AA. The whip-poor-will was also only recorded once on the 1,380 points over more than a three year time frame and is also presumed to be a misidentification.

#### Wood Thrush & Worm-Eating Warbler

The USFWS does not identify the wood thrush and worm-eating warbler as priority species for conservation because of high populations recorded within the region. Partners-in-Flight (PIF) recommends these species be dropped from the birds of concern list and are not of local conservation interest.

The worm-eating warbler is often found in steep areas with a thick rhododendron and laurel shrub layer. The canopy trees they favor are oak, hickory, white pine, and hemlock according to the Audubon Society and there are approximately 7,100 acres (75%) of this preferred habitat type in the AA. Alternative B would regenerate 3.2% of the habitat and Alternative C would

regenerate 2.2% of the habitat. As a result, the majority of habitat preferred by this species within the AA would not be affected by the action alternatives.

The wood thrush is found in moist cove forests where deciduous shrubs and saplings occur. The AA contains 201 acres of this species preferred forest type. Neither Alternative B nor Alternative C proposes to treat this habitat so there would be no potential adverse effects to the thrush from harvesting. Past wildfires were, for the most part, on dry ridges in the northwest portion of the AA. The proposed 550 acres of prescribed burning would not adversely impact moist coves so shrubs within these areas would not be affected. As a result, the majority of habitat preferred by this species within the AA would not be affected long-term by the action alternatives.

Recent research (Vitz 2006) found both worm-eating warbler and wood thrush were utilizing the interior of clearcuts from 10-22 acres in size during post-breeding. This research tested several widely held theories regarding the mature forest or forest interior bird guilds that resulted in their conclusion that a mosaic of successional stages holds the greatest promise for this bird guild.

There are 863 acres of riparian habitat which may not always be defined as a cove forest type. The proposed Cherry Creek Trail relocation would not directly impact this species and may improve the surrounding riparian habitat over time. As a result, the majority of habitat preferred by this species within the AA would not be affected long-term by the action alternatives.

#### Swainson's Warbler & Louisiana Water Thrush

The Swainson's warbler was recorded at five bird points across the AA and the Louisiana water thrush was recorded at 16 points across the AA. The Swainson's warbler is considered the rarest in the Southern Blue Ridge physiographic area. Both species are tied to riparian habitat in the mature forest community and there are approximately 863 acres of this riparian habitat within the AA. No harvesting is proposed within this habitat; however the proposed Cherry Creek Trail relocation and decommissioning of dispersed campsite(s) near Cold Springs Creek are proposed within riparian areas. These actions are expected to improve riparian habitat conditions over time for both species.

#### Kentucky Warbler

The USFWS considers the Kentucky warbler similar to the wood thrush in that it is not a priority species for conservation due to high populations recorded within the Southern Blue Ridge physiographic area. The PIF recommends these species be dropped from the birds of concern list and are not of local conservation interest. This species prefers mature forest communities and was recorded at 16 bird points across the AA. Alternative B would affect 3% of mature forest habitat and Alternative C would affect 2% of this habitat. Because so little mature forest habitat would be harvested in the AA, neither action alternative would adversely affect the Kentucky warbler.

### **3.3 Non-native Invasive Plants**

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#### **3.3.1 Existing Condition**

There are 124 species of non-native plant species documented to occur on the Pisgah and Nantahala National Forests (Danley and Kauffman). An increase of non-native plant species in the proposed activity area is expected. Many of these species, both native and non-native, have benefits for wildlife and erosion control. However, as succession progresses, most ruderal

species tend to become much less prevalent and generally do not persist in the area. Most ruderal plant species are expected to decrease to non significant population levels within ten years after the initial disturbance.

The persistence of most non-native plant species is not considered desirable to natural ecosystem health. There are primarily two ways in which non-native plant species may persist in the forested ecosystems: (1) non-native plant species may persist by the introduction of an “invasive non-native species” to the ecosystem, or (2) by modification of the ecosystem in such a way that an invasive species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah Nantahala National Forest, 25 are currently recognized as having aggressive invasive qualities that can dominate local communities (Danley and Kauffman, Regional Foresters, May 2001, List of Invasive Exotic Plant Species).

Surveys for invasive species were conducted (2007) within the activity areas and around roads to the activity areas. Eleven species on the Regional Forester’s non-native invasive plant species are known within the AA (see table below). It is recommended that the known populations of *Miscanthus sinensis*, *Rosa multiflora*, *Ligustrum sinense*, *Paulownia tomentosa*, *Alliaria petiolata*, and *Ailanthus altissima* be controlled to mitigate possible adverse effect of invasive plant species to this proposal (see management recommendation given below). The invasive plants *Microstegium vinineum*, *Lonicera japonica*, and *Allium vineale* are so well established in parts of the AA that eliminating them by any currently known method is impractical.

The populations of *Lespedeza cuneata*, *Lolium arundinaceum* and *Coronilla varia* are not known to be invasive within natural forested communities within the mountains. While *Lespedeza cuneata*, *Lolium arundinaceum* and *Coronilla varia* may be invasive in Coastal Plain, Piedmont regions and rare natural areas (i.e. serpentine glades), they are not expected to be a concern in this proposal and/or the AA as they are not known to be invasive within natural forested communities within the mountains. Therefore, it is not recommended that these species be controlled.

**Table 3-7: Non-native Invasive Species Summary**

Species	Regional Category	Location in Project Area	Recommendation
<i>Ailanthus altissima</i> Tree of heaven	1	Scattered along FSRs 357, 148 and spur roads.	Control all populations (if found) prior to disturbance on FS land
<i>Rosa multiflora</i> Multi-flora rose	1	Scattered along FSRs 357, 148, 3533 and spur roads. Especially in the Cold Springs area	Control all populations along FSRs
<i>Celastrus orbiculatus</i> Oriental bittersweet	1	Not found	N/A
<i>Lespedeza cuneata</i> Sericea	1	Wildlife Fields, roadsides	This species does not display invasive tendencies. Not recommended to control.
<i>Paulownia tomentosa</i> Princess tree	1	Scattered along FSRs 357, 148 and spur roads.	Control all populations prior to disturbance on FS land
<i>Ligustrum sinense</i> Chinese privet	2	Not found	Control all populations prior to disturbance on FS land
<i>Lolium arundinaceum</i> Tall fescue	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control.

Species	Regional Category	Location in Project Area	Recommendation
<i>Lonicera japonica</i> Japanese honeysuckle	1	Alluvial Forests, Cold Springs Creek bog Roads Etc.	No practical effective control method known. No recommendation to control.
<i>Microstegium vinineum</i> Japanese stiltgrass	1	Mostly in Alluvial Forests and coves. Very well established bottoms.	No practical effective control method known. No recommendation to control.
<i>Miscanthus sinensis</i> Plume grass	2	Along FSRs. Very scattered populations	Control all population prior to disturbance on FS land
<i>Allium vineale</i> Field garlic	1	Wildlife Fields, roadsides	This species does not display invasive tendencies. Not recommended to control
<i>Coronilla varia</i> Crown vetch	2	Found only along system roads	This species does not display invasive tendencies. Not recommended to control
<i>Alliaria petiolata</i> garlic mustard	2	Scattered along FS road 357, 148 and spur roads.	Control all population prior to disturbance on FS land

\* Regional categories have specific legal ramifications as per Regional Forester memo dated May 2001

### 3.3.2 Alternative A – Direct, Indirect, and Cumulative Effects

Existing conditions and trends continue. Under this alternative no actions are proposed. There would be no potential increase in non-native invasive plant species as a result of ground disturbing actions. However, there would also be no control measures implemented to reduce the continued spread of these species. Based on observations across the Forest, it is expected that non-native invasive plant species would continue to increase in the analysis area. There are no other known foreseeable actions in the activity areas that could affect spread or control/management of non-native invasive plants.

### 3.3.3 Alternatives B & C – Direct, Indirect, and Cumulative Effects

Each alternative proposes to control/manage non-native invasive species on about five acres using both manual and chemical applications (see also Section 1.2, Chapter 1; Section 2.2.3, Chapter 2; and Appendix F for more specific implementation details). Each alternative also proposes to monitor treatment effectiveness to determine if follow-up treatments are necessary (Section 2.4.2, Chapter 2).

It is expected that there would be a temporary increase of ruderal (weedy) species of plants under all alternatives. Of the action alternatives, Alternative B would result in about 306 acres of disturbed area for the increase in ruderal species and Alternative C would result in about 205 acres of disturbed area for the increase in ruderal species. These species are often prevalent during the initial stages of succession. This is particularly true near constructed roads and log landings. Because Alternative B would have more harvesting and landings/skid roads compared to Alternative C (about 101 more harvest acres and 4 more acres of landings/skid roads respectively), the amount of area exposed to non-native invasive species is higher than Alternative C. A high percentage of these ruderal species are non-native. A temporary increase of non-native plant species in the proposed activity areas is expected. Many of these species have benefits for wildlife and erosion control. However, as succession progresses, most ruderal species tend to become much less prevalent and generally do not persist or spread to other areas.

Furthermore, the action alternatives include requirements for monitoring and treatment of non-native invasive species as needed to control/manage them in the AA.

Non-native invasive plants persist in the area by continual disturbance. For example, a maintained road shoulder or wildlife field often has persistent ruderal and non-native plant species. These areas are often maintained in an early successional state for wildlife or human benefit. Therefore, it is expected that this proposal could increase the persistence of non-native vegetation in the analysis area. Because it disturbs more acres, Alternative B would have more potential increases in non-native invasive plants than Alternative C; however, pre-treatment of existing non-native invasive species along with monitoring and follow-up treatment are expected to reduce adverse increases and effects of these plants in the analysis area. To further help reduce this effect, native plants would be utilized in wildlife improvement and roadside erosion control plantings. It is recognized that erosion control and wildlife production are the primary goals of seeding areas and some non-native invasive plant species may be highly beneficial at accomplishing these goals. However, Presidential Executive Order 13112, Title 3 recognizes the need to reduce the impact of non-native species by reducing the amount in which non-native plant species are planted on federal property. Goals of erosion control, wildlife production, and encouragement of native plant species may be met by planting native plant species or a suitable mixture of native and non-native mixture of species.

### 3.4 Herbicides

#### 3.4.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to wildlife, water quality, and humans as related to herbicide use as none would be applied. The existing condition would remain the same; invasive and invasive exotic plant species would likely continue to spread in the AA. There are no other known foreseeable actions in the activity areas that could affect herbicide use.

#### 3.4.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects

The following table displays expected maximum acreages of herbicide treatment (Glyphosate and Triclopyr) that may occur:

**Table 3-8: Maximum Acres of Pesticides Applied Manually by Alternative<sup>1</sup>**

Herbicide	Alternative A	Alternative B	Alternative C
Triclopyr/Glyphosate (ac) <sup>2</sup>	0	1,005	904

1 – Not all acreage is treated, i.e. buffers along streams and “non-target” species would not be treated. Herbicides are applied manually and would not be applied aerially (see also Appendix F). Herbicides are primarily applied to stems during TSI (timber stand improvement) and to foliage on non-native invasives.

2 – Acres include treatment for TSI, site preparation, and non-native invasive species

Use of herbicides is not expected to have measurable adverse effects on wildlife, water quality, and humans due to proper application as per Material Safety Data Sheets (MSDSs), product labels, risk assessments, fact sheets, mitigation measures contained in the *Vegetation Management in the Appalachian Mountains* (VMAM) FEIS, issued in July 1989, Forest Plan standards and guidelines (Forest Plan, page III-181), and design features disclosed in Appendix F below. The use of herbicides would be done according to the labeling information, at the lowest

rate effective at meeting project objectives in accordance with guidelines for protecting the environment, and manually (not aerially). This risk is further reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of herbicides. Other factors reducing risk are the low level of active ingredient per acre and placement of notice signs in areas where herbicides have been applied. The signs include information on the herbicide used, when it was applied, and who to contact for additional information. It is expected that up to three applications of herbicide treatment could be required within about a five year period to adequately reduce non-native invasives in the activity areas.

Herbicide with the active ingredients Glyphosate and Triclopyr are not considered soil active (mobile). In addition, with the provision of riparian buffer strips on stream zones, the risk of herbicide spills or movement into stream zones is further reduced. Due to project design, effects of the treatment would be limited to individual trees/plants and the immediate area near them and is not expected to adversely affect downstream resources or landowners. All applicable mitigation measures contained in the VMAM FEIS and Forest Plan standards and guidelines would be followed. A complete discussion of the effects of herbicides is contained in this FEIS, to which this analysis tiers to. Current pesticide information for Glyphosate and Triclopyr may be found at: <http://www.fs.fed.us/foresthealth/pesticide/risk.shtml>.

Impacts of herbicide use to wildlife, water quality, and humans are expected to be low due to proper handling and application. The use of herbicides would have no measurable impact on water quality because according to the Vegetation Management FEIS *“No herbicide is aerially applied within 200 horizontal feet, nor ground-applied within 30 horizontal feet, of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them”* (Veg. Mgt. FEIS, page II-67). There would be no adverse effects (direct, indirect, or cumulative) of the usage of herbicides associated with the action alternatives if no spills occur within riparian areas—no herbicide would be applied within at least 30 feet of riparian areas. According to the Veg. Mgt. FEIS, *“The greatest hazards to surface and ground water quality arise from a possible accident or mishandling of concentrates during transportation, storage, mixing, and loading, equipment cleaning, and container disposal phases of the herbicide use cycle”*. Herbicides would not be mixed in the field and applicators would not carry concentrated amounts in the field. There are no other known foreseeable applications of herbicides on NFS lands in the Harmon Den area that could affect herbicide use with this proposal—the last measurable herbicide use on NFS lands in the Harmon Den area was about eight years ago when the Preacher Timber Sale was implemented. The Forest Service is unaware of any large-scale quantities of herbicide being applied on adjacent non-NFS lands within the watershed that could cause adverse cumulative effects. Individual home owners are expected to use herbicides on their properties; however, determining measurable amounts, formulations, locations, frequency, and timing of their use would be speculative.

Effects from past activities listed in Table 3-1 above in the AA that used herbicides are not expected to cause adverse cumulative effects from herbicide use with this proposal because effects from each project are not expected to be cumulatively added together due to the project design of each, adherence to standards in the Vegetation Management FEIS and Forest Plan and

the relatively small amount of acres harvested within the entire 9,501 acre AA over the past eight years.

### 3.5 Soil Resources

The following is an analysis of the soils that would be impacted by harvest-related activities in the activity areas. The following table lists the soil map units found by stand number:

**Table 3-9: Primary Soil Map Units by Stand and Access Route by Alternative**

Primary Soil Map Unit Name (w/ Slope Range) <sup>1</sup>	Stands <sup>2</sup> /Access Routes <sup>3</sup>	Alternative A (acres harvested)	Alternative B (acres harvested)	Alternative C (acres harvested)
Brasstown-Junaluska (D&E)	451-7a, 451-7b, 460-10, 460-6, 461-2, 461-30	0	77	41
Edneyville-Chestnut (D,E&F)	451-12, 451-19, 451-22, 459-10, 459-12, 460-6, 461-30	0	138	96
Plott (E&F)	451-19	0	5	5
Soco-Saunook (D&E)	451-22, 451-7a, 451-7b, 459-10, 459-12, 460-10, 460-6, 461-2, 461-30	0	67	46
Whiteoak (D)	451-7b, 460-10, 461-30	0	3	11
<b>Total Acres</b>		<b>0</b>	<b>290<sup>4</sup></b>	<b>199<sup>4</sup></b>

1 Average slope percent ranges are for soil map units from NRCS data and are not necessarily the average slope within the stand (A = 0% - 2%, B = 2% - 8%, C = 8% - 15%, D = 15% - 30%, E = 30% - 50%, and F = 50% - 95%)

2 Portions of soil map units make up each stand – includes developing landings and skid trails/roads to facilitate harvesting

3 Includes reconstruction, decommissioning, and/or disking & seeding

4 Harvesting would include developing about 12¼ acres and 8½ acres total of log landings and skid roads for Alternatives B and C respectively within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested) – acres are derived from Forest GIS database and may not be the same as those disclosed in other portions of the EA.

The following table displays characteristics of each soil map unit:

**Table 3-10: Comparison of Soil Map Units<sup>1</sup>**

Soil Map Unit Name	Characteristics
Brasstown-Junaluska	The <u>Brasstown</u> series consists of deep, well drained, moderately permeable soils on ridges and side slopes of the Southern Appalachian Mountains. They are well drained; very slow runoff where forest litter has had little or no disturbance; medium to rapid runoff where litter has been removed; moderate permeability. The <u>Junaluska</u> series consists of moderately deep, well drained, moderately permeable soils on ridges and side slopes of the Southern Appalachian Mountains. They are well drained; very little runoff where forest litter has not been disturbed. Medium to very rapid runoff where litter has been removed; moderate permeability.
Edneyville-Chestnut	The <u>Edneyville</u> series consists of very deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge. They are well drained; medium internal drainage; moderate rapid permeability. Runoff class is very low on gentle slopes, low on strong or moderately steep slopes, and medium on steeper slopes. Runoff is much lower where forest cover is intact. The <u>Chestnut</u> series consists of moderately deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge. They are well drained; moderately rapid permeability. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest cover is intact.

Soil Map Unit Name	Characteristics
Plott	The <u>Plott</u> series consists of very deep, well drained, moderately permeable soils on cool, north- to east-facing or shaded ridges and side slopes in the Blue Ridge. They are well drained. Saturated hydraulic conductivity in the subsoil is moderately high, permeability is moderate; in the underlying material, saturated hydraulic conductivity is high, permeability is moderately rapid. Index surface runoff is medium or high.
Soco-Saunook	The <u>Soco</u> series consists of moderately deep, well drained, moderately rapid permeable soils on ridges and side slopes of the Blue Ridge. They are well drained; very little runoff where forest litter has not been disturbed. Medium to very rapid runoff where litter has been removed; moderately rapid permeability. The <u>Saunook</u> series consists of very deep, well drained, moderately permeable soils on benches, fans, and toe slopes in coves in the Blue Ridge. They are well drained; saturated hydraulic conductivity is moderately high or high, permeability is moderate. Surface index runoff is negligible to medium. These soils receive surface and subsurface water from surrounding uplands, and seeps and springs are common.
Whiteoak	The <u>Whiteoak</u> series consists of very deep, well drained, moderately permeable soils on benches, fans, and toe slopes in coves in the Southern Appalachian Mountains. They are well drained; moderate permeability. Runoff class is low on gentle slopes, medium on strongly sloping or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.

1 Information obtained from USDA Natural Resource Conservation Service (NRCS) website

### 3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no adverse effects to soils with this alternative because no activities are proposed. Any areas with current erosion would not be corrected. Soil displacement and compaction related to temporary road construction and landing construction would not occur.

### 3.5.2 Alternative B – Direct, Indirect, and Cumulative Effects

#### 3.5.2.1 Soil Productivity

There would be some soil compaction in harvest areas as a result of heavy equipment accessing log landings, skid roads, and skid trails. This compaction can increase the bulk density of the soils and result in a decrease in pore space, soil air, and water holding capacity of the soils. These effects are considered detrimental to plant growth. The degree of compaction depends on the number of equipment passes over the soil and the moisture content of the soil at the time of equipment use. Changes in pore space do not normally occur on well-drained soils until three or more passes have occurred. Areas less susceptible to compaction are where the organic surface material remains intact and where surface rocks are present. Areas of concentrated use such as log landings and skid roads are most affected. These areas are designed to concentrate affected areas to reduce potential for compaction throughout a given stand and receive mitigation such as seeding to reduce long-term compaction. Other areas where harvest-related activities will occur are expected to revegetate naturally with existing root systems, organic matter accumulation, and soil bio-activity are expected to alleviate long-term compaction.

Changes in soil productivity are determined to be significant when more than a 15 percent change in project area soil productivity can be identified (Forest Service Handbook 2509.18, Chapter 2.05, and R8 supplement). Significant changes in soil productivity are indicated when changes in soil properties are expected to result in a reduced productive capacity over the long-

term (beyond the planning horizon or 10-15 years) and these changes in soil properties are more than 15 percent from pre-existing undisturbed conditions in the analysis area.

The estimated extent of ground disturbance and associated estimated short and long-term effects (considered cumulatively with potential residual long-term effects from past harvesting) to soils are summarized below:

**Table 3-11: Estimated Effects on Soil Productivity in Harmon Den AA since 1994 (this planning horizon)**

<b>Direct and Indirect Estimates</b>			
Harmon Den Alternative B		Harmon Den Alternative C	
<b>Activity</b>	<b>Area of Disturbance</b>	<b>Activity</b>	<b>Area of Disturbance</b>
Log Landings & Skid Roads	12¼ acres	Log Landings & Skid Roads	8½ acres
Temporary Roads	½ acre	Temporary Roads	½ acre
System Road Construction	0 acres	System Road Construction	0 acres
Existing System Roads	45 acres	Existing System Roads	45 acres
<b>Harmon Den Alt B Affected</b>	<b>57¼ acres</b>	<b>Harmon Den Alt C Affected</b>	<b>54 acres</b>
Proposed Harvest Acres	306	Proposed Harvest Acres	205
<b>% of Harvest Acres Affected</b>	<b>4.00%</b>	<b>% of Harvest Acres Affected</b>	<b>2.73%</b>
<b>Cumulative Estimates</b>			
Preacher Timber Sale		Preacher Timber Sale	
Log Landings & Skid Roads	4½ acres	Log Landings & Skid Roads	4½ acres
System Road Construction	0 acres	System Road Construction	0 acres
<b>Total</b>	<b>62¼ acres</b>	<b>Total</b>	<b>58½ acres</b>
Analysis Area Acreage	9,501 acres	Analysis Area Acreage	9,501 acres
<b>% of Analysis Area Affected<sup>1</sup> (Alt B)</b>	<b>0.66%</b>	<b>% of Analysis Area Affected<sup>1</sup> (Alt C)</b>	<b>0.62%</b>

<sup>1</sup> Includes Harmon Den and Preacher projects

As disclosed in the preceding table, significant impacts to soil productivity are not expected because the 15 percent threshold of ground disturbance in the analysis area would not be exceeded by either the Harmon Den proposal itself nor when cumulatively added to past timber harvest activities.

In addition, adverse effects to soil productivity with either of these alternatives is not expected because almost all the soil types are very deep and well drained (reducing potential for compaction); would be taken out of long-term production through permanent system road construction; and would have project design features (Section 2.4, Chapter 2) and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage.

Neither alternative proposes new system (classified) road construction; both alternatives propose about 1/3 mile of temporary roads that would be disced, seeded, and closed following harvest-related activities. About 12¼ acres of skid roads and log landings would be developed within harvest units under Alternative B to facilitate harvest activities and about 8½ acres of skid roads and log landings would be developed within harvest units under Alternative C to facilitate harvest activities. Skid roads and log landings would be closed and seeded following harvest activities to reduce potential for long-term compaction and erosion. Following harvest activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction. Skid trails would also be used within harvested stands to facilitate log removal, but since equipment is used to drag logs on specified routes to log landings (typically over branches, brush, and other similar vegetation) and not to

use a blade to break new ground, long-term compaction to soil resources is not expected to occur (see definitions at end of Appendix A).

### **3.5.2.2 Nutrient Cycling**

An initial surge of available plant nutrients would occur as the vegetative canopy is opened or burned. The increase in soil moisture, surface soil temperatures, and organic debris would produce ideal conditions for accelerated organic matter decomposition and increased soil biotic activity. This in turn would result in an increased availability of nutrients in the upper part of the soil profile. The existing root systems on-site, along with new plant germinations are expected to take advantage of the increased availability of nutrients and moisture, and a surge of growth would occur. Possible losses of nutrients to groundwater through leaching and through volatilization are expected to be offset by additions of nutrient rich leafy material and small woody debris left on-site after harvest, plus additions by the atmosphere and precipitation. There would be short-term changes in vegetation from prescribed burning (one season or less); however burns would be done in dormant season to reduce fire intensity. This creates a mosaic pattern with low potential for severe effects to soils and other resources. The majority of the Cherry Creek Trail relocation would occur on previously disturbed areas (old road beds). As a result, there would be no significant direct, indirect, or cumulative effects on nutrient cycling, either through nutrient removal or nutrient leaching as a result of the proposal.

### **3.5.3 Alternative C – Direct, Indirect, and Cumulative Effects**

#### **3.5.3.1 Soil Productivity & Nutrient Cycling**

Effects to soils under Alternative C would be less than Alternative B because Alternative C proposes 95 less acres of harvesting, decommissions one more non-system road (~¼ mile), and develops four less acres of log landings and skid roads. Any effects to soils with Alternative C would be negligible because the majority of the soil types where harvesting is proposed are very deep and well drained (reducing potential for compaction); would not be taken out of production through permanent road construction; and would have project design features (Section 2.4, Chapter 2); and FPGs and BMPs applied to further reduce potential for compaction and long-term damage.

## **3.6 Cultural Resources**

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### **3.6.1 Alternative A – Direct, Indirect, and Cumulative Effects**

There would be no adverse direct, indirect, or cumulative effects to cultural resources with this alternative because no ground disturbing activities are proposed.

### **3.6.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects**

An archaeological review will be completed in the field prior to a decision being made and any sites eligible or potentially eligible for the National Register of Historic Places (NRHP) under Criteria D (36 CFR 60.4) would be protected through avoidance.

## 3.7 Scenery Resources

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### 3.7.1 Existing Condition

The Harmon Den Project is located on the Appalachian Ranger District of the Pisgah National Forest, and lies west of Cold Springs Road between I-40 and Max Patch. Areas along Cold Springs Road are a natural-appearing landscape with a mix of hardwood and coniferous forest. There are many Foreground views of Cold Springs Creek, and a few open Middleground views of the surrounding mountains.

Developed recreation sites in the area include Harmon Den Horse Camp, Cold Springs Picnic Area, and Harmon Den Horse Trailhead. The Appalachian National Scenic Trail (AT) follows the ridge forming the western project boundary (NC-TN state line). Several other hiking and equestrian trails are in the area as well. Max Patch, a well known and highly used bald, lies just north of the project area.

Evidence of past timber management is visible in the form of logging roads and timber harvest areas. Existing clear-cuts have regenerated to a point where they have a predominately natural-appearing vegetative cover, with color and texture similar to the adjacent forest. In Middleground views, these old harvests are primarily identified by a faint shadow-line at the upper unit boundary; in the foreground they appear as dense young growth.

### 3.7.2 Scenery Analysis

Within the Analysis Area, Management Areas (MA) where activities are proposed include 2A, 3B, 4D & 14. Management Area 2A has an assigned Visual Quality Objective (VQO) of Retention (R) in Foreground Sensitivity Level 1, and Partial Retention (PR) in all other Sensitivity Levels and Distance Zones. Management Area 3B has an assigned VQO of Modification (M) in all Distance Zones and Sensitivity Levels; except areas seen from the Appalachian Trail, where a PR VQO must be met. Management Area 4D has assigned VQOs of PR in Foreground and Middleground Sensitivity Level 1, and M in all other Sensitivity Levels and Distance Zones. See Definitions at end of Biological Evaluation, Appendix A.

To meet R VQO, management activities must not be evident from analyzed viewpoints, and be met within one growing season. In PR VQO activities must repeat form, line, color, and texture of the surrounding landscape to such an extent that activities are perceived as a visually subordinate feature in the characteristic landscape. Partial Retention VQO must be met within two growing seasons. Under Modification VQO, activities may be dominant, but must borrow elements of form, line, color, and texture so it appears as a natural occurrence within the characteristic landscape. Modification VQO must be met within three growing seasons. All management activities in MA 14 must be to enhance the AT experience, and must meet a R VQO. No commercial timber harvest is allowed in the visible foreground of the AT (MA 14).

Foreground Distance Zone is the area visible within ½ mile, Middleground is seen between ½ and five miles, Background extends from 5 miles to the horizon. Sensitivity Level 1 areas are primary travel routes, water bodies, and use areas where at least ¼ of users have a major concern for scenic quality, or they are areas of National or Regional significance such as a scenic byway. Sensitivity Level 2 or 3 areas are primary or secondary routes, water bodies, or use areas where less than ¼ of users have a major concern for scenic quality; these would include secondary state roads or National Forest System (NFS) roads.

Secondary State roads, Forest Service roads, and Forest Service trails in the project area are classified as Sensitivity Level 2 or 3. Primary viewing areas such as Max Patch and developed recreation sites are Sensitivity Level 1; as is the Appalachian Trail.

Computer analysis and leaf-off field surveys were used to identify viewpoints and determine visibility of proposed management activities. All travel corridors, water bodies and use areas in and around the project area were considered for potential viewpoints (see Figure 3-2 below). Some of these locations were found to have views of the project area, and were subject to detailed analysis using digital imagery, GIS and/or 3-D computer simulations. Other viewpoints were considered, but preliminary analysis determined no proposed activities would be visible from these locations; I-40, Mt. Sterling (Great Smokey Mountains National Park), and Max Patch.

For analyzed viewpoints, some of the views would be seen as the observer is moving (in a vehicle, hiking, horseback riding, etc.), others are from stationary vistas. Views may be partially filtered or screened by foreground vegetation, others are open and unobstructed. The degree of potential impact varies with these and several other factors, such as distance from viewer and viewer position; as well as the slope, size, shape, and type of proposed harvest, road, log landing, etc. All of these factors are considered when determining what activities would meet assigned VQOs, and what scenery design features should be incorporated. The following list identifies viewpoint locations considered in the analysis (see also Figure 3-2 below):

### **3.7.2.1 Viewpoints**

1. Cold Springs Road
2. Max Patch Road
3. Brown Gap Road
4. Cold Springs Horse Camp
5. Cold Springs Picnic Area
6. Harmon Den Horse Trailhead
7. Appalachian Trail
8. Cherry Creek Trail
9. Cherry Ridge Trail
10. Rube Rock Trail
11. Other FS roads and trails in the Harmon Den area

### **3.7.2.2 Other Viewpoints Considered (no proposed activities visible):**

- I-40
- Mt. Sterling
- Max Patch

## **3.7.3 Effects by Alternative**

### **3.7.3.1 General Discussion Relative to All Action Alternatives – Direct & Indirect Effects**

Proposed vegetation management activities utilize two-age harvest techniques, prescribed burning, and timber stand improvement with non-commercial thinning and exotic invasive plant control.

Timber stand improvements, invasive plant control, and prescribed burning have minimal impacts to scenery. In some areas manually treated vegetation may appear to be dead, but will

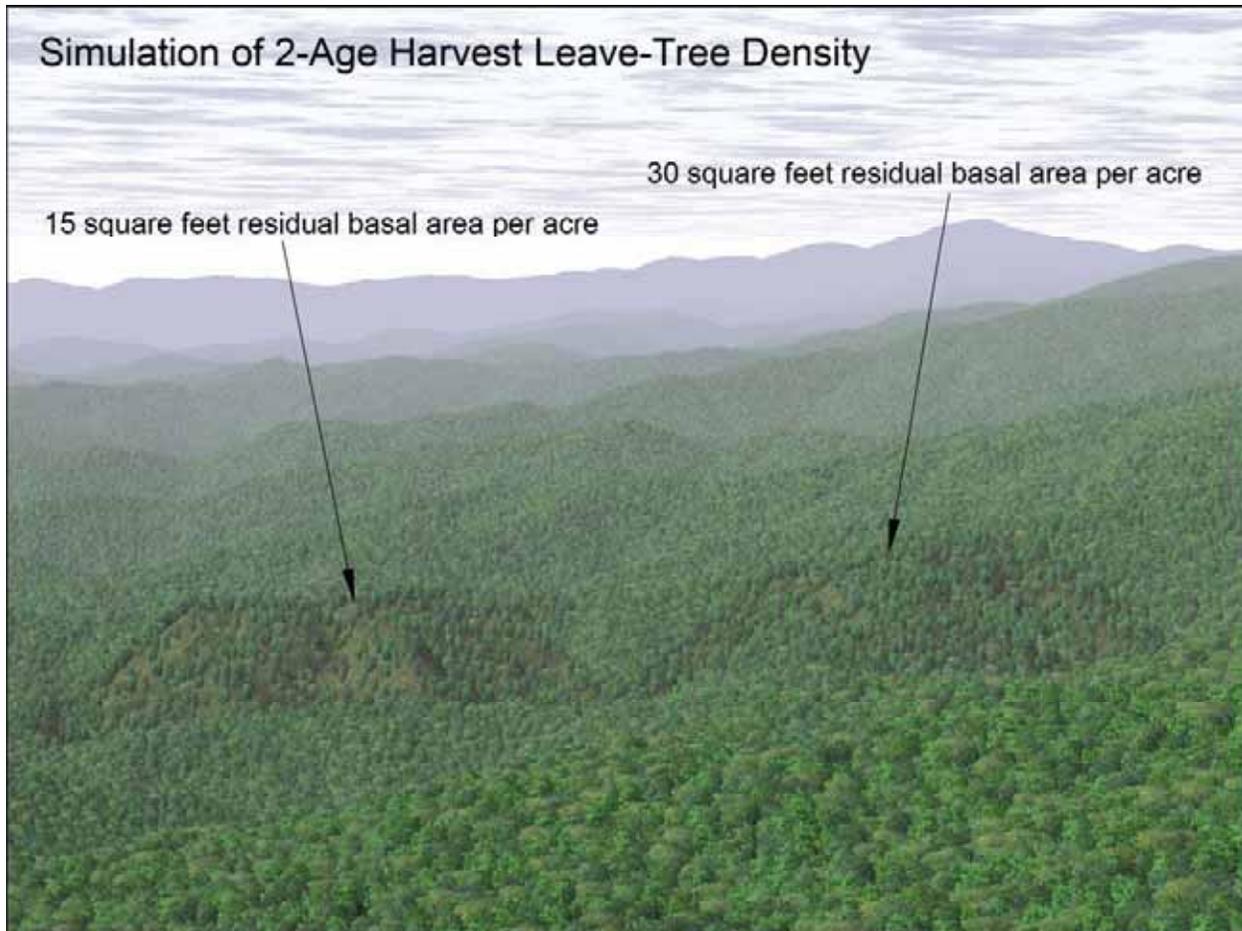
decay over time and be unnoticeable to most viewers. Prescribed burn areas may appear blacked for a few months, but generally green-up with the first growing season.

When viewed in the Middleground, two-age timber harvest areas may appear to be more sparsely vegetated or have fewer trees than adjacent un-cut stands, but do not create a distinct opening as with clear-cut harvests used in the past. (Clear-cut timber harvest methods often resulted in large openings with hard shadow lines along the edge; they were/are noticeable because of contrasts in vegetation height, form, line, color, and texture. In a Southern Appalachian hardwood forest, clear-cut harvests remain noticeable to the average viewer for about 10-15 years after harvest. However, no clear-cut treatments are proposed in this project).

The higher leave-tree density of a two-age harvest method reduces textural and color contrasts between treated areas and adjacent forest, while edge-feathering eliminates shadow-lines along unit boundaries. In leaf-on-season, Middleground views of two-age treatments may allow varying degrees of visible ground beneath the remaining overstory trees, and in certain lighting conditions shadows beneath residual trees may make the stand appear darker and have a more coarse texture than the adjacent forest. Within 2-3 growing seasons, crowns of residual overstory trees expand to create a denser canopy, and understory vegetation grows to obscure views of ground exposed during harvest. In leaf-off season, two-age treatment areas are almost indistinguishable from adjacent un-cut stands; however roads, log landings, and logging debris may be more noticeable.

Along specific boundaries of two-age treatment areas, leave-tree density is transitioned (or feathered) from the desired density to adjacent un-cut stands. This technique eliminates a hard shadow-line along upper unit boundaries, and helps blend treatment areas into the adjacent forest canopy.

These and other design features effectively soften visual impacts of timber harvest, and allow assigned VQOs to be met. To the average viewer, a two-age treatment with 15-20 square feet of residual basal area per acre ( $\text{ft}^2$  rba/ac) may be noticeable for 6 to 8 years after harvest; while a 30+  $\text{ft}^2$  rba/ac treatment may only be noticeable for 3 to 5 years. Figure 3-1 displays a simulation of a two-age treatment with 15  $\text{ft}^2$  rba/ac and a two-age treatment with 30  $\text{ft}^2$  rba/ac.; these are hypothetical examples used to demonstrate effects of varying leave-tree density. Photos of two-age treatments from the Stateline Project in Madison County are shown in Figures 3-3 and 3-4 are displayed to provide representative examples of two-age harvesting.



**Figure 3-1: Simulation of 2-age Harvest Leave-Tree Density**

In addition to increased leave-tree densities and edge feathering, other scenery design features used in these proposals are to retain un-cut areas between roads and treatments, and maintain screening vegetation below visible log landings and roads.

Implementation of scenery design features in Alternative C would reduce contrasts with the surrounding forest, softening visual impacts to the degree where effects achieve assigned VQOs.

### **3.7.3.2 Alternative A (No Action) – Direct & Indirect Effects**

No effects to scenery, all VQOs would be met.

### **3.7.3.3 Alternative B (Proposed Action) – Direct & Indirect Effects**

Portions of some treatment areas visible from analyzed viewpoints would not meet the assigned VQO as proposed. All of these issues are addressed in design features of Alternative C treatments.

### **3.7.3.4 Alternative C – Direct & Indirect Effects**

Alternative C modified boundaries and reserve basal area of treatment stands primarily within the “seen area” of the Appalachian Trail (MA 14). As a result, all management activities proposed in this Alternative would meet the assigned VQOs from all analyzed viewpoints (see also Sections 2.2.3 and 2.4, Chapter 2).

### **3.7.3.6 Cumulative Effects**

Past timber harvests, clearings, roads, structures, and other landscape modifications are visible from various analyzed viewpoints. The degree to which these modifications impact scenic quality varies greatly with the type, scale, and contrast with the surrounding natural landscape. Treatments proposed in the Harmon Den Project would create small openings, or the canopy may appear thinner. In leaf-off season, roads and log landings will be visible from some viewpoints. However, scenery design features of Alternative C were incorporated with consideration for cumulative effects of proposed and existing landscape modifications. No foreseeable future actions which may have cumulative impacts to scenery are known.

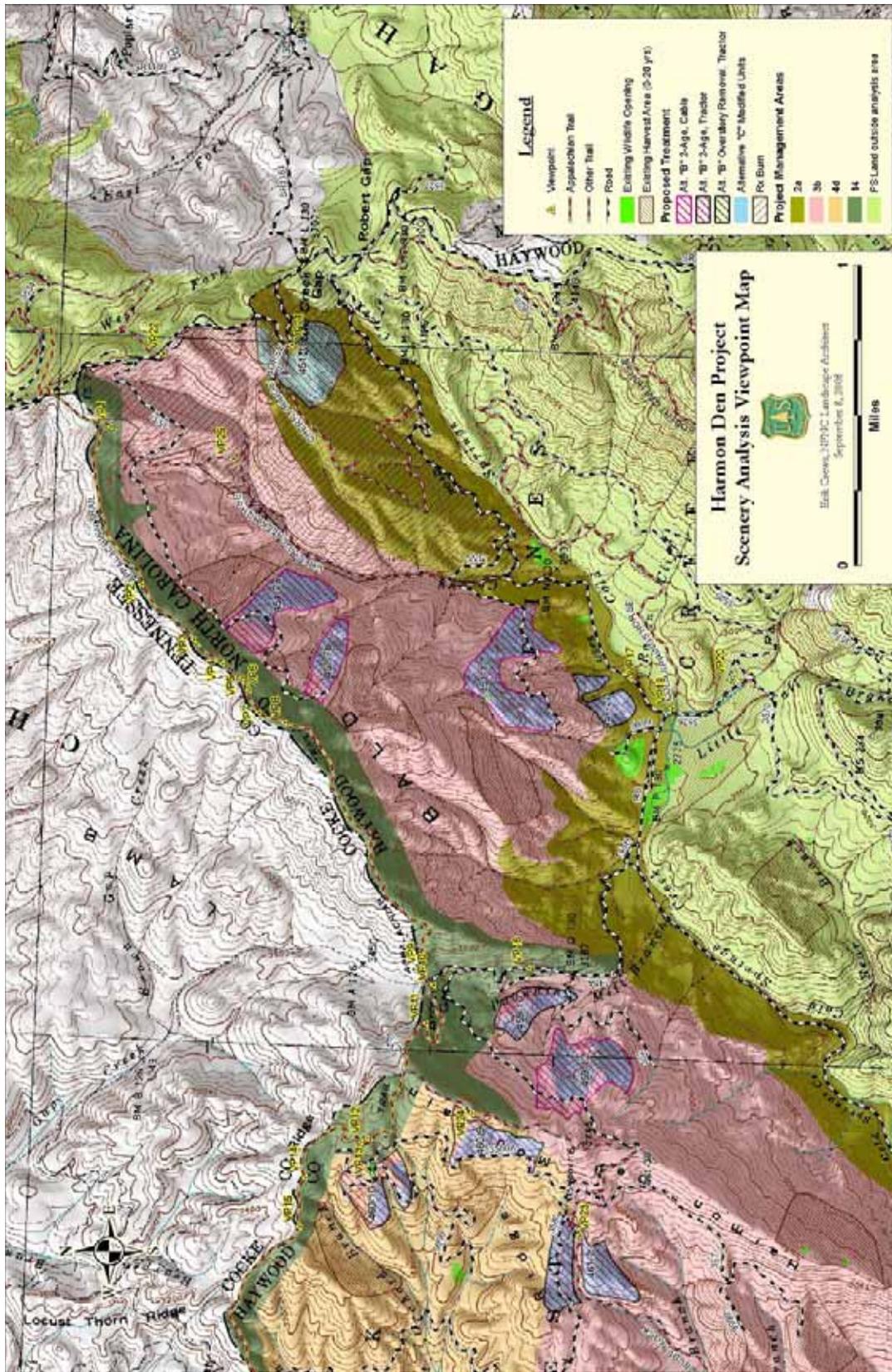


Figure 3-2: Viewpoint Location Map

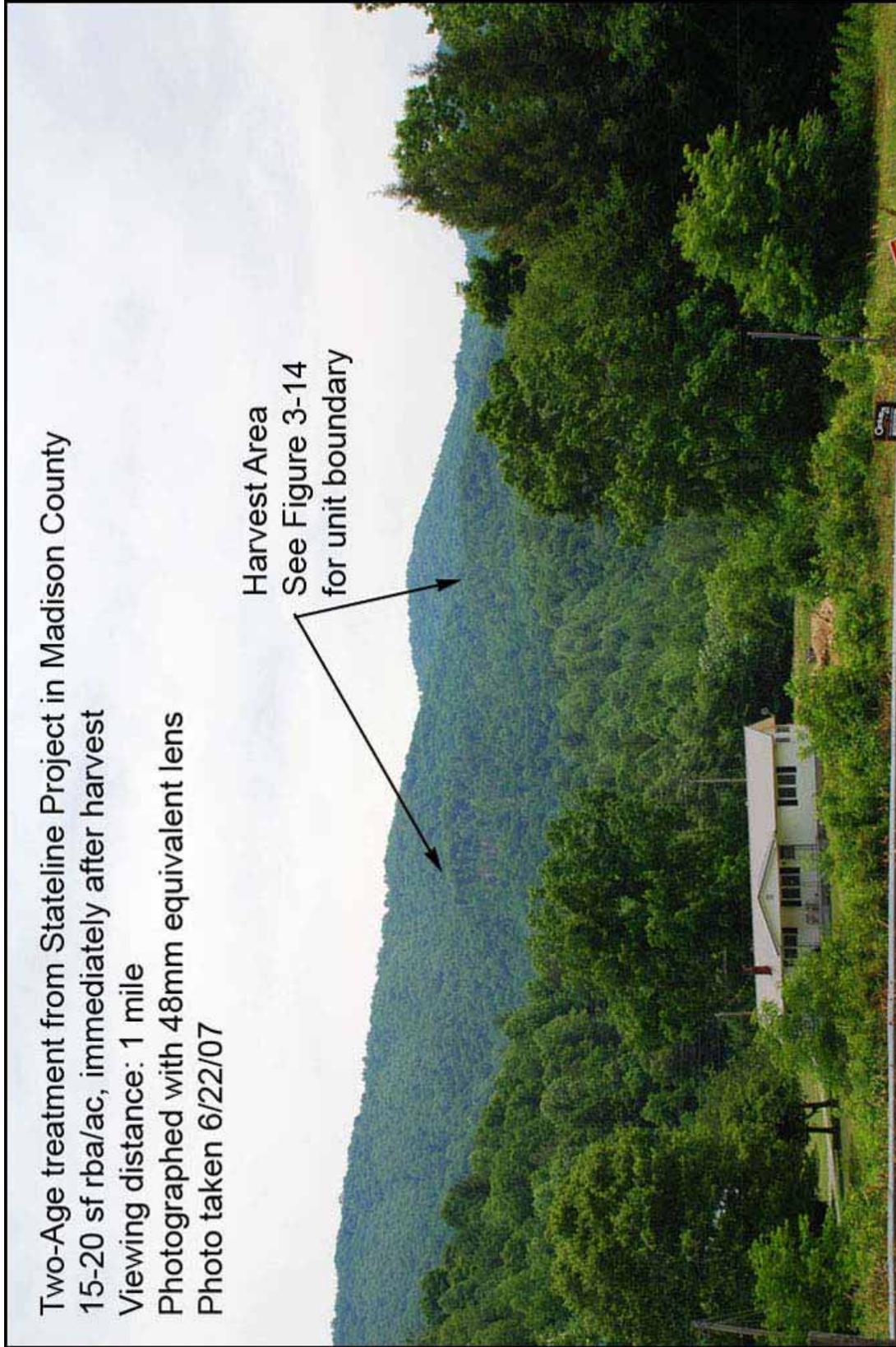


Figure 3-3: Photo depicting example of 15-20 ft<sup>2</sup> rba/ac Two-Age treatment from Stateline Project in Madison County

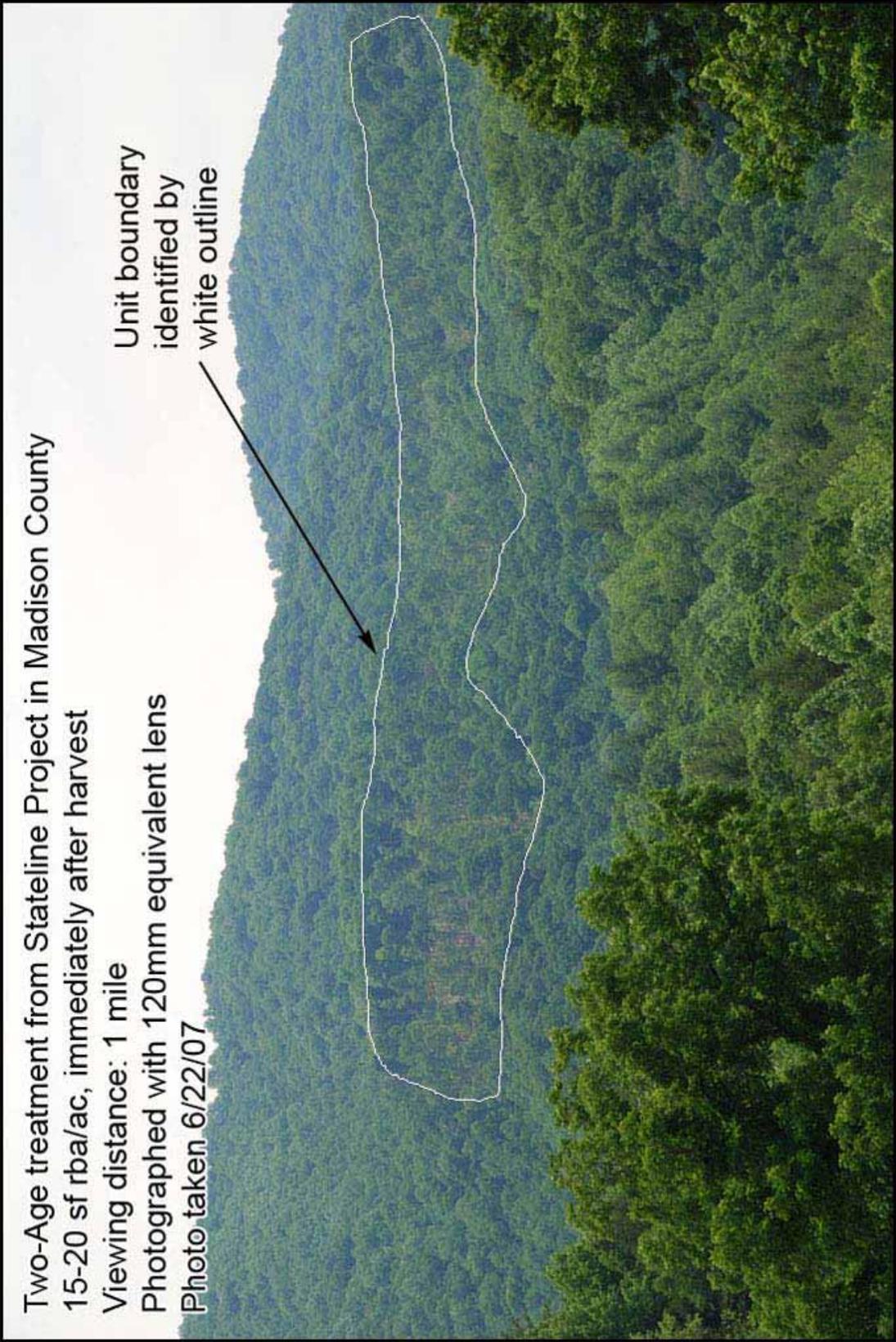


Figure 3-4: Photo depicting example of 15-20 ft<sup>2</sup> rba/ac Two-Age treatment from Stateline Project in Madison County

### 3.8 Management Indicator Species

The Forest-wide list of MIS was considered as it relates to the Harmon Den AA. Only those MIS that occur or have habitat within the AA and may be affected by any of the alternatives were carried through a site-specific analysis. The documentation below shows which MIS were and were not analyzed along with the reasons.

Consistent with the Forest Plan and its associated FEIS (Volumes I and II), the effects analyses focus on changes to MIS habitat. These project-level effects are then put into context with the Forest-wide trends for populations and habitats. Additional MIS information is within the Wildlife, Aquatics, and Botanical resource reports located in the project record.

To process and document the information efficiently, a series of tables are used as follows:

- 1) **Table 3-12:** This table displays biological communities and associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is Amendment 17 to the Nantahala and Pisgah Land and Resource Management Plan effective October 1, 2005, and the associated environmental assessment (EA) and project record.
- 2) **Table 3-13:** This table displays the habitat components and associated MIS, and reasons species were, or were not selected for analysis in the project.
- 3) **Table 3-14:** This table displays by MIS the Forest-wide population trend along with the associated biological community or habitat component. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests.
- 4) **Table 3-15:** This table compares effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and habitat component considered in the project-level analyses. This table explains how effects to communities and habitats affect Forest-wide population trends for the species considered.

**Table 3-12: Biological Communities, Associated MIS, and why Species were Chosen or Eliminated from Analysis**

Biological Community	MIS	Analyzed Further/ Evaluation Criteria*
Fir dominated high elevation forests	Fraser fir	No/1
Northern hardwood forests	Ramps	No/1
Carolina hemlock bluff forests	Carolina hemlock	No/1
Rich Cove forests	Ginseng	No/1
Xeric yellow pine forests	Pine warbler	No/2
Reservoirs	Largemouth bass	No/1
Riparian forests	Acadian flycatcher	No/2
Coldwater streams	Wild brook trout, wild brown trout, wild rainbow trout, blacknose dace (lower tropic levels of streams)	Yes
Coolwater streams	Smallmouth bass	No/1
Warmwater streams	Smallmouth bass	No/1

\*1 Biological Community and its represented species do not occur within the activity areas; therefore, this biological community would not be affected by any of the alternatives. Given no effects to the community, the

alternatives in this project would not cause changes to forest-wide trends or changes in population trends of species associated with this community.

- 2 Biological Community and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities because the associated habitat would not be entered by the proposed activities, pursuant to forest plan direction; therefore, there would be no change to forest-wide population trends.

**Table 3-13: Habitat Components Associated MIS and why Species were Eliminated from Analysis**

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	Yes
Early successional (11-20)	Ruffed grouse	No/2
Soft mast producing species	Ruffed grouse	Yes
Hard mast-producing species (>40 yrs)	Black bear	Yes
Large contiguous areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest	Ovenbird	Yes
Permanent grass/forb openings	White-tailed deer	Yes
Downed woody debris	Ruffed Grouse	Yes
Snags	Pileated woodpecker	No/2

- \*1 Habitat and its represented species do not occur within the project area; therefore, this special habitat would not be affected by any of the alternatives. Given no effects to the habitat, the alternatives in this project would not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.
- 2 Habitat and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities; therefore, there would be no change to forest-wide population trends.

**Table 3-14: MIS Estimated Population Trend and Biological Community or Habitat Component**

Species	Estimated Population Trend	Biological Community and/or Habitat Component
Wild trout (brook, brown, and rainbow); blacknose dace	Static	Coldwater streams
Rufous-sided (eastern) towhee	Decreasing	Early successional (0-10 years old)
Ruffed grouse	Static to decreasing	Soft mast producing species & Downed woody debris
Black bear	Increasing	Hard mast producing species (>40 yrs)
Ovenbird	Slight decrease	Large contiguous areas of mature deciduous forest
White-tailed deer	Static to decreasing	Permanent grass/forb
Ruffed grouse	Static to decreasing	Downed woody debris

**Table 3-15: Habitat Component, Forest-wide Estimates, and Expected Changes resulting from the Alternatives**

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C
Coldwater streams	5,060 miles	No change	Re-disturb ~52 linear feet of 22.82 miles of stream channel with reinstallation of two culverts	Re-disturb ~52 linear feet of 22.82 miles of stream channel with reinstallation of two culverts
Early successional (0-	26,800 acres, 5 year average of	No change	306 acre habitat increase (harvest stands)	205 acre habitat increase (harvest stands)

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C
10 years old)	2,040 acres Forest-wide, downward trend			
Soft mast-producing species	13,144 acres early seral, highest potential on 5,800 acre, downward trend	No change	306 acre habitat increase (harvest stands) and 550 acre habitat improvement (prescribed burning)	205 acre habitat increase (harvest stands) and 550 acre habitat improvement (prescribed burning)
Hard mast-producing species (>40 yrs)	681,000 acres, increasing trend	No change	306 acre reduction of ~6,600 total acres in AA (marking guidelines would retain white oak, red oak, hickory, black oak, and chestnut oak, where they occur)	205 acre reduction of ~6,600 total acres in AA (marking guidelines would retain white oak, red oak, hickory, black oak, and chestnut oak, where they occur)
Large contiguous areas of mature deciduous forest	279,000 acres	No change	53 acre reduction of ~4,945 total acres in AA	27 acre reduction of ~4,945 total acres in AA
Permanent grass/forb openings	3,000 acres	No change	6.4 acre increase	6.8 acre increase
Downed woody debris	High accumulation small wood: 18,000 acres; Large wood: 386,000 acres; Low accumulation (approximately 600,000 acres)	No change	306 acre increase	205 acre increase

### 3.9 Threatened, Endangered, Sensitive, and Forest Concern Species \_\_\_\_\_

This section discloses the determination of effects the proposal may have on threatened and endangered (T&E); Regional Forester’s sensitive (S); and Forest Concern (FC) aquatic, wildlife, and botanical species—see Appendix A, Biological Evaluation (BE) for more complete disclosure of surveys, habitat, species, and effects analyses.

There would be no effect to any TES or FC species under Alternative A as no actions are proposed—current conditions would be maintained.

#### 3.9.1 Threatened, Endangered, and Sensitive Species

##### 3.9.1.1 Botanical & Aquatic Species

###### Alternatives B and C

Neither Alternative B nor Alternative C would adversely affect TES botanical or aquatic species or their habitat as disclosed in the BE. Consultation with the US Fish and Wildlife Service is not required.

##### 3.9.1.2 Wildlife Species

### Southern Water Shrew (Alternatives B and C)

The southern water shrew (*Sorex palustris punctulatus*), a Regional Forester’s sensitive species, is likely present in a 20-50 foot corridor surrounding China Creek and Skiffley Creek. Dr. W. Mark Ford, Research Wildlife Biologist with the USDA Northern Research Station is a recognized expert on this species. Dr. Ford stated the water shrew is very hard to catch and there would be collateral damage (killing) to northern short-tailed shrew, smoky shrews, and woodland jumping mice if trapping was to occur. In his opinion, any trapping effort would probably not catch a water shrew. Therefore, trapping to confirm the presence of this sensitive species was determined to be unrealistic and unnecessary due to existing protection afforded to perennial stream corridors under the Forest Plan.

The proposed timber harvest activities would not impact water shrew because harvesting is not proposed within 100 foot corridors on either side of perennial streams. The proposal to relocate the Cherry Creek Trail out of Cherry Creek would reduce or eliminate sedimentation; as the riparian area recovers it is expected to improve water shrew habitat in the long-term. Relocating the trail would involve the Pisgah Zone Wildlife Biologist to ensure water shrew habitat is not adversely impacted.

The hemlock wooly adelgid infestation would not impact water shrew directly; however, the loss of hemlock trees within riparian areas is expected to create openings and eventually increase downed woody debris within streams and stream corridors. The natural loss of these trees would indirectly cause habitat to increase for water shrew as available protective cover and aquatic food availability increases.

Prescribed fire or wildfires rarely enter riparian areas and burn at lower intensities with lower severity in these moist environments. Water shrews are mobile and can escape into water, under rocks, or downed trees. Since it is rare for fire to occur or enter riparian areas, there is a low likelihood of adverse impacting the water shrew. Therefore, impact to water shrews and its habitat by fire is not expected to be measurable.

No other past or foreseeable future actions would impact the water shrew and no other TES wildlife species or their habitat are located within the activity areas and therefore, would not be impacted.

### 3.9.2 Forest Concern Species

The following table discloses Forest Concern (FC) species documented in the Harmon Den AA and potential effects by alternatives:

**Table 3-16: Forest Concern Species Documented Within The Harmon Den AA and Potential Effects by Alternative**

Species	Occurrence	Alternative A	Alternative B	Alternative C
<i>Hydrophyllum macrophyllum</i> (largeleaf waterleaf)	Known to occur in AA south of Cold Springs Creek. Not known to occur in or near activity areas	No activities proposed – no effect	No effect – species not within activity areas	No effect – species not within activity areas
<i>Micrasema burksi</i> (a caddisfly)	May occur within the aquatic analysis area	No activities proposed – no effect	If <i>Micrasema burksi</i> exists at the proposed stream crossings, individuals could be	If <i>Micrasema burksi</i> exists at the proposed stream crossings, individuals could be

Species	Occurrence	Alternative A	Alternative B	Alternative C
			crushed or lost. Loss of individuals within the sites for stream crossings will not affect the viability of <i>Micrasema burksi</i> across the Forest.	crushed or lost. Loss of individuals within the sites for stream crossings will not affect the viability of <i>Micrasema burksi</i> across the Forest.
<i>Baetopus trishae</i> (a mayfly)	May occur within the aquatic analysis area	No activities proposed – no effect	If this species occurs in the Harmon Den AA at the crossing replacement locations, individuals may be crushed or lost. Loss of individuals will not affect the viability of the species across the Forest.	If this species occurs in the Harmon Den AA at the crossing replacement locations, individuals may be crushed or lost. Loss of individuals will not affect the viability of the species across the Forest.
<i>Habrophleidiodes spp.</i> (a mayfly)	May occur within the aquatic analysis area	No activities proposed – no effect	If this species occurs in one of the areas proposed for stream crossings individuals could be crushed or lost during project implementation. Loss of individuals will not affect the viability of the species across the Forest.	If this species occurs in one of the areas proposed for stream crossings individuals could be crushed or lost during project implementation. Loss of individuals will not affect the viability of the species across the Forest.
Southern Appalachian eastern woodrat, <i>Neotoma floridana haematoreia</i>	Known to occur in the AA	No activities proposed – no effect	No adverse effect due to retention of approximately 70% of the canopy over boulder groups, defined as a minimum of 3 boulders that are each at least 5 feet in length within 5 feet of each other	No adverse effect due to retention of approximately 70% of the canopy over boulder groups, defined as a minimum of 3 boulders that are each at least 5 feet in length within 5 feet of each other

### 3.10 Old Growth Communities

The Forest Plan describes the purpose of retaining old growth communities: [T]he desired future condition for old growth across the forest is to have a network of small, medium, and large sized old growth areas, representative of sites, elevation gradients, and landscapes found in the Southern Appalachians and on the Forests, that are well dispersed and interconnected by forested lands. Areas to be managed for old growth would be selected considering the following criteria: 1. Priority consideration for areas currently exhibiting high quality old growth

characteristics, including areas in the initial inventory of possible old growth; 2. Areas with unique species diversity; 3. Community, soil type, aspect, and elevation; 4. Other resource concerns and management objectives (Forest Plan, page III-26).

Currently, there are 2,906 acres of designated Forest Plan large patch old growth #17; no Forest Plan medium old growth designated; and 133 acres of designated small patch old growth in the 9,501 acre Harmon Den AA. There are also currently six timber stands (447 acres total) within the Harmon Den AA identified as Forest Plan initial inventory old growth; five of which are already incorporated within Forest Plan Large Old Growth Patch #17. The Continuous Inventory of Stand Condition (CISC) stand age and other available data are used for comparison and selection. Stand age can be used to compare old-growth condition and evaluate alternatives. Within the southern Appalachian mountains, most natural forest communities may have minimum old-growth characteristics at about the 120-140 years old and may be considered for old-growth (Guidelines for Conserving and Restoring Old-Growth Forest Communities on National Forests in Southern Region, USFS). Other disciplines may employ slightly different age definitions. See also additional analysis on old growth communities disclosed in Appendix C below.

### 3.10.2 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting Forest Plan standards for designated small patch old growth community habitat in the two compartments would continue. Existing stands would remain intact. Past, present, and reasonably foreseeable actions listed in Table 3-1 above would not have measurable adverse cumulative effects on old growth communities in the project area because no action is proposed with this alternative that could be cumulatively added to them.

### 3.10.3 Alternative B – Direct, Indirect, and Cumulative Effects

No adverse effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested and about 51 acres would be designated as small patch old growth communities and would not be scheduled for future harvest. The 51 acres of old growth proposed for designation is in addition to the 2,906 acres of designated Forest Plan Large Old Growth Patch #17. The following table summarizes age-classes for the Harmon Den Project AA by alternative along with old growth disclosures and natural communities in the AA and old growth designations:

**Table 3-17: Age-Class for Harmon Den Project in AA 19 by Alternative and Old Growth Communities Disclosures**

Measurement	Alternative A current	Alternative B post harvest	Alternative C post harvest
<u>Harmon Den Analysis Area Age Classes</u>			
Non-forested (I-40 & State roads)	316 ac (3%)	316 ac (3%)	316 ac (3%)
0-10 years old	0 ac (0%)	306 ac (3%)	205 ac (2%)
11-20 years old	392 ac (4%)	392 ac (4%)	392 ac (4%)
21-39 years old	369 ac (4%)	369 ac (4%)	369 ac (4%)
40-100 years old	7,143 ac (77%)	6,915 ac (>74%)	7,009 ac (>75%)
101+ years old	1,092 ac (12%)	1,014 ac (11%)	1,021 ac (11%)
Acres of existing Forest Plan designated old growth or initial inventory old growth communities proposed for harvest	0	0	0
Acres of newly designated small patch old growth	0	51	608

### **3.10.4 Alternative C – Direct, Indirect, and Cumulative Effects**

No adverse effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested and about 608 acres would be designated as both large and small patch old growth communities and would not be scheduled for future harvest. The 608 acres of old growth proposed for designation is in addition to the 2,906 acres of designated Forest Plan Large Old Growth Patch #17.

## **3.11 Other Areas of Concern**

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### **3.11.1 Alternative A – Direct, Indirect, and Cumulative Effects**

Since no action is proposed under this alternative, there would be no direct, indirect, or cumulative effects to park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

### **3.11.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects**

There would be no measurable direct, indirect, or cumulative effects from any of these alternatives because none propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment. There are no other known foreseeable actions in the activity areas that could adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

## CHAPTER 4 – CONSULTATION WITH AGENCIES AND OTHERS

The following individuals helped develop this environmental assessment:

### 4.1 ID Team Members

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Sandy Burnet	-	Wildlife Biologist
Eric Crews	-	Landscape Architect
David Danley	-	Botanist
Brady Dodd	-	Hydrologist
Dave Dyson	-	Archaeologist
Cleve Fox	-	Fire/Fuels
Michael Hutchins	-	Team Leader
Barry Jones	-	Engineer
David McFee	-	Recreation
Ted Oprean	-	Project Leader
Lorie Stroup	-	Fisheries Biologist
Amber Vanderwolf	-	GIS

### 4.2 Government Agencies and Elected Officials Contacted

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Eastern Band of the Cherokee Indians;; NC Department of Administration; NC Department of Natural Resources; NC Department of Transportation; NC Division of Water Quality; NC State Troopers; NC Forest Service; NC Parks and Recreation; NC State Historic Preservation Office; NC Wildlife Resources Commission; US Fish and Wildlife Service

### 4.3 Others Contacted

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Over 210 members of the public were contacted and/or provided comments on the proposal during the scoping period that was initiated on February 26, 2008, and at the March 6, 2008, open house. A complete list of individuals and their comments is located in the project record.

# APPENDIX A – BIOLOGICAL EVALUATION

BIOLOGICAL

EVALUATION

OF THE

HARMON DEN PROJECT ENVIRONMENTAL ASSESSMENT

PISGAH NATIONAL FOREST

APPALACHIAN RANGER DISTRICT

HAYWOOD COUNTY

NORTH CAROLINA

Contact Person:

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Botanist

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Burnsville, North Carolina 28714

## I. INTRODUCTION

The purpose of this biological evaluation (BE) is to provide the decision maker with relevant biological information as to the possible effects this proposal may have to Federally Threatened, Endangered (T&E) and Regional Forester's Sensitive (S) species (TES).

This BE documents the possible biological effects of the Harmon Den Project Environmental Assessment (EA). Included within Alternative C (preferred alternative) are: using the existing classified road system, regenerating stands, removing the overstory of a stand, replacing a damaged culvert, moving a gate to a wildlife field, adding existing roads to the transportation system, decommissioning roads not needed for long-term management, closing some dispersed recreation sites, relocating the Cherry Creek trail, controlling/managing non-native invasive plants, performing timber stand improvement, site preparing regenerated stands, releasing naturally regenerated hardwoods, designating old growth community habitat, prescribe burning (see Section 2.2.3, Chapter 2 of the EA for a complete description of acreage, distances, procedures, and areas). Surveyed areas include proposed treatment areas as well as areas outside proposed treatment areas.

### A. LOCATION

The proposal is located within the Harmon Den Forest Plan analysis area (AA) 19 within Haywood County. There are several ways to access the AA: (1) via Interstate 40 to the Cold Springs Road (Forest Service Road – FSR) 148; (2) via Interstate 40 to North Carolina State Road 1338, to State Road 1334, to State Road 1182, and to FSR 148; or (3) from Hot Springs, North Carolina via State Road 209 to State Road 1175, to State Road 1881, and then to FSR 148. The Harmon Den AA is bounded by the Appalachian Trail and the North Carolina/Tennessee state boundary on the north, FSR 148 on the south and east, and Interstate 40 on the west.

## II. METHOD OF EVALUATION AND SURVEYS

Potentially affected current TES species and habitat were identified from the following sources:

- 1) Information on TES species and their habitat on the Nantahala and Pisgah National Forests were obtained from the North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) occurrence records.
- 2) Surveys completed for this analysis, past surveys, and analysis for projects within or near the analysis areas.
- 3) Consulting with individuals both in the public and private sector who are knowledgeable of the area and its biota.

### III. SURVEY INFORMATION

#### A. BOTANICAL SURVEYS

The proposed activity areas were surveyed by David M. Danley, Forest Botanist on: March 11, 13, 18 April 8, 9 May 19, 30 June 17, 18 July 6 2008. All proposed units or activity areas were visited at least once during this time.

Other relevant botanical surveys include: *Botanical Analysis of the Hurricane Timber Sale* (Danley, 1998); Skiffley Creek Timber Sale (USFS 1990); *Botanical Analysis Preacher Timber Sale* (Danley 1998); *Significant Natural Communities and Rare Plant and Animal Habitats of the Appalachian Trail Corridor in North Carolina and Tennessee* (Heiman, Karin 1998); *Inventory of Natural Areas of the French Broad Ranger District, Pisgah National Forest*. (Heiman, Karin 1995); and *A Natural Areas Inventory of Haywood County, North Carolina*(Oakley, Shawn C., 1996) and botanical inventories conducted by Josh Kelly (2008).

#### B. WILDLIFE SURVEYS

Extensive bird surveys were conducted over a three year period by Ted Simons and his students, US Geologic Service Cooperative Research Unit, along with three Region 8 bird points surveyed the past six years. Snail and salamander surveys were conducted by US Forest Service (USFS) employees Sandy Burnet (Wildlife Biologist), and Luke Decker and Kerri Lyda-Taylor (Forest and Biologic Technicians)—only common species were located within the activity areas. No spruce/fir habitat (associated with the northern flying squirrel) exists within the activity areas.

#### C. AQUATIC SURVEYS

Project information was obtained from USFS employee Ted Oprean (Silviculturist), USFS employees Lorie Stroup (Fisheries Biologist), Kerri Lyda-Taylor, (Biologic Technician) and Bryan King (Wildlife Technician) conducted aquatic habitat and aquatic macroinvertebrate surveys of the proposed aquatic project and AA in winter, spring, and summer months of 2007 and 2008. Fish surveys were conducted in cooperation with the District 9 fisheries biologist and fisheries technicians of the NC Wildlife Resources Commission's (NCWRC) Inland Fisheries Division as well as members of the environmental organization WildSouth.

The fish surveys were conducted in Cherry Creek (2008) and Groundhog Creek (2007). Survey information was available for other fish-bearing streams within the area; therefore no new surveys were conducted. All fish surveys were conducted using an electrofishing back pack shocking device. Other surveys consisted of examining streams within the aquatic activity areas, noting habitat quality, quantity, and suitability for rare aquatic and management indicator species (MIS), as well as existing impacts and their source. Pertinent information was also obtained from Josh Kelly, ecologist with WildSouth, who has distinct and personal knowledge of the fisheries in the area.

Virginia Commonwealth University, under contract by the USFS conducted odonate surveys across the Pisgah and Nantahala National Forests (2004). There is a sample site within Harmon

Den in the Pigeon River at the low water ford. This site is located just outside of the aquatic AA; however, it is a good representation of what odonate species occupy riverine habitat within this area. Ten different species of odonates were collected during the surveys—none of which were uncommon or listed as rare.

Additional information specifically addressing aquatic species was obtained from NCWRC biologists; North Carolina Natural Heritage Program (NCNHP) records; North Carolina Department of Environment and Natural Resources (NCDENR) Division of Water Quality aquatic biologists; and US Fish and Wildlife Service (USFWS) biologists.

## IV. EXISTING BIOLOGICAL CONDITION

A detailed review of species information and their habitats within the botanical, wildlife, and aquatic analyses areas is located in the project record and has been prepared based on the best available information at the present time.

### A. BOTANICAL

#### Natural Plant Communities and Habitats Found in the Harmon Den Forest Plan AA

The Harmon Den Forest Plan AA #19 has one major east-west trending ridge (Snowbird) that runs entirely through the northern edge of the AA. The highest points of this ridge are about 4,000 feet. Secondary north-south ridges extend from the main ridge downward to about 2,000 feet to Cold Springs Creek. The topography is typically steep with elevation changes of greater than 2,000 feet per mile. There are occasional flatter areas along ridges in some coves, and a notable area near the confluences of Cold Springs Creek and Fall Branch Creek.

The Forest Plan AA is dominated by deciduous forest community types. Natural, non-forested areas are very rare within this area—nearly all of these forests were logged near the turn of the last century. Additional areas were logged more recently. As a result, the forested communities of the Hurricane area are of a second (or third) growth nature. Even so, the existing forest represents a relatively diverse group of communities and plant species. Common throughout the AA are four natural communities: (1) Acidic Cove Forest, (2) Montane Oak-Hickory Forest, (3) Chestnut Oak-Scarlet Oak Forest, Pine-Oak Heath Forest, and (much less common) (4) Rich Cove Forest. The “community concept” and definitions follow closely that of Schafale (Schafale and Weakley, 1990) with modification from Newell’s works (Newell, 1995, 1996 1997). Almost all of the proposed activities occur within the Montane Oak-Hickory Forest and the Chestnut Oak Forest. These communities are not discussed or described further within this document (these communities are described within the Classification of Natural Communities of North Carolina-Third Approximation by Schafale and Weakley, 1990).

The primary natural communities affected by this proposal are the Chestnut Oak Forest, and Montane Oak-Hickory Forest communities. Within the Harmon Den AA, a pattern of natural communities is often encountered. On upper and mid elevation slopes Montane Oak-Hickory Forest is often dominant. This community normally grades into an Acidic Cove Forest on steep lower slopes. Chestnut Oak-Scarlet Oak Forest is found on dryer ridges or slopes. A Rich Cove Forest can occur in some east facing coves. On very steep and lower elevation and cove bottoms

Acidic Cove Forest or Chestnut-Scarlet Oak Forest are often encountered. The plant communities encountered in the flat alluvial area of the Cold Springs Creek and Fall Branch are discussed separately in the discussion of the “Cold Springs Bog” Another community, a Montane Acidic Cliff Community occurs rarely in the AA. This community, within the AA, is found mostly in the Fall Branch “natural area”.

Using (1) the natural vegetation predictive model (S. Simon, USFS); (2) CISC data (USFS); and (3) field experience, the acres of natural communities are estimated in Table A-1 within the botanical AA.

**Table A-1: Estimated Quantity of Communities within Botanical AA**

Community	Est. Acres/% of Total Habitat in AA	Acres Under 30 Years Old
Acidic Cove Forest	3,162 acres / 31%	177 acres
Chestnut Oak Forest/Pine Oak Heath	2,476 acres/ 24%	259 acres
Montane Oak-Hickory Forest	3,299 acres/ 32%	191 acres
Rich Cove Forest	145 acres/ 1%	0 acres
Other (High Elevation Red Oak Forest) Private, Etc. No data	1,263 acres/ 12%	0 acres
<b>Totals</b>	<b>10,345 acres</b>	<b>627 acres</b>

### TES Plant Species

One Regional Forester’s S species (*Hydrotheria venosa*, a lichen) is known to occur within the botanical AA; however, no TES plant species are known to occur within the activity areas. *Hydrotheria venosa* would not be negatively impacted by the proposal because they are sufficiently far enough away from the proposed activities that they will not be directly or indirectly impacted.

No other TES botanical species are known to occur within the botanical AA, but some may have potential habitat within in the AA. Of the 406 plant TES species known to occur or could occur within the Pisgah/Nantahala National Forest, all but one S (*Hydrotheria venosa*) plant species were dropped from further consideration, discussion, and analysis for one of the following reasons: (1) lack of suitable habitat for the species in the botanical AA; (2) the species has a well-known distribution that does not include the analysis area; or (3) based on field surveys no habitat or element occurrence of a TES was seen in the activity areas (see following table). Habitats, community types, and ranges of plant TES species are derived from information in *Classification of the Natural plant Communities of North Carolina*, the Natural Heritage Program's List of Rare Plants of North Carolina or information obtained through other botanist. The following table discloses known botanical TES species in the AA:

**Table A-2: Known TES Plant Species in the Botanical AA**

Species	Type	Natural Community or Habitat	Occurrence
<b>Federally Threatened or Endangered Plant Species (T &amp;E)</b>			
None Known	NA	NA	NA
<b>2002 Region 8 Regional Forester's Sensitive Plant Species (S)</b>			
<i>Hydrotheria venosa</i>	Lichen	Aquatic on rocks in fast moving streams.	Known to occur in AA south of Cold Springs Creek. Not known to occur in or near treatment areas.

A summary of natural communities found with the various activity areas is disclosed in the following table:

**Table A-3: Natural Communities and Sensitive Botanical Species by Stand or Activity**

Stand/ Activity	Natural Community or Habitat	Occurrence
451-12	Montane Oak-Hickory Forest with some Chestnut Oak Forest near ridges.	No known occurrence of any TES plant species.
451-22	Mostly Montane Oak-Hickory Forest	No known occurrence of any TES plant species.
451-19	Mostly Montane Oak-Hickory Forest (Harvested)	No known occurrence of any TES plant species.
451-7a	Chestnut Oak Forest, Montane Oak Hickory Forest small amount of Rich Cove Forest on NE corner.	No known occurrence of any TES plant species.
4517b	Mostly Montane Oak-Hickory Forest with elements of Rich Cove Forest in E facing Coves.	No known occurrence of any TES plant species.
459-10	Montane Oak-Hickory Forest with some Chestnut Oak Forest.	No known occurrence of any TES plant species.
459-12	Mostly Montane Oak-Hickory with some Chestnut Oak Hickory	No known occurrence of any TES plant species.
460-6	Mostly Montane Oak-Hickory Forest with Rich Cove Forest in E facing Coves.	No known occurrence of any TES plant species.
460-10	Mostly Montane Oak-Hickory with some Chestnut Oak Hickory. Acidic Cove Forest near drains.	No known occurrence of any TES plant species.
461-2	Mostly Montane Oak-Hickory Forest with Rich Cove Forest in E facing Coves.	No known occurrence of any TES plant species.
All roads, trail work etc.	Various, mostly Chestnut Oak Forest, Montane Oak-hickory and Acidic Cove Forest	No known occurrence of any TES plant species.
Rx Burns	Various. Mostly mostly Chestnut Oak Forest and Acidic Cove Forest	No known occurrence of any TES plant species.

### Proposed State Natural Heritage Areas, Research Natural Areas (RNA), Special (botanical) Areas

There are no known Research Natural Areas (RNA) or botanical special interest areas recognized by the current Forest Plan within the Harmon Den AA. Therefore, this proposal would have no effect to any of these areas.

There are two proposed North Carolina natural “inventory areas” within the AA. These inventories were conducted by the North Carolina Natural Heritage Program and published in *A Natural Areas Inventory of Haywood County, North Carolina* (Oakley, 1996). In the Pigeon River Gorge area, the Haywood County publication draws extensively from a previous work entitled *Inventory of Natural Areas of The French Broad Ranger District* (Hieman, 1995). These inventory natural areas are: Fall Branch Forests and Cold Springs Bog. These areas have been described in detail (Oakley, 1996) and their botanical significance given. Neither of these areas is within the proposed activity areas and would not be impacted by this proposal.

#### Cold Spring Bog Site

This site contains 100 acres. No activities are proposed in this area; therefore, there would be no effect to this inventory area.

#### Fall Branch Site

This site is 145 acres. No activities are proposed in this area; therefore, there would be no effect to this inventory area.

### Past Actions within the Botanical AA (Considered in Cumulative Effects)

Timber harvest (<40 years old), large wildfires (> 100 acres), and agricultural conversion are the only activities sufficient to have a measurable effect upon habitat for plant populations. Specifically the Preacher Timber Sale, Hurricane Timber Sale (in part), Skiffley Creek Timber Sale (in part), and the Tunnel Ridge wildfire.

## B. WILDLIFE

The wildlife analysis considered the Harmon Den analysis areas (AA) of 9,501 acres, in determining the habitat present and potential occurrence for Threatened, Endangered, and Regional Forester's Sensitive, (TES) species. The following table lists those species or their habitat found within Haywood County:

**Table A-4: Wildlife Species or Habitat Found Within Haywood County**

Species	Type & Status	Potential of Occurrence	Analyzed Further?
Gray Bat ( <i>Myotis grisescens</i> )	Mammal, E	No known roosting habitat within the analysis area	No
Carolina northern flying squirrel ( <i>Glaucomys sabrinus coloratus</i> )	Mammal, E	No known habitat within the analysis area	No
Rafinesque’s big-eared Bat ( <i>Corynorhinus rafinesquii</i> )	Mammal, S	Not recorded during bat surveys	No
Eastern small-footed bat	Mammal, S	Not recorded during bat surveys	No

Species	Type & Status	Potential of Occurrence	Analyzed Further?
<i>(Myotis leibii)</i>			
Bald eagle ( <i>Haliaeetus leucocephalus</i> )	Bird, S	Potential habitat outside the analysis area	No
Peregrine Falcon ( <i>Falco peregrinus</i> )	Bird, S	Potential habitat outside the analysis area	No
Diana Fritillary ( <i>Speyeria Diana</i> )	Insect, S	No record within AA, none observed during surveys	No
Southern rock vole ( <i>Microtus chrotorrhinus carolinensis</i> )	Mammal, S	Potential habitat outside the proposed activity areas	No
Southern water shrew ( <i>Sorex palustris punctulatus</i> )	Mammal, S	High Potential Habitat in the vicinity of Cherry Creek	Yes

## C. AQUATIC

### Aquatic Habitat

Substrate within the activity area waters was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for proposed TES species as well as other aquatic organisms. Un-named tributaries are listed as (UT). The following table discloses stream information in the Harmon Den AA:

**Table A-5: Forest Plan Watershed 32 (Pigeon River)**

Stream Name	Stand	Project (mi)	Analysis (mi)	DEM Classification*
Groundhog Creek			1.95	C;Tr
Chestnut Orchard Branch	460-10	0.36	1.43	C;Tr
UT 1	460-10	0.15	0.53	C;Tr
UT 2	460-10	0.15	0.60	C;Tr
UT 3	460-10	0.23	0.33	C;Tr
Rube Rock Branch	461-2		1.80	C
UT 1	461-2	0.30	0.83	C
UT 2	461-2	0.15	0.43	C
	461-30	0.30		C
UT 3	461-2		0.20	C
Pounding Mill Branch	459-10	0.45	0.98	C;Tr
UT 1	459-10	0.30	0.38	C;Tr
	459-12	0.15		C;Tr
Cold Springs Creek	451-22	0.45	7.05	C;Tr
UT 1	459-12		0.65	C;Tr
UT 2	451-12	0.38	0.98	C;Tr
	451-22	0.23		C;Tr
UT 3	451-22	0.15	0.30	C;Tr
UT 4	451-12	0.15	0.38	C;Tr
	451-22	0.15		C;Tr
UT 5	451-19	0.09	0.54	C;Tr
Cherry Creek	451-7A	0.23	1.88	C;Tr

Stream Name	Stand	Project (mi)	Analysis (mi)	DEM Classification*
UT 1			0.53	C;Tr
UT 2	451-7B	0.30	0.6	C;Tr
UT UT 2			0.15	C;Tr
UT 3	451-7B	0.23	0.30	C;Tr
<b>Total</b>		<b>4.9</b>	<b>22.82</b>	

\*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The "Tr" classification is a supplemental classification intended to protect freshwaters which have conditions which shall sustain and allow for trout propagation and survival of stocked trout on a year-round basis.

In the Harmon Den analysis area, landforms can be characterized as Valley Types I and II using the Rosgen (1996) classification. Typical for these valley types, the drainages in the area have predominantly stable stream types characterized as "A" and "B" depending on the valley type that they occur. These stream types are stable with a low sediment supply due to abundant stream side vegetation and gravel to boulder sized substrate.

Existing old roads and skid trails are existing potential threats to streams and drainages within the Harmon Den AA. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. In most cases, it is suspected that a majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams. In surveying the Harmon Den Project Area, the roads were generally in good, stable condition with a few exceptions. There were some drainage concerns on a few roads that would be corrected prior to haul activities. These include but are not limited to a drainage ditch concern on Forest Service Road (FSR) 148A; an undersized culvert with potential for undercutting on FSR 352; an undersized culvert in UT Cold Springs on FSR 3580A, which is emptying some water on to the road bed itself; another undersized culvert on FSR 3580A, which has water scouring under and around the existing pipe; and the spur road accessing Stand 451-22 which needs additional drainage culverts installed to correct standing water on the road.

The culvert located in Cherry Creek on Cold Springs Road (FSR 148) will also be repaired as a part of the Harmon Den Project. This crossing is currently unstable and causing some erosion issues. The existing crossing is restricting non-native brown and rainbow trout from the upper reaches of Cherry Creek which is optimal as this creek has been identified for brook trout restoration (completed September 2008).

### Aquatic TES Species

Fifteen rare aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Haywood County. These 15 species, which are one Endangered (E) mussel, no sensitive and 14 Forest concern are included in Attachment 2. Attachment 2 contains occurrence information for rare aquatic species on the Pisgah National Forest. Of the 15 aquatic species included on the original list for analysis, 11 were dropped as a result of a low likelihood of occurrence evaluation based on preferred habitat elements and field survey results. The following table lists aquatic species for Haywood County and indicates their occurrence within the activity and/or analysis area.

**Table A-6: Threatened and Endangered Species, Sensitive Species, and Forest Concern Species in Haywood County**

Species	Type	Habitat	Occurrence
<b>Federally Threatened and Endangered Species</b>			
Appalachian elktoe ( <i>Alasmidonta raveneliana</i> )	Mussel	Lotic-fast, clean substrate rivers	Does not occur
<b>2005 Region 8 Regional Forester's Sensitive Species List</b>			
NONE			

**Aquatic T&E**

Three aquatic T&E species are either known to occur, or with potential or high potential for occupancy on the Pisgah and Nantahala National Forests. The North Carolina Heritage database was queried for occurrences of T&E species for Haywood County. One species remained after this initial filter, *Alasmidonta raveneliana* (Appalachian elktoe). This species inhabits riverine habitat which exists only downstream (and outside of) the Harmon Den aquatic analysis area in the Pigeon River. No *Alasmidonta raveneliana* have ever been documented in this section the Pigeon River which is below the Waterville Reservoir Dam. Influences from historical dam construction have limited the occupied habitat for many freshwater mussels including *Alasmidonta raveneliana*. Extensive surveys of this area by both USFS, NCWRC, University of Tennessee, and others confirm that the area of the Pigeon River below the Harmon Den aquatic AA is not occupied habitat for *Alasmidonta raveneliana*. Therefore, this species has been eliminated from further analysis.

**Aquatic S**

There are eighteen aquatic S species either known to occur, or with potential or high potential for occupancy on the Pisgah and Nantahala National Forests. The North Carolina Natural Heritage Database was queried for occurrences of S species in Haywood County. No S aquatic species remained after this initial filter.

**V. EFFECTS/IMPACTS OF PROPOSED MANAGEMENT ON TES SPECIES**

This section and the following table summarize the effects/impacts to TES species. Other ecological effects/impacts or possible effects/impacts to other species may be found within individual biologic resource reports.

**Table A-7: Summary of Effect/Impact to TES Species Known or Have a High Potential for Occupancy in Biological AAs\***

Species	Type	Effects/Impacts
<b>Federal T&amp;E Species</b>		
Gray Bat ( <i>Myotis grisescens</i> )	Mammal	No potential effects because no proposed activity in Pigeon River
<b>2002 Region 8 Regional Forester's S Species List<sup>1</sup></b>		
<i>Hydrothera venosa</i>	Lichen	Occurs in the analysis area but activity areas (no impacts)
Southern water shrew ( <i>Sorex palustris punctulatus</i> )	Mammal	No impact to individuals with improvement to Cherry Creek trail. Potential adverse impacts to habitat in the short-term, but long-term habitat improvement

\* There are no aquatic TES species in the analysis area.

In recent years bat surveys have been conducted by NCWRC employees at the confluence of Pigeon River and Cold Springs, where USFS surveys four years ago indicated the gray bat was present. The gray bat occurrence has been documented by NCWRC employees who surveyed all cave potential within the surrounding area and no hibernacula were found. Gray bats are cave residents year-round, although different caves are usually occupied in summer and winter. Few have been found roosting outside caves. The species' present total population is estimated to number over 1,500,000; however, about 95 percent hibernate in only eight caves—two in Tennessee, three in Missouri, and one each in Kentucky, Alabama, and Arkansas. There would be no effect to this species or its habitat by any alternative because it was not located in activity areas.

**A. EFFECTS/IMPACTS TO TES PLANT SPECIES**

There are no effects/impacts to TES plant species because there are no known species, or their habitats, within, or close to, the activity areas (botanical report, project record and Table A-7 above). There would be no direct, indirect, or cumulative effects/impacts to these species and habitats because the proposed activities are far enough removed from them to be affected/impacted by the proposed actions.

**Direct Effects/Indirect Effect/Impact to Potential Habitat for TES Plants**

This discussion summarizes the possible effect/impact on potential, or “apparently suitable habitat” for TES plant species known to occur within the botanical AA. This analysis is based upon current knowledge of species habitat parameters. Usually, these parameters are very broad habitat concepts. This definition does **not** imply species occupancy or “high potential for occupancy” in those areas. It examines potential suitable habitat based upon a predictive model of general forest communities and current knowledge of species habitat parameters within the AA. Species occupancy could be none or a very small percentage of these potential habitat acres. For example, *Carex pedunculata* (longstalk sedge) is known to occur from only one small (<2 acres) population on the Forest. Since this population is found within Rich Cove Forest, the potential habitat is all known Rich Cove Forest within the Forest (56,223 acres). The known Forest occupancy for this species is then 3 one thousandths of a percent (0.003%). This example is typical of many TES plant species with broad habitat definitions. As habitat definitions and botanical surveys become more complete, estimation of potential habitat may become more precise. The following table summarizes the results of this analysis within the botanical AA.

**Table A-8: Effect Upon Potential Habitat for TES Plant Species within Botanical AA (Alternative C)**

Species	Natural Community or Habitat	Predicted Potential Acres Existing condition	Acres of Potential Habitat Impacted, % of Area Total (Alternative C)
<b>Federal T&amp;E Plant Species</b>			
None	N/A	None	None
<b>2002 Region 8 Regional Forester’s S Plant Species</b>			

Species	Natural Community or Habitat	Predicted Potential Acres Existing condition	Acres of Potential Habitat Impacted, % of Area Total (Alternative C)
<i>Hydrothera venosa</i>	Aquatic – occurs on rocks in fast shallow streams	<1 acre	None, No %

### Cumulative Effect/Impact to Potential Habitat for TES Plants

The cumulative effect to potential habitat is the total affect of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected TES plant species potential habitat. Within the botanical AA, only timber harvest and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed (2004 hurricane and storm road repair, special forest product permits, hemlock woolly adelgid control, public recreation, etc.).

Past timber harvest and clearing activities greater than 50 years old are thought to be recovered for forest species requiring more mature habitat conditions and unsuitable for species requiring early successional habitat. The following table summarizes these impacts of proposed harvest actions and past harvest actions less than 50 years old.

**Table A-9: Summary Cumulative Impact of Past & Future Timber Harvest Upon Potential Suitable Habitat Sensitive Plant Species Known within Botanical A.A**

Regionally Sensitive Plant Species Potential Habitat, Alternative C						
Habitat	Total Acres in AA	Associated Species	Past impact(s) (<50 years old)	Proposed Impact(s) in acres	Future Impact(s)	Total Impact/ % of Total Habitat in AA
Acidic Cove Forest	3,162	None in AA	177 acres	1 acre	None known	178 acres/>6%
Rich Cove Forest	3,299	None in AA	0 acres	4 acres	None known	4 acres/>1%
Pine Oak Heath/ Chestnut Oak Forest	2,476	None in AA	259 acres	25 acres	None known	284 acres/11%
Montane Oak Hickory	3,299	None in AA	191 acres	175 acres	None known	366 acres/11%
Streams	105	<i>Hydrothera venosa</i>	0 acres	0 acres	None known	Habitat not affected
Other (High Elevation Red Oak Forest) Private, Etc. No data	1,263	None in AA	0 acres	0 acres	None known	Habitat not affected

## B. WILDLIFE TES SPECIES

### Direct/Indirect Effects/Impacts to Wildlife TES Species

#### Southern Water Shrew

The southern water shrew (*Sorex palustris punctulatus*) is likely present in a 20-50 foot corridor surrounding China Creek and Skiffley Creek. Dr. W. Mark Ford, Research Wildlife Biologist with the USDA Northern Research Station is a recognized expert on this species. Dr. Ford stated the water shrew is very hard to catch and there would be collateral damage (killing) to northern short-tailed shrew, smoky shrews, and woodland jumping mice if trapping was to occur. In his opinion, any trapping effort would probably not catch a water shrew. Therefore, trapping to confirm the presence of this sensitive species was determined to be unrealistic and unnecessary due to existing protection afforded to perennial stream corridors under the Forest Plan.

### **Cumulative Effects/Impacts to Wildlife TES Species**

#### **Southern Water Shrew**

The proposed timber harvest activities would not impact water shrew because harvesting is not proposed within 100 foot corridors on either side of perennial streams. The proposal to relocate the Cherry Creek Trail out of Cherry Creek would reduce or eliminate sedimentation; as the riparian area recovers it is expected to improve water shrew habitat in the long-term. Relocating the trail would involve the Pisgah Zone Wildlife Biologist to ensure water shrew habitat is not adversely impacted.

The hemlock wooly adelgid infestation would not impact water shrew directly; however, the loss of hemlock trees within riparian areas is expected to create openings and eventually increase downed woody debris within streams and stream corridors. The natural loss of these trees would indirectly cause habitat to increase for water shrew as available protective cover and aquatic food availability increases.

Prescribed fire or wildfires rarely enter riparian areas and burn at lower intensities with lower severity in these moist environments. Water shrews are mobile and can escape into water, under rocks, or downed trees. Since it is rare for fire to occur or enter riparian areas, there is a low likelihood of adverse impacting the water shrew. Therefore, impact to water shrews and its habitat by fire is not expected to be measurable.

No additional past or foreseeable future actions will impact the water shrew.

No additional TES wildlife species or their habitat are located within the activity areas and therefore, would not be impacted.

### **C. EFFECTS/IMPACTS TO TES AQUATIC SPECIES**

There were no aquatic TES found or known to occur within the activity and AA; therefore, there would be no effects/impacts.

## **VI. PROJECT DESIGN FEATURES/ REQUIRED MITIGATION**

### **Botanical Species**

The preferred alternative needs no specific project design features to protect plant TES species. In addition, there are no mitigation measures recommended for plant TES species.

### **Wildlife Species**

The preferred alternative needs no specific project design features to protect wildlife T&E species. There are no mitigation measures recommended for wildlife TES species. The preferred alternative needs the following specific project design feature to ensure protection of wildlife S species:

- Planning for the relocation of the Cherry Creek Trail would involve the Forest Hydrologist, the Pisgah Zone Fisheries Biologist, and the Pisgah Zone Wildlife Biologist

### **Aquatic Species**

The preferred alternative needs no specific project design features to protect aquatic TES species. There are no mitigation measures recommended for aquatic TES species.

## **VII. DETERMINATION OF EFFECT**

This proposal would have no effect upon any federally listed (T&E) species. No T&E species or their habitat is known to occur in or near enough the proposed activities to be affected by this proposal. Formal consultation with the US Fish and Wildlife Service is not required.

Relocating the existing Cherry Creek Trail would ultimately improve habitat for the southern water shrew, a Regional Forester's S species. No additional past or foreseeable future actions would impact the water shrew. Therefore, it was determined that any alternative considered in the Harmon Den environmental assessment will not impact water shrews or their habitat.

No additional Regional Forester's S species or their habitat would be impacted by the proposal.

### **Prepared By**

*/s/ David Danley*

*September 15, 2008*

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## DEFINITIONS

Threatened, or Endangered (T&E) is a species that has been listed or is proposed for listing by the United States Fish and Wildlife Service. These species are included in every BE conducted for projects where the species is known to, likely to, or may occur. These species are also included in projects where the species occurred historically but hasn't been found during recent surveys.

Sensitive species (S) is a species appearing on the Regional Forester's Sensitive Species List for the Southern Region (August 7, 2001). These species are included in every BE conducted for projects within an area where the species is known to, likely to, or may occur.

Known to occur: those species in which there are records that they exist within a specified area, or it was found in the area during project specific surveys.

High Potential for Occupancy: those species in which there is no documentation of the species occurring in a specified area but are expected to occur based on documentation of very similar habitat to known populations. For purposes of the BE, it should be assumed that the species does occur in specified area until presence/absence of the species is verified.

Potential for Occupancy: the species probably occurs in a specified area in the broadest sense. Only very general habitat preferences and species distribution are used to determine if a species may occur. This does not imply their existence in an area, but that their general habitat description is found in the area, so therefore the species may occur. See the attached resource reports for "may occur".

Forest Plan Analysis Area (AA): 4<sup>th</sup> order watersheds as determined by the Forest Plan.

Biological Analysis Area: The maximum geographic boundary where cumulative biological effects of analyses from past, present, and reasonably foreseeable actions are expected to be combined with effects from the proposal. Analysis areas are specific to individual resources and may be different boundaries. The **wildlife biological analysis area (AA)** is the Forest Plan analysis area #19 (AA), Harmon Den Project is located in Haywood County, North Carolina. The wildlife treatment area is defined as the area where proposed ground disturbing actions are proposed.; the **botanical biological AA** or "boundary of effects" used for this proposal is defined as: the total area within 2 kilometers of any proposed unit (treatment area) or known EO (Element occurrence) of any plant TES and FC species. The botanical AA consists of 10,345 acres – more than the 9,501 acre Forest Plan AA boundary. All potential effects (direct, indirect and cumulative) to botanical resources in the botanical AA were analyzed using this "boundary". The botanical AA definition was selected because it is analogous to the Natural Heritage Program and The Nature Conservancy's plant delimitation guidelines of EO. Other resource disciplines may employ different definitions to analyze this proposal; and the **aquatic biological AA** addresses activity area waters and analysis area (AA) waters. Treatment area waters are defined as those in the area of potential site-specific impacts to aquatic habitat and populations.

The AA encompasses waters downstream that potentially could be impacted by project activities, in addition to treatment area waters. The AA is larger than the treatment area.

Management Area: Forest Plan designated areas with specific management objectives, standards, and guidelines.

Project Area: The general location identified by the Responsible Official where actions are proposed.

Treatment Area: The geographic boundary where direct effects of the proposal would specifically occur, i.e. specific timber stands, haul routes, temporary roads, linear wildlife fields, trails, prescribed fire, areas where invasive exotic species would be treated, etc. and would change by alternative.

Coldwater Streams: Are usually defined as those with maximum temperatures of 68 degrees F or less. In North Carolina, these streams are largely ground-water fed, have relatively stable flows and generally elevations of 1,100 feet or more. They have gradients that are steep with stable banks. Boulder-rubble dominates their bottoms, and their turbidity is low. Productivity is usually limited.

Coolwater Streams: Represent the transitional community between coldwater streams and warmwater streams. Components of the community may include elements of both coldwater and warmwater habitats.

Warmwater Streams: Are characterized by having annual maximum temperatures greater than 68 degrees F.

Classified (system) Road: Roads wholly or partially within or adjacent to National Forest System Lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service.(36 CFR 212.1, FSM 7705)

Log Landing (log deck): a cleared area to which logs or stems are yarded to, a processing operation is performed, and loading of logs onto a transport vehicle for haul to a mill occurs.

Unclassified (non-system) Roads: Roads on National Forest System Lands that are not managed as part of the forest transportation system, such as unplanned roads, abandoned travelways, and off-road vehicle tracks that have not been designated and managed as a trail; and those roads that were once under permit or other authorization and were not decommissioned upon the termination of the authorization. (36 CFR 212.1, FSM 7705)

Temporary Road: Road authorized by contract, permit, lease, other written authorization, or emergency operation not intended to be a part of the forest transportation system and not necessary for long-term resource management. (36 CFR 212.1, FSM 7705)

Haul Road: A road capable of accommodating the transport of logs or products loaded onto a highway legal motor vehicle (a motor vehicle travelway over 50 inches wide, unless designated and managed as a trail). A road may be classified, unauthorized, or temporary. (36 CFR 212.1, FSM 7705)

Skid Road: Road cut through the woods for skidding. This is usually assumed to be a skidding pathway that has had excavation of material in order to facilitate the safe passage of the skidding operation.

Skid Trail: Skidder path through the woods. This is usually assumed to mean a pathway made by the skidding of a turn(s) in which no excavation of material was performed to facilitate the skidding operation.

Preservation: This visual quality objective allows ecological changes only. Management activities, except for very low visual-impact recreation facilities, are prohibited.

Retention: This visual quality objective provides for management activities which are not visually evident. Under retention activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident.

Partial Retention: Management activities are visually evident but subordinate to the characteristic landscape when managed according to the partial retention visual quality objective. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Modification: Under the modification visual quality objective management activities may visually dominate the original characteristic landscape. However, activities of vegetative and land form alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area or character type.

Maximum Modification: Management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color, or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground.

## APPENDIX B – AGE CLASS DISTRIBUTION

The Harmon Den Project is located in the Appalachian Ranger District Analysis Area 19 (9,501 GIS acres), Compartments 451 (1301 ac), 459 (1,247 ac), 460 (1,018 ac), 461 (1,369 ac), 470 (1,187 ac), 471 (628 ac), 472 (824 ac), 473 (1,403 ac) and 474 (524 ac). Analysis Area 09 contains Management Areas; MA 2A motorized recreation and timber management emphasis, MA 3B timber management emphasis, MA 4A scenery and timber management emphasis, MA 4D wildlife and timber management emphasis, MA 5 non-motorized recreation emphasis, MA 14 Appalachian Trail emphasis and MA 18 aquatic and riparian ecosystems emphasis, MA18 is embedded within the other management areas.

Management Area 5, emphasis is on providing large blocks of backcountry where there is little evidence of other humans or human activities other than recreation use. This area is unroaded (Forest Plan, page III-89). MA 5 dominates Analysis Area 09 occupying 30% (~2857 acres) of the total land area and is found in Compartments: 470, 471, 473 and 474.

Management Area 3B, emphasizes sustainable supply of timber, but with few open roads and limited disturbance associated with motorized vehicles (Forest Plan, page III-71) and is 25% (~2428 acres) of Analysis Area 09. MA 3B is found in Compartments: 451 (55%), 459 (37%) & 461 (74%). Inventory data shows that the age-class distribution is unbalanced for MA 3B in Analysis Area 09 with no 0-10 age class present.

Management Area 4D, emphasizes high quality wildlife habitat, with timber management to provide early successional habitat (Forest Plan, page III-78) and is 21% (~2032 acres) of Analysis Area 09 (33%). MA 4D is found in Compartments: 460, 471, and 472.

Management Area 2A, emphasis is providing pleasing scenery with open roads and permits timber management that is modified to meet visual quality objectives (Forest Plan, page III-63) and is 8% (~717 acres) of Analysis Area 09. MA2A is found in Compartments: 451 and 459.

Management Area 4C, emphasis is to provide visually pleasing scenery and habitats for wildlife requiring older forests. This land is not suitable for timber management at this time (Forest Plan, page III-77) in order to meet visual quality objectives, or the lands are not cost efficient for timber production. MA 4C is 6% (~544 acres) of Analysis Area 09 and is found in Compartments: 459, 460, 461, 471 & 472.

Management Area 14 consists of the Appalachian National Scenic Trail and its foreground zone as mapped through the Visual Management System. MA 14 is 10% (~923 acres) of Analysis Area 19 and is found in Compartments: 451, 459, 460, 471, 472 & 473.

**Table B-1: Analysis Area 19 Acres by Compartment and Management Area**

Compartment	Total Acres	Acres MA 2A	Acres MA 3B	Acres MA 4C	Acres MA 4D	Acres MA 5	Acres MA 14	% Analysis Area 19
451	1,301	452	710				139	14%
459	1,247	265	701	102			179	13%
460	1,018			15	898		105	11%
461	1,369		1017	352				14%
470	1,187					1187		12%
471	628			64	454	91	19	7%
472	824			11	680		133	9%
473	1403					1,055	348	15%

Compartment	Total Acres	Acres MA 2A	Acres MA 3B	Acres MA 4C	Acres MA 4D	Acres MA 5	Acres MA 14	% Analysis Area 19
474	524					524		5%
<b>Totals</b>	<b>9,501</b>	<b>717</b>	<b>2,428</b>	<b>544</b>	<b>2,032</b>	<b>2,857</b>	<b>923</b>	<b>100%</b>
% AA by MA		8%	25%	6%	21%	30%	10%	100%

This analysis is to determine the maximum harvest levels for the project area according to the Forest Plan. Both action alternatives would help to balance the age-class distribution to a lesser or greater degree.

### Forest Plan Direction for Distribution of Early Successional Habitat

The Forest Plan contains specific desired conditions for the amount of 0-10 year age-class in management areas suitable for timber production, 1B and 3B - at least 5% not to exceed 15%, 2A -at least 5% not to exceed 10% and 4A and 4D - not to exceed 10%, (Forest Plan Amendment 5, pages 29-32). The amount of 0-10 age class is regulated at three geographic scales: the analysis area; the management area within the analysis area; and the compartment(s) within the analysis area. Projects which create 0-10 year age class must meet analysis area, management area, and compartment regulations as directed by the Land and Resource Management Plan (Forest Plan) Amendment 5.

The tables below summarize the existing 0-10 year age-class and regeneration goals for Analysis Area 09 Appalachian Ranger District and for the Harmon Den Project in Compartments 451, 459, 460, 461, 471 and 472 which contain acres suitable for timber management. Acres in management areas not suitable for timber management are not considered in the analysis of 0-10 year old regeneration at the analysis area scale.

### Analysis Area Level Analysis

For every analysis area with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the amount of 0-10 year age class allowed in the analysis area is calculated as follows:

For Management Areas 1B, 2A, 3B, 4A and 4D multiply the number of acres in each MA by the maximum percent allowed:

$$\begin{array}{rcl}
 1B \ \& \ 3B & \sim 2,428 \text{ acres} \times 15\% & = 364 \text{ acres} \\
 2A & & \sim 717 \text{ acres} \times 10\% & = 72 \text{ acres} \\
 \underline{4A \ \& \ 4D} & & \sim 2,032 \text{ acres} \times 10\% & = 203 \text{ acres} \\
 & & \mathbf{5,177} & \mathbf{639 \text{ acres}}
 \end{array}$$

For Management Areas 1B, 2A, 3B, 4A and 4D multiply the number of acres in each MA by the minimum percent allowed:

$$\begin{array}{rcl}
 1B \ \& \ 3B & \sim 2,428 \text{ acres} \times 5\% & = 121 \text{ acres} \\
 2A & & \sim 717 \text{ acres} \times 5\% & = 36 \text{ acres} \\
 \underline{4A \ \& \ 4D} & & \sim 2,032 \text{ acres} \times 0\% & = 00 \text{ acres} \\
 & & \mathbf{5,177} & \mathbf{157 \text{ acres}}
 \end{array}$$

The sum of these is the amount of 0-10 year age class allowed in the analysis area.

**Table B-2: Analysis Area 09 Calculations for 0-10 Year Age-Class**

Analysis Area	Suitable Acres 1B, 2A, 3B, 4A & 4D	0-10 Year Age-Class <sup>1</sup>			Harvest Goals	
		Min. Allowed	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
19	5,177	157	639	00	157	639

1 – Minimum and maximum 0-10 allowed may not exceed levels allowed under Compartment analysis, thus the lower number than 5%-15% allowed in each Analysis Area

## Management Area Analysis

For every Management Area with at least 250 acres in the Analysis Area, the amount of 0-10 year age-class allowed in the Management Area is calculated by multiplying the number of acres in each Management Area in the Analysis Area by the maximum percent allowed. Each result is the amount of 0-10 year age-class allowed in that Management Area.

**Table B-3: Management Area Calculations 0-10 Year Age-Class Appalachian District Analysis Area 09 (Compartments 451, 459, 460, 461, 470, 471, 472, 473 & 474)**

Mgmt. Area	Forested Acres	0-10 Year Age-Class			Harvest Goals	
		Min. Allowed <sup>1</sup>	Max. Allowed <sup>1</sup>	Existing 0-10 Yr.	Min.	Max.
1B, 3B	2,428	121	364	0	121	364
4A, 4D	2,032	-	203	0	0	203
2A	717	36	72	0	36	72
2C, 4C, 5, 14	4,324	0	0	0	0	0
<b>Totals</b>	<b>9,501</b>	<b>157</b>	<b>639</b>	<b>0</b>	<b>157</b>	<b>639</b>

1 – Minimum and maximum 0-10 allowed cannot exceed levels allowed under Compartment analysis, thus the number lower than 5%-15% allowed in the Management Areas

## Compartment Area Analysis

For every compartment with at least 250 acres in Management Areas 1B, 2A, 3B, 4A, or 4D, the amount of 0-10 year age-class allowed in each compartment is calculated by first determining which MA has the most acres in the compartment (1B, 3B, 2A, 4A, or 4D). If 1B and 3B have the most, then the maximum 0-10 year age-class is 15 percent of all acres in the compartment. If 2A, 4A, or 4D have the most acres, then the maximum amount allowed 0 – 10 year age-class is 10 percent of all acres in the compartment. The following table displays the allowable 0 - 10 age-class by compartment:

**Table B-4: Appalachian District Analysis Area 09 Compartments 451, 459, 460, 461, 470, 471, 472, 473 & 474 0-10 Year Age-Class**

Compartment	Mgmt. Area	Forested Acres	0-10 Year Age-Class			Harvest Goals	
			Min. Allowed	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
451	2A, 3B & 14	1301	58	195	0	58	195
459	2A, 3B, 4C & 14	1247	48	187	0	48	187
460	4C, 4D & 14	1018	0	102	0	0	102
461	3B, 4C & 14	1369	51	205	0	51	205

Compartment	Mgmt. Area	Forested Acres	0-10 Year Age-Class			Harvest Goals	
			Min. Allowed	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
470	5	1187	0	0	0	0	0
471	4C, 4D, 5 & 14	628	0	63	0	0	63
472	4C, 4D & 14	824	0	82	0	0	82
473	5 & 14	1403	0	0	0	0	0
474	5	524	0	0	0	0	0
<b>Totals</b>		<b>9,501</b>	-	-	-	-	-

Note: Maximum acres allowed in an individual Compartment is based on either 10% or 15% as determined by Management Area.

### Comparison of Alternatives for Early Successional Habitat

Table B-5 compares the proposed regeneration harvest for all the alternatives by acres and % of forested land for the 3 geographic scales.

**Table B-5: Percent of 0-10 age-class distribution by Alternative of Proposed Timber Harvest- Base Year 2009**

A L T	Acres Proposed Harvest & % 0-10At Compartment Scale									% 0-10 at MA Scale 5,177 ac	% 0-10 at AA Scale 9,501 ac
	451 1,301 ac	459 1,247 ac	460 1,018 ac	461 1,369 ac	470 1,187 ac	471 628 ac	472 824 ac	473 1,403 ac	474 524 ac		
<b>A</b>	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	<b>000 ac 0.0 %</b>	<b>0.0 %</b>
<b>B</b>	93 ac 7.1 %	53 ac 4.3 %	50 ac 4.9 %	71 ac 5.2 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	<b>267 ac 5.2 %</b>	<b>2.8 %</b>
<b>C</b>	83 ac 6.4 %	34 ac 2.7 %	24 ac 2.4 %	31 ac 2.3 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	000 ac 0.0 %	<b>172 ac 3.3 %</b>	<b>1.8 %</b>

Analysis Area: Both action alternatives meet the minimum percent of 0-10 age class by Analysis Area, but the No-Action Alternative does not. The minimum number of acres of 0 -10 age class is needed for AA09 is157 acres or 1.7% of the Analysis Area.

The comparison of alternatives in Table 6 below shows that Alternatives B and C meet Forest Plan Amendment 5 Direction and Standards for regulating the 0-10 age class distribution at the Analysis Area geographic scale.

**Table B-6: Comparison of Alternatives by Age-Class Distribution for Analysis Area – Base year 2009**

Alternative	Acres Regeneration Harvest	Acres of Existing 0-10 in Analysis Area	Total Acres of 0-10 in Analysis Area	Meets FLRMP Direction for 157 Acres Minimum @ Analysis Area Level
A	0	0	0	NO
B	267	0	267	Yes
C	172	0	172	Yes

Management Area: Only Alternative B meets Forest Plan direction for minimum 0-10 age class acres at the Management Area Level. The minimum acreage to meet Forest Plan direction for

AA09 is 157 acres or 3% of the suitable acres within AA09. Alternatives A (No Action) and C (Visuals) do not meet the minimum acres of 0-10 as directed by the Forest Plan. Alternative C meets Forest Plan Standards for MA 2A but falls short by 24 acres for MA 3B. Tables B-7 and B-8 show that only Alternative B meets Forest Plan Direction for 0-10 age class distribution at the Management Area Level for Management Area 3B

**Table B-7: Comparison of Alternatives by 0-10 Age-Class Distribution for Management Area 2A**

Alternative	Acres Regeneration Harvest MA 2A	Acres of Existing 0-10 in MA 2A	Total Acres of 0-10 in MA 2A	Meets FLRMP Direction for 36 Acres Minimum & 72 Acres Maximum at the Management Area 2A Level
A	0	0	0	NO
B	51	0	51	Yes
C	51	0	51	Yes

**Table B-8: Comparison of Alternatives by 0-10 Age Class Distribution for Management Area 3B**

Alternative	Acres Regeneration Harvest MA 3B	Acres of Existing 0-10 in MA 3B	Total Acres of 0-10 in MA 3B	Meets FLRMP Direction for 121 Acres Minimum & 364 Acres Maximum at the Management Area 3B Level
A	0	0	0	NO
B	166	0	166	Yes
C	97	0	97	NO

**Compartment Level:** Of the 7 Compartments that make up Analysis Area 09 only 3 are required to maintain a minimum number of acres in the 0-10 age class distribution, these are: Compartments 451, 459 and 461 all of which contain either MA 2A and/or 3B which must maintain a minimum of 5% of the Compartment acres in 0-10 age class. Compartments 460, 470, 471, 472 and 474 are managed under Management Areas 4C, 4D, 5 and 14 which do not require maintaining a minimum number of acres in 0-10 age class. Although none of the Alternatives fully meet Forest Plan Direction; Alternative B is close with only Compartment 459 being under by 11 acres.

**Table B-9 displays the results of proposed regeneration by Alternative (Ref. Table B-4 for minimum and maximum acres by Compartment)**

Comp.	Mgmt. Area	Forested Acres	0-10 Year Age-Class			Harvest Goals		Alternatives		
			Min. Allowed	Max. Allowed	Existing 0-10 Yr.	Min.	Max.	A Meets Forest Plan	B Meets Forest Plan	C Meets Forest Plan
451	2A, 3B & 14	1,301	58	195	0	58	195	0 ac 0% NO	93 ac 7.1% YES	83 ac 6.4% YES
459	2A, 3B, 4C & 14	1,247	48	187	0	48	187	0 ac 0% NO	53 ac 4.3% NO	34 ac 2.7% NO
460	4D, 4C & 14	1,018	0	102	0	0	102	0 ac 0% YES	50 ac 4.9% YES	24 ac 2.4% YES

Comp.	Mgmt. Area	Forested Acres	0-10 Year Age-Class			Harvest Goals		Alternatives		
			Min. Allowed	Max. Allowed	Existing 0-10 Yr.	Min.	Max.	A Meets Forest Plan	B Meets Forest Plan	C Meets Forest Plan
461	3B, 4C & 14	1,369	51	205	0	51	205	0 ac 0% NO	71 ac 5.2% YES	31 ac 2.3% NO
470	5	1,187	0	0	0	0	0	0 ac 0% YES	0 ac 0% YES	0 ac 0% YES
471	4C, 4D, 5 & 14	628	0	63	0	0	63	0 ac 0% YES	0 ac 0% YES	0 ac 0% YES
472	4C, 4D & 14	824	0	82	0	0	82	0 ac 0% YES	0 ac 0% YES	0 ac 0% YES
473	5 & 14	1,403	0	0	0	0	0	0 ac 0% YES	0 ac 0% YES	0 ac 0% YES
474	5	524	0	0	0	0	0	0 ac 0% YES	0 ac 0% YES	0 ac 0% YES
<b>Totals</b>		<b>3,917</b>	<b>157</b>	<b>487</b>	<b>0</b>	<b>157</b>	<b>487</b>	<b>0</b>	<b>267 ac</b>	<b>172 ac</b>

This final analysis compares the Alternatives to see how they best meet the desired future conditions for early successional habitat (0-10 age class) for acres at the 3 geographic scales and through time based on a 10 year entry cycle as directed by Forest Plan Amendment 5 Standards, Page III-75. The Forest Plan Amendment 5 General Direction for 0-10 age-class distribution states *Assure a regular and sustained flow of habitats across the Forests through space and time for diversity and viability of plant and animal populations.* (Forest Plan III-29). Time frame for maintaining the minimum of 157 acres of 0-10 age class in Compartments containing Management Areas 2A and 3B is 10 years.

Tables B-9, B-10, and B-11 display the effects of each alternative on the 0-10 age-class distributions by the Compartments within Analysis Area 09 over a 10 year timeline.

**Table B-9: Alternative A – 0-10 Age-Class Distribution Over 10 year Period by Analysis Area and Compartment (Must maintain at least 157 acres or 1.7% of analysis area for 10 year period)**

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Total Acreage</b>	<b>0</b>											
<b>% Analysis Area</b>	<b>0%</b>											
Compartment 451	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment:	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 459	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment:	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 460	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 461	0	0	0	0	0	0	0	0	0	0	0	0
%Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 470	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

<b>Future</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Total Acreage</b>	<b>0</b>											
<b>% Analysis Area</b>	<b>0%</b>											
Compartment 471	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 472	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 473	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 474	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

**Table B-10: Alternative B - 0-10 Age-Class Distribution Over 10 Year Period by Analysis Area and Compartment (Must maintain a minimum of at least 157 acres or 1.7% of analysis area for 10 year period)**

<b>Future</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
<b>Total Acreage</b>	<b>0</b>	<b>267</b>	<b>0</b>									
<b>% Analysis Area</b>	<b>0.0%</b>	<b>2.8%</b>	<b>0.0%</b>									
Compartment 451	0	93	93	93	93	93	93	93	93	93	93	0
% Compartment:	0%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	7.1%	0%
Compartment 459	0	53	53	53	53	53	53	53	53	53	53	0
% Compartment:	0%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	4.3%	0%
Compartment 460	0	50	50	50	50	50	50	50	50	50	50	0
% Compartment	0%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	0%
Compartment 461	0	71	71	71	71	71	71	71	71	71	71	0
%Compartment	0%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	5.2%	0%
Compartment 470	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 471	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 472	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 473	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 474	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

**Table B-11: Alternative C - 0-10 Age-Class Distribution over a 10 Year Period by Analysis Area and Compartment  
(Must maintain at least 157 acres or 1.7% of analysis area for 10 year period)**

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Total Acreage</b>	<b>00</b>	<b>172</b>	<b>00</b>									
<b>% Analysis Area</b>	<b>0.0%</b>	<b>1.8%</b>	<b>0.0%</b>									
Compartment 451	0	83	83	83	83	83	83	83	83	83	83	0
% Compartment:	0%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	0%
Compartment 459	0	34	34	34	34	34	34	34	34	34	34	0
% Compartment:	0%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	0%
Compartment 460	0	24	24	24	24	24	24	24	24	24	24	0
% Compartment	0%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	0%
Compartment 461	0	31	31	31	31	31	31	31	31	31	31	0
%Compartment	0%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	0%
Compartment 470	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 471	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 472	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 473	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 474	0	0	0	0	0	0	0	0	0	0	0	0
% Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Alternative A, No Action alternative, early successional habitat does not meet the minimum of maintaining 1.7% in 0-10 age class over a 10 year entry period. Both Alternatives B and C meet the minimum and maximum standard for 0-10 age class for the required 10 year (2009 - 2019) entry period in Analysis Area 19.

## APPENDIX C – OLD GROWTH COMMUNITIES ANALYSIS

### Forest Plan Direction for Old Growth Restoration Patches

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III-26 – III-28). The desired future condition for old growth across the forest is to have a network of small, medium and large sized old growth areas, representative of sites, elevation gradients and landscapes found in the Southern Appalachians and on the Forests, that are well dispersed and interconnected by forested lands.

Areas to be managed for old growth will be selected considering the following criteria:

1. Priority consideration for areas currently exhibiting high quality old growth characteristics, including areas in the initial inventory of possible old growth.
2. Areas with unique species diversity;
3. Community, soil type, aspect and elevation;
4. Other resource concerns and management objectives.

The administrative watershed affected by the Harmon Den Project is #32. The requirements for this project are as follows: (1) Check for large old growth patches in Appalachian District Harmon Den Analysis Area #19; (2) check for medium old growth patches in Appalachian Harmon Den Analysis Area #9; (3) select small old growth patches for Compartment 460; and (4) field check stands in the initial inventory of old growth that would be directly affected by this project.

**Large Patch:** The purpose of the large patches is to serve as permanent reservoir of biological diversity and to provide preferred habitats for forest interior birds across the landscape. The intent is to allow the restoration of functional old growth ecosystems at the sub regional, Forest and landscape scales.

The Appalachian Ranger District is covered by Large Old Growth Patch #17 Lower Pigeon River; in and around Pigeon River Gorge (Forest Plan Amendment 5, page K-5). Large Old Growth Patch #17 is found throughout Compartments 459, 461, 470, 471, 472, 473, and 474 (see Table C1).

**Table C1- Large Patch Old Growth #17, Harmon Den Analysis Area**

Compartment	Stands	Acres
459	16, 23, 19	100
461	27, 28, 29, 30, 31, 32	235
470	7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33	966
471	7, 13, 18	60
472	4, 11	11
473	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 54, 55, 56, 57, 58, 59	1,020
474	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	514
<b>Total</b>		<b>2,906</b>

**Medium Patch:** The purpose of the medium patches is to serve as permanent reservoirs of biological diversity and to allow for the restoration of functioning old growth ecosystems at the landscape and Forest scales.

The Harmon Den Analysis Area contains no medium patch old growth.

### Initial Inventory of Old Growth and Small Patch Designation

The Initial Inventory of Possible Old Growth in the Forest Plan lists four stands within the Appalachian Ranger District Harmon Den Analysis Area (see Table C2).

**Table C2 – Forest Plan Initial Inventory of Possible Old Growth within Harmon Den Analysis Area**

Initial Old Growth #	Compartment	Stand(s)	Acres
409	470	1	87
413	470	18, 33	85
415	470	28, 30	150
411	471	5	125
<b>Total</b>			<b>447</b>

**Small Patch:** The purpose of the small patches is to increase biological diversity and to provide structural components of old growth at the stand and landscape levels. Currently 1 designated small old growth patch exists within the Harmon Den Analysis Area (see Table C-3).

**Table C-3: Existing Small Patch Old Growth Stands Harmon Den Analysis Area**

Comp.	Minimum Acres	Small Patch Acres	Stand No(s)	Birth Year	Initial Inv.?	Community Type
451	65	133	1, 5	1907	No	53
<b>Total</b>		<b>133</b>				

The following stands are proposed to be designated as Small Patch Old Growth for long-term old growth retention to meet Forest Plan standards for Old Growth (see Table C-4).

**Table C-4: Stands Recommended for Small Patch Old Growth in Harmon Den Analysis Area**

Comp.	Minimum Acres	Selected Acres	Stand No(s)	Birth Year	Initial Inv.?	Community Type
459	62	179	1, 8, 32	1919, 1929, 1929	No	53, 60, 56
460	51	105	1	1926	No	53
461	68	21	5	1899	No	53
472	50	133	8, 10	1929, 1929	No	3, 53
473	70	91	12, 13, 14, 15, 16	1938, 1933, 1972, 1933, 1936	No	45, 53, 53, 45, 53
<b>Total</b>		<b>529</b>				

**Synopsis:** The Harmon Den Analysis Area contains a large portion of Large Old Growth Patch #17, four stands from the Forest Plan Initial Inventory of Possible Old Growth, and one Small Old Growth Patch in Compartment 451. Alternative C recommends additional stands to be added to Large Patch #17 along with small patches in Compartments that do not contain any portion of the Large Patch or designated Small Patches. Table C-5 displays existing designated and proposed Old Growth of all types throughout the analysis area.

**Table C-5: All Old Growth Existing and Proposed Alternative C Harmon Den Analysis Area**

Compartment	Compartment Acres	Acres Old Growth Needed to meet 5% <sup>1</sup>	Large Patch #17	Acres Proposed Addition to Large Patch #17	Acres Existing Small Patch	Acres Proposed Small Patch	Total Acres Old Growth	% Old Growth
451	1,301	65			133		133	10%
459	1,247	n/a	100	179			279	22%
460	1,018	51		105			105	10%
461	1,369	n/a	235	78		21	334	24%
470	1,187	n/a	966				966	81%
471	628	n/a	60				60	10%
472	824	n/a	11	133			144	17%
473	1,403	n/a	1,020	91			1,111	79%
474	525	n/a	514				514	98%
<b>Totals</b>	<b>9,501</b>	<b>116</b>	<b>2,906</b>	<b>587</b>	<b>133</b>	<b>21</b>	<b>3,696</b>	

<sup>1</sup> If 5% of the compartment acres are already part of a large or medium patch, an additional small patch is not needed. – Compartments 459, 461, 470, 471, 472, 473, and 474 contain at least 5% of their forested acres in Large Old Growth Patch #17

Forest Plan general direction states large old growth patches are to be at least 2,500 contiguous acres. Large Old Growth Patch #17 has 2,906 acres within the Harmon Dena analysis area. Alternative C would add an additional 587 acres, enlarging Large Old Growth Patch #17 to 3,493 acres within the analysis area. Overall, Alternative C would designate 3,646 acres of the 9,501 acres in the Harmon Den AA as old growth (approximately 38% of the forested area); with 3,493 of these acres in Large Old Growth Patch #17 and 153 acres in small old growth patches.

Of the six stands of Initial Inventory of Possible Old Growth, five are incorporated in Large Old Growth Patch #17. Initial inventory old growth stand 470-1 was not found to contain old growth characteristics identified in the Forest Plan. No Forest Plan initial inventory old growth is proposed for harvesting.

Only Compartment 451 contained a Small Old Growth Patch, all other Compartments in the analysis area have a portion of Large Old Growth Patch #17 in them that exceeds the minimum required 5% except for Compartment 460. Compartment 460 has 105 acres of proposed addition to Large Patch #17, thus it would not require a small patch. A small patch is added to Compartment 461 although no more old growth is necessary to meet Forest Plan standards, but a small stand was found to contain old growth characteristics and is proposed to be added.

## APPENDIX D – APPROPRIATENESS OF HARVEST ANALYSIS

Regeneration methods are discussed at length in Appendix E of the FEIS for the Forest Plan, and on pages E1-E2 in Amendment 5 of the Forest Plan. Choices include shelterwood cutting and clearcutting (even-aged management system), shelterwood with reserves (two-aged system), and group selection (uneven-aged system). At this time, single-tree selection (uneven-aged management) is not being considered as appropriate in meeting long-term regeneration needs to sustain productive stands of desirable tree species except in northern hardwood (beech-birch-sugar maple) or hemlock stands (all shade tolerant species). This is because regeneration objectives would not be met and single-tree selection does not work with the shade intolerant species that occur in the Harmon Den Forest Management Project Area. Thinning and sanitation cutting may also occur, but they are intermediate treatments and will not establish regeneration.

With any method, there must be enough quantity and quality of timber to be removed to make a sale operable, i.e. economically feasible to log at a given stumpage price (stumpage is the price paid for standing timber). The minimum quantity would generally be three thousand (3mbf) board feet (approximately 550 cubic feet) of sawtimber per acre, although markets may develop for lower value products. Sawtimber would be defined as trees that are large enough, free enough of defects, and of commercially valuable species which could be sawed into grade 3 or better lumber. Some species like scarlet oak seldom contain any grade 3 logs because of defect. Other species like sourwood seldom reach large enough diameter to become sawtimber. Changes in markets may change operability standards in a local area as well as affecting stumpage price.

Operability and stumpage price are also affected by transportation cost, logging cost, and size of the area being logged. Costs of getting logs from the stump to the mill are higher for timber in remote areas, where haul roads must be built, or for timber logged with specialized logging equipment, e.g. with cable systems or with a helicopter. As costs increase, prospective timber purchasers lower their bid prices on stumpage to compensate. If the price one can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one will buy it).

Each logging crew, depending on the size of their operation and the value of the timber to be logged, would have a minimum amount of timber that would be economical for them to move in and cut. For instance, in a given stand, it might be economical for a given logging crew to harvest a clearcut as small as 10 acres to obtain 50 MBF. If group selection is chosen, where only about 25 percent of the area is regenerated per entry, 40 acres would be needed to provide the crew with the same amount of sawtimber. Therefore, operability becomes an important factor in determining which regeneration methods are appropriate.

Much concern has been expressed over **clearcutting** as a management tool. Other regeneration methods will be used when management objectives can be met and when the other methods are economically feasible. In a memo to Regional Foresters dated June 4, 1992, the Chief of the Forest Service stated that *"Clearcutting would be limited to areas where it is essential to meet forest plan objectives and involve one or more of the following circumstances:*

1. *To establish, enhance, or maintain habitat for threatened, endangered, or sensitive species.*

2. *To enhance wildlife habitat or water yield values, or to provide for recreation, scenic vistas, utility lines, road corridors, facility sites, reservoirs, or similar development.*
3. *To rehabilitate lands adversely impacted by events such as fires, windstorms, or insect or disease infestations.*
4. *To preclude or minimize the occurrence of potentially adverse impacts or insect or disease infestations, windthrow, logging damage, or other factors affecting forest health.*
5. *To provide for the establishment and growth of desired trees or other vegetative species that are shade intolerant.*
6. *To rehabilitate poorly stocked stands due to past management practices or natural events.*
7. *To meet research needs.”*

These circumstances will be referred to on a site-specific basis when showing that clearcutting is optimum for a given stand.

Regeneration using the **group selection** method is appropriate where logging costs are relatively low and where there is enough volume and value in the stands to make selection cutting operable. Group selection is not traditionally done in very small stands or on slopes greater than 40 percent where cable logging is necessary, where timber volume or value is low, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **shelterwood** method of regeneration has been traditionally used where a residual seed source was needed for stand establishment or where new seedlings developed best with partial shade or protection from exposure. In the Appalachian Mountain region, seed from reserve trees (or "leave trees") are usually not needed to establish a new stand, but visual concerns often make shelterwood desirable. Leave trees must be those that would not likely be windthrown after having the adjacent trees cut. The residual overstory of a new shelterwood cut would look more park-like with the biggest and best trees evenly distributed across the landscape, rather than having a denuded appearance like a fresh clearcut might have. Regeneration would become established under the residual overstory. Then, at some later time depending on objectives, all or part of the overstory may be removed so it will not hinder further growth and development of the new stand. Some damage to the regeneration would occur during the overstory removal. Shelterwood is not appropriate on slopes greater than 40 percent where cable logging is necessary unless timber volume and values are very high. Shelterwood is not appropriate in stands where leaving an overstory would make the stands inoperable, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The shelterwood with reserves is a **two-age** regeneration method that is similar to the shelterwood method except the overstory removal is deferred until mid rotation (80 years for cove hardwoods) or indefinitely. In many cases it would remain until a new age class reaches rotation. With the development and growth of a new age class in the understory

along with the continued growth of the overstory, the stand takes on a two-aged structure. Since leave trees do not have to support another operable sale, they do not have to be merchantable and not as many have to be left. The type of leave trees retained would depend on site-specific objectives. Basal area of leave trees should not exceed 20-30 sq ft/acre fifteen years after harvest so they will not hinder further growth and development of the new stand. More than one harvest entry may be used to reduce basal area to this level. For example, a shelterwood removal could reduce basal area from 50 sq ft/ac to 15 sq ft/ac, thus perpetuating a two-aged stand. The two-age method is appropriate in operable stands on slopes less than 40 percent and whenever there are enough suitable trees to leave that will live to be a part of the stand for 40-80 years into the future. Two-age would be appropriate to meet objectives other than timber production, e.g. if continuous acorn production is needed within a stand, if den trees are scarce, or if aesthetics is a consideration. Two-age would be appropriate on slopes greater than 40 percent if timber value is high enough to offset increased costs of selective logging with cable systems, and if visual concerns or wildlife habitat objectives cannot be met by clearcutting. Two-age is not appropriate in stands where leaving an overstory would make the stands inoperable or in stands that require full sunlight for propagation of the management species.

The following table describes factors to be considered in determining appropriateness of regeneration methods for each stand:

**Table D-1: Factors Considered in Determining Appropriate Regeneration Methods**

Compt.-Stand	Acres for Alt B	Acres for Alt C	Vol./ac (CCF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
451-7a	28	21	20.20	H	Y	C	Y	V
451-7b	14	11	21.21	H	Y	C	Y	V
451-12	39	39	20.24	VH	Y	C	Y	V
451-22	12	12	20.90	M	Y	N	Y	V
459-10	15	10	20.81	H	Y	N	Y	V
459-12	38	24	20.95	H	Y	C	Y	V
460-06	25	15	20.84	H	Y	N	Y	V
460-10	25	9	20.70	M	Y	N	Y	V
461-02	31	31	20.64	M	Y	N	Y	W
461-30	40	0	20.84	VH	Y	N	Y	B, H
451-19	39	33	11.33	H	Y	N	Y	V
	306	205						

- 1/ Timber Quality:
  - Very High = ave dia > 20" - Northern Red Oak, White Oak, Black Cherry
  - High = ave dia > 18" - Northern Red Oak, White/Chestnut Oaks, Yellow-poplar
  - Medium = ave dia < 18" - Small Diameter Sawtimber, Mixed Oak
  - Low = ave dia does not come into play - Small Roundwood, Scarlet Oak, Chestnut Oak
- 2/ Leave Trees:
  - Y = Well distributed, long-lived, meet objectives
  - Spotty = Available in clumps; not well distributed
  - N = Scarce, scattered, or high mortality risk
- 3/ Future Removal:
  - Yes = Potential for operable removal of overstory
  - No = Removal will not be operable within 10 years
  - Cable = Slopes >40 percent require cable logging systems
- 4/ Access:
  - Good = Less than 0.5 mile from existing haul road
  - Fair = 0.5-1.0 mile from existing haul road
  - Poor = Greater than 1.0 mile from existing haul road
- 5/ Special Concerns:
  - Conversion = Risk that oak component be lost to pine
  - Wildlife = Modify to provide needs for wildlife
  - Visual = Modify to mitigate aesthetic concerns

Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline
Heritage	= High risk, existing sites or mitigate needed
Botanical	= Modify to mitigate botanical concerns
Water	= Streamside zone

The following table summarizes appropriate regeneration methods for each stand and what is proposed in each alternative:

**Table D-2: Appropriate Regeneration Method by Stand by Alternative**

Compt - Stand	Acres for Alt B	Acres for Alt C	Forest Type	Age**	Method Of Logging	Overwood Removal	Sanitation Thinning	Selection	Two-Age
451/7a	28	21	Cove Hardwood	102	Skyline				Alt B & C
451/7b	14	11	Cove Hardwood	102	Skyline				Alt B & C
451/12	39	39	Cove Hardwood	102	Skyline				Alt B & C
451/22	12	12	Cove Hardwood	79	RTS*				Alt B & C
459/10	15	10	Cove Hardwood	80	RTS*				Alt B & C
459/12	38	24	Cove Hardwood	84	Skyline				Alt B & C
460/6	25	15	Upland Hardwood	83	RTS*				Alt B & C
460/10	16	0	Upland Hardwood	83	RTS*				Alt B & C
461/2	31	31	Upland Hardwood	82	RTS*				Alt B & C
461/30	40	0	Cove Hardwood	84	Skyline/RTS*				Alt B
451/19	39	33	Cove Hardwood	18	RTS*	Alt B & C			
Total	306	205							

\* RTS – Rubber-tired Skidder

\*\* Age – Calculated from base year 2009, year of implementation

## Timber Cutting Methods Considered

The following is a list of timber cutting methods which were considered in this analysis. A brief description is provided to help the reader understand these terms as they are used in this document:

### Cutting for Even-aged or Two-aged Regeneration

#### Clearcutting

Regeneration or harvest method that removes essentially all the trees in a single operation to establish a new stand in a fully exposed microclimate. All merchantable trees on an area are harvested, and remaining trees are treated in site preparation. This method will be used only when no other method is feasible.

#### Shelterwood Cutting

The cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment. Removal of the overwood is done in a sequence of treatments that can include three types of cuttings: (a) an optional preparatory cut to enhance conditions for seed production, usually 50-60 square feet per acre of basal area is left after this cut, (b) an establishment cut to prepare the seed bed and to create a new age class, usually 20-40 sq ft/acre of basal is left, and (c) a removal cut to release established regeneration from competition with the overwood. Normally, only healthy, wind-firm trees are left as overwood. The usual time frame for the preparatory cut, establishment cut to the removal cut falls within a 10 year period.

#### Two-Age Cutting

Similar to shelterwood cutting except fewer overstory trees are left in place, and they are not subsequently removed, so that two distinct ages of trees are maintained on the same site. Trees left as overwood should be long-lived since they may be expected to live 120 years or more (Beck 1986).

### **Cutting for Uneven Aged Regeneration**

Uneven-aged (selection) methods regenerate and maintain a multi-aged structure by removing some trees in all size classes either singly, in small groups, or in strips. (*The Dictionary of Forestry, 1998*).

#### Group Selection Cutting

Cutting small openings between 0.2 and 1.0 acre each, distributed over a stand size area, with the intent to establish three or more distinct age-classes within a prescribed rotation. Width of an individual opening would be 1.5 - 2 times the average height of trees adjacent to the opening. Small trees having good growth potential may be left standing within openings, and priority for openings would be where mature timber occurs. The number of openings would depend on the size of the area where selection would be used, the frequency of timber sale entry, and the desired age of the oldest trees. Intermediate harvests to improve the condition of the residual stand or to establish advance regeneration may be done between openings when needed.

### **Intermediate Harvest**

Cutting to anticipate mortality and improve the growth and vigor of the remaining trees without regard for the establishment of regeneration

#### Free Thinning

The removal of trees that are crowding desirable trees without regard to crown position as in selection thinning. The best trees in terms of species, size or quality are left to grow. Some minimum basal area is usually set using this type of cultural treatment.

#### Sanitation Thinning

Cutting trees that have been attacked or appear in imminent danger of attack from injurious agents (such as disease or insects) other than competition between trees. The best trees in terms of species or vigor are left to grow. No minimum basal area is set using this type of cultural treatment.

#### Selection or Crown Thinning

The removal of trees from the dominant and co-dominant crown classes in order to improve the growth of the remaining trees, but leaving enough desirable, healthy trees to recapture the potential of the site and develop into larger merchantable trees themselves in a reasonable time. This may be done with yellow-poplar on a good site, but only once during a rotation (Beck 1988).

### **Other Terms Used:**

#### Advance Reproduction

Young trees, usually seedlings and saplings, growing in the understory of existing stands.

#### Rotation

The time between regeneration and final harvest.

**Stand**

A community of trees sufficiently uniform in composition, age, site productivity, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity.

## APPENDIX E – FINANCIAL EFFICIENCY

### Purpose

The purpose of the financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the Environmental Analysis for the Proposed Harmon Den Forest Management Project on the Appalachian Ranger District, Pisgah National Forest. As per Forest Service Handbook 2409.18, each timber sale in the project proposal expected to exceed \$100,000 in advertised value requires a financial analysis to determine financial efficiency.

### Assumptions

For the purpose of this analysis, the following assumptions will apply:

1. Discount Rate is 4%.
2. Inflation rate is 0% throughout the analysis period (60 years plus).
3. Estimated timber revenues for pine and poletimber were calculated using base prices from the Pisgah and Nantahala National Forests 3<sup>rd</sup> Quarter Adjustment Sheet for Fiscal Year 2008 and base prices for hardwood species from the Base Price Calculation Worksheet dated 07/18/2008 prepared by Forest Timber Staff at the Supervisor's Office National Forests in North Carolina, Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from Fiscal Year 2009 initial budget figures for the National Forests in North Carolina. Sale preparation costs (layout, cruising and marking) are funded at \$8.80/CCF plus \$2,900.00 to prepare each sale package. Timber harvest administration costs are funded at \$5,600 per year of Sale (generally sales run 1-3 years depending on size and complexity).
5. Reforestation treatment costs are taken from current KV Plans that are similar in size and type of reforestation activities. Current overhead cost of 53.32% is included in this figure.
6. Road construction is estimated at an average of \$45,000/mile and road reconstruction costs at an average of \$15,000/mile. These are based on current road construction and reconditioning costs.
7. A 60-year long-term projection was used for comparison basis only. Many of these stands will be carried for a longer rotation period.

### Limitations of Analysis

Any financial analysis must draw limitations on the amount of data to be included or the entire process would quickly become a mix of different alternatives and expected yields or losses. For instance, inflation rate is assumed to be 0% over the entire analysis period; a situation rarely encountered in the real world. The differences between the economic values of the alternatives remain the same, regardless of the inflation rate, so constant dollars were used for comparisons between alternatives. The following tables are an estimate of total project costs directly associated with a timber sale (sale preparation, essential reforestation and administration cost for logging) and are used to determine timber sale financial efficiency.

## Financial Analysis Worksheets

**Table E-1: Sale Revenue Estimates for all Alternatives**

Alternative	Timber Volume (CCF)	Revenues
A	0	\$0
B	5,972	\$328,032
C	3,927	\$205,820

**Table E-2: Sale Cost Estimates – Alternative B**

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	5,972	\$9.29	\$55,480
Harvest Administration	Year	3	\$5,600	\$16,800
Analysis, Documentation, Other Resource Support	Each	0	\$80,000	\$0
Site Preparation Natural– Herbicide & Handtools	Acres	267	\$350	\$93,450
Road Engineering and Design Construction	Miles	0	\$45,000	\$0
Road Engineering and Design Reconstruction	Miles	7.45	\$15,000	\$111,750
Temporary Road Construction	Miles	0.29	\$10,000	\$29,00
<b>Total Costs</b>				<b>\$280,380</b>

**Table E-3: Benefit Cost Ratio – Alternative B**

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	\$328,032	\$280,380	\$47,652	1.17
60	4%	\$13,121	\$11,215	\$1,906	1.17

PNV – present net value

BCR – benefit cost ratio

**Table E-4: Sale Cost Estimates – Alternative C**

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	3,927	\$9.54	\$37,464
Harvest Administration	Year	3	\$5,600	\$16,800
Analysis, Documentation, Other Resource Support	Each	0	\$85,000	\$0
Site Preparation Natural – Herbicide & Handtools	Acres	172	\$350	\$60,200
Road Engineering and Design Construction	Miles	0	\$45,000	\$0
Road Engineering and Design Reconstruction	Miles	7.45	\$15,000	\$111,750
Temporary Road Construction	Miles	0.29	\$10,000	\$2,900
<b>Total Costs</b>				<b>\$229,114</b>

**Table E-5: Benefit Cost Ratio – Alternative C**

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	\$205,820	\$229,114	\$-23,294	0.90
60	4%	\$8,233	\$9,165	\$-932	0.90

PNV – present net value

BCR – benefit cost ratio

## APPENDIX F – PROJECT DESIGN FEATURES FOR HERBICIDE USE AND PRESCRIBED FIRE

**Herbicide Application Project Design Features** (see also Forest Plan, Appendix I, pages I-10 – I-14)

1. Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on National Forest System lands are applied.
3. Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after herbicide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. No herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
11. No herbicide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
12. During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
13. Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.

14. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas.
15. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

### **Prescribed Fire Project Design Features**

1. Slash burns are done so they do not consume all litter and duff and alter structure and color of mineral soil on more than 20 percent of the area. Steps taken to control soil heating include use of backing fires on steep slopes, scattering slash piles, and burning heavy fuel pockets separately.
2. On severely eroded forest soils, any area with an average litter-duff depth of less than 1/2 inch is not burned.
3. Where needed to prevent erosion, water diversions are installed on firelines during their construction, and the firelines are revegetated promptly after the burn.
4. Firelines which expose mineral soil are not located in filter strips along lakes, perennial or intermittent springs and streams, wetlands, or water-source seeps, unless tying into lakes, streams, or wetlands as firebreaks at designated points with minimal soil disturbance. Low-intensity fires with less than 2 foot flame lengths may be allowed to back into the strip along water bodies, as long as they do not kill trees and shrubs that shade the stream. The strip's width is at least 30 feet plus 1.5 times the percent slope (Forest Plan, page III-183).
5. When wetlands need to be protected from fire, firelines are used around them only when the water table is so low that the prescribed fire might otherwise damage wetland vegetation or organic matter. Where practical, previous firelines are reused, and firelines must cause minimal soil disturbance.
6. Smoke management guidelines are used to reduce smoke emissions. When feasible, backing and flanking fires are used instead of heading fires, and burning is done when duff and large fuels are moist and small fuels are dry. Slash piles are not burned unless relatively free of soil. All burns are completed during the active burning period and mopped up as soon as practical after completion (Forest Plan, page III-29).
7. Smoke management guidelines are also used to enhance smoke dispersion. Burning is done when the atmosphere is thermally neutral to slightly unstable, not during pollution alerts, stagnant or humid weather, or inversions (Forest Plan, page III-29).
8. Prescribed fires are conducted under the direct supervision of a burning boss with fire behavior expertise consistent with the project's complexity. All workers must meet health, age, physical, and training requirements in FSM 5140, and use protective clothing and equipment.

## APPENDIX G – PROJECT-LEVEL ROADS ANALYSIS

This project-level roads analysis evaluates the existing condition of the transportation system within the Harmon Den Project Analysis Area (AA). It is being completed for information and support of the Environmental Assessment and the decision to be made for the Harmon Den project. This report includes the analysis of all system classified Forest Service Roads (FSRs) within the project AA. Objectives of this roads analysis are:

1. *Identification of needed and un-needed roads*
2. *Identification of road associated environmental and public safety risks*
3. *Identification of site-specific priorities and opportunities for road improvements and decommissioning*
4. *Identification of areas of special sensitivity or unique resource value that may require specific road management*
5. *Provide other specific information that may be needed to support the Harmon Den Project*

### 1. Identification of Needed and Un-needed Roads

Forest Plan transportation system management and Road Management Objectives (RMOs, see definitions below) need to be reviewed concurrently with most resource management projects. The designation of RMOs is to establish the intended purpose of an individual road based on management area direction and Forest Plan access management objectives.

**Table G-1: Inventory of System (classified) FSR's within the Harmon Den Project<sup>1</sup>**

FSR	FSR Name	Length (miles)	RMO(s)	Management Area (MA)	Recommendation
<b>System Roads</b>					
148	Cold Springs	6.0	B1	2A, 5	Maintain as open
148A	Brown Gap	1.2	C3	2A, 14	Maintain as open
148H	Horse Camp	0.7	C3	2A	Maintain as open
352	Harmon Den Mt	0.8	D1	3B	Maintain as closed (install gate)
357	Hickory Ridge	1.6	D3	3B	Maintain as closed (gated)
3522	Groundhog	0.3	D1	3B, 4D	Decommission (Alt C)
3532	Lower Cherry Cr	1.6	D1	2A, 3B	Maintain as closed (gated)
3533	Upper Cherry Cr	2.1	D3	3B, 14	Maintain as closed (gated)
3580	Skiffley Creek	8.18	D1/D3	3B, 4D, 5, 14	Maintain as closed (gated)
3580A	Chestnut Orchard	1.0	D1	3B, 4D	Maintain as closed (gated)
<b>Non-system Roads (existing in the Harmon Den AA)</b>					
A	Mine Ridge	0.5	D1	4D	Add to the system (gated behind 3580)
B	Holly Bottom	0.4	D1	4D	Add to the system (gated behind 3580)
C	Ephraim Branch	1.0	D1	4D	Add to the system (gated behind 3580)
D	Rube Rock	0.25	D1	3B	Add to the system (gated behind 3580)
E	n/a	0.25	n/a	4D	Decommission (Alts B & C)
F	Pounding Mill	0.25	D1	3B, 14	Add to the system (install gate)
G	n/a	0.25	n/a	3B, 14	Decommission (Alts B & C)
H	Lower Cherry Ext	0.6	D1	3B	Add to the system (gated behind 3532)
I	Little Cherry	0.25	D3	2A	Add to the system (install gate past rec site)
J	Ranger Residence	0.25	D5	2A	Add to the system (install gate)

<sup>1</sup> State Road 1182 (1 mi) and Interstate 40 (7 mi) are within the AA, but not managed by the USFS

**Table G-2: Comparison of FSRs within the Harmon Den Project and Forest Plan Direction<sup>1</sup>**

MA	Forest Plan Direction for Open FSRs/mi <sup>2</sup>	Current Miles of Open FSRs/mi <sup>2</sup>
2A	2.0	2.75
3B	0.5	0.03
4D	0.25	0.8
5	0.0	0.0
14	0.0	0.49

1 – Does not include State Road 1182 or Interstate 40

### Forest Plan Direction for Transportation System Management

#### **Management Area 2A (Forest Plan p. III-63)**

Emphasize visually pleasing scenery. Manage for motorized recreation use. Open roads through scenic forest. Permit timber management modified to emphasize visual quality. Permit road construction. Manage access through an approximate density of 2.0 miles of open road per square mile. Where existing open road densities exceed 2.0 mile per square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce the open road density.

#### **Management Area 3B (Forest Plan p. III-76)**

Emphasize sustained yield timber management. Close most roads to motorized vehicles. Permit road construction. Manage access through an approximate density of 0.5 miles of open road per square mile. Where existing open road densities exceed 0.5 square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce open road density.

#### **Management Area 4D (Forest Plan p. III-88)**

Emphasize high quality habitats for wildlife requiring older forests and freedom from disturbance from motorized vehicles. Close most roads to private motorized vehicles. Close all Traffic Service Level D roads to public vehicular use when management activities are complete except those roads designated as four-wheel drive ways. Manage access through an approximate density of 0.25 miles of open road per square mile. Include four-wheel drive ways in this density. Where existing open road densities exceed 0.25 miles per square mile, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce the open road density.

#### **Management Area 5 (Forest Plan p. III-92)**

Emphasis is on providing large blocks of backcountry where there is little evidence of other humans or human activities other than recreation use. An unroaded forest environment and natural appearing forests with large old trees are desirable. Manage all roads as closed to public vehicular use. Allow forest development roads not needed for resource activities to revegetate naturally.

#### **Management Area 14 (Forest Plan p. III-163)**

This management area consists of the Appalachian National Scenic Trail and its foreground zone as mapped through the Visual Management System. Manage all roads as closed to public vehicular use except for open roads which cross the Appalachian Trail.

## **2. Identification of road associated environmental and public safety risks**

In following Forest Plan direction when performing road planning and road maintenance, the Forest Service must insure road stability and protection of the environment. The maintenance of all system roads (open or closed) must be done at a level sufficient to provide appropriate use and protect soil, water, and other resources.

Properly designed, constructed, and maintained roads incorporate outlets where needed so that runoff water infiltrates soil/vegetation and sediment is deposited before reaching stream channels. Access management of specific road segments with the use of gates can be used to seasonally or permanently control uses such as hunting, recreation, administrative (i.e. resource or pest management), and fire protection.

Improperly maintained roads can degrade water quality when inadequate or nonfunctioning outlets for runoff are not periodically inspected and maintained. Such roads, if open to the public, may become a hazard to many motorized vehicles which in turn could threaten public safety via vehicle accident or limit emergency fire protection access. System roads in the Harmon Den AA receive periodic maintenance as per the road's RMO.

A proper combination of RMOs and access management (seasonal or permanent closures) of FSRs must be implemented to ensure the integrity of resources (i.e. wildlife, recreation and road stability) in order to protect the environment while minimizing risks. This is occurring within the Harmon Den AA.

## **3. Identification of site-specific priorities and opportunities for road improvements and decommissioning**

Forest Service Roads 148 and 148A receive road reconditioning twice a year, brushing once every two years, and removal of hazard trees and drainage/shoulder maintenance every year. This road reconditioning work is done to better stabilize system roads.

Alternative B would add eight existing non-system roads (about 3.5 miles total) to the Forest's transportation system for long-term resource management. It also proposes to decommission two roads (about ½ mile total) not needed for long-term management. The newly added roads would remain closed to public vehicle access, thus not affecting current overall open road densities in the AA. These roads can be added under various RMOs; however, the RMOs proposed are the lowest level compatible with management area direction and resource objectives. Decommissioning these roads would not allow long-term management objectives for wildlife habitat and timber management to be met.

Alternative C would add eight existing non-system roads (about 3.5 miles total) to the Forest's transportation system for long-term resource management. It also proposes to decommission three roads (about 0.8 mile total) not needed for long-term management. The newly added roads would remain closed to public vehicle access, thus not affecting current overall open road densities in the AA. These roads can be added under various RMOs; however, the RMOs

proposed are the lowest level compatible with management area direction and resource objectives. Decommissioning these roads would not allow long-term management objectives for wildlife habitat and timber management to be met.

#### **4. Identification of areas of special sensitivity or unique resource value that may require specific road management**

Non-system road I currently allows year-round motorized access across an un-named tributary to Cold Springs Creek, increasing potential for sedimentation/erosion. Placing a gate before the crossing would improve aquatic habitat.

Non-system road J currently allows year-round motorized access to a wildlife field, potentially disrupting wildlife especially during spring. As a result of access to the wildlife field, a dispersed recreation site has developed. Closing the road and removing the dispersed site would improve wildlife habitat.

There are no other areas of special sensitivity or unique resource value that would require specific road management within the scope of the Harmon Den Project.

#### **5. Provide other specific information that may be needed to support the Harmon Den Project decision**

The current condition of the Harmon Den AA and the Harmon Den Project activities do not satisfy Forest Plan transportation system management direction. The MA 2 standard for open road density is 2.0 mi/mi<sup>2</sup> and the MA 4 standard is 0.25 mi/mi<sup>2</sup>. Currently the Harmon Den AA is at 2.75 mi/mi<sup>2</sup> for MA 2 and 0.8 mi/mi<sup>2</sup> for MA 4. Forest Plan direction states: *Where existing open road densities exceed 2.0 [for MA 2] 0.25 [MA 4] mile per square mile, and, if closure of existing roads is prohibitive for administrative or legal reasons, then document these exceptions to the standard and investigate strategies to reduce the open road density.* Only three roads are open within MA 2 (FSRs 148, 148A, and 148H), an adjacent National Forest, provide alternate routes for members of the public during inclement weather, provide access for fire suppression, and both eventually access private properties and remote communities outside the Harmon Den AA. The MA 14 standard for open road density is 0 mi/mi<sup>2</sup>. Currently the Harmon Den AA is at 0.49 mi/mi<sup>2</sup>. Forest Service Road 148A is the only open road in the Harmon Den AA within MA 14. This road addresses MA 14 transportation direction because it crosses the Appalachian Trail at Brown Gap (*Manage all roads as closed to public vehicular use except for open roads which cross the Trail.* Forest Plan, page III-163). This road also provides access to the Cherokee National Forest and eventually private properties.

### **RMO Definitions**

#### **B1**

Gravel road (6"); 1.5 lanes; culverts/ditches; blade three times a year. Brush to maintain site distance (minimum once every two years). Maintain shoulders and drainage. Maintain drainage. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and

maintain route markers, warning, regulatory, and guide signs. Remove hazard trees and clean up litter. Provide safe travelway for passenger cars and trucks. Moderate use (25-100 ADT). Design speed between 20-40 mph. Single lane with intervisible turnouts and wide spots for passing. Compatible with Management Areas 2A, 2C, and 9. Open to all traffic. By exception compatible with MA 14. Open to all traffic. Provide and maintain as year round access for timber harvesting and treatments. Provide for moderate degree of user comfort and convenience for recreationists.

**C3**

Moderate gravel (4"); one lane with turnouts; culverts/ditches; blade twice a year. Brush once every 2 years. Maintain shoulders and drainage. Maintain drainage. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain route markers, warning, regulatory, and guide signs. Remove hazard trees and clean up litter. Use as 2-WD access for timber harvesting and fire protection. Compatible with Management Areas 1B, 2A, 2C, and 9. By exception compatible with MA 14. Open to all traffic. Provide and maintain as access route for timber harvesting and treatments (entry twice each decade). Encourage motorized use for recreationists.

**D1**

Dirt, seeded; one lane with outslope/dips; maintain as Linear Wildlife Opening. Mow roadbed annually. Brush shoulders once every three years. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain route markers, warning, regulatory, and guide signs. Scarify, seed, and fertilize roadbed. Provide access for future timber operations and for fire protection. Compatible with Management Areas 3B, 4A, 4C, 4D, 14, 15, and 17. By exception compatible with MA 5. Closed with a gate or other structure. Allow occasional access for mowing operations and administrative use and fire protection. Create and maintain as wildlife habitat. Future access for timber harvesting. Discourage non-motorized use but do not prohibit.

**D3**

Spot gravel; one lane with outslope/dips/silt traps; blade once a year. Brush once every three years. Maintain shoulders and drainage. Maintain drainage. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain route markers, warning, regulatory, and guide signs. Remove hazard trees. Use as 2-WD access for administrative, timber harvesting, and fire protection. Compatible with Management Areas 1B and 4A. By exception compatible with MA 3B. Closed with a gate or other structure. Restricted most of the year. Access can be allowed seasonally for hunting and other public/administrative activities and fire protection. Seasonally open for hunting. Access route for wildlife habitat management. Provide and maintain as access route for timber harvesting and treatments (entry once each decade). Encourage non-motorized use such as hiking, biking, and horseback riding.

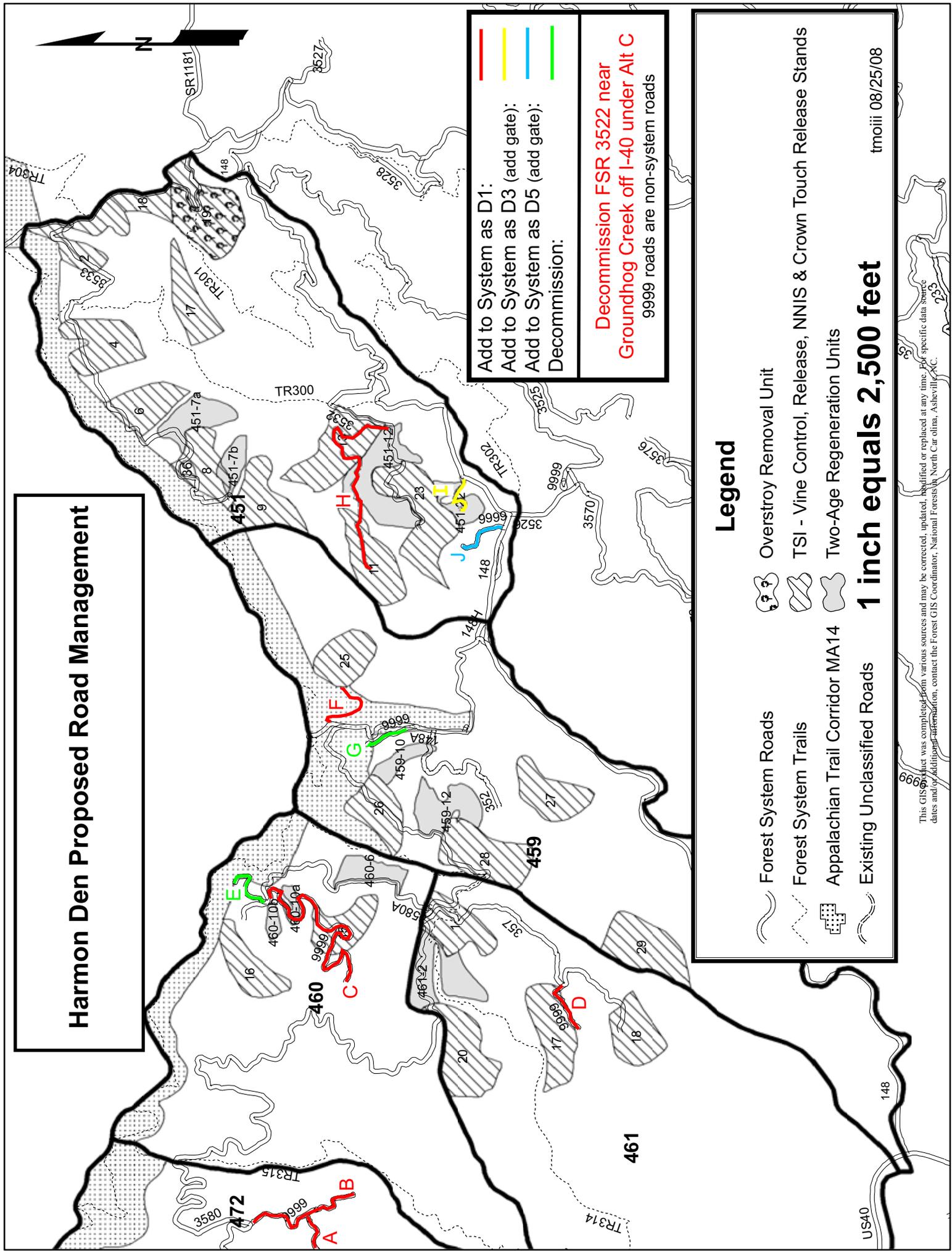
**D5**

Dirt/seeded; one lane with outslope/dips; maintain as Linear Wildlife Opening. Mow roadbed annually and brush shoulders once every three years as funds are available. Maintain turnarounds suitable for fire equipment at the end of dead-end roads. Install and maintain route markers, warning, regulatory, and guide signs. Scarify, seed, and fertilize roadbed. Provide

access for future timber operations and for fire protection. Compatible with Management Areas 3B, 4A, 4C, 4D, 14, 15, and 17. By exception compatible with MA 5. Closed with a gate or other structure. Allow occasional access for mowing operations and administrative use and fire protection. Create and maintain as wildlife habitat. Future access for timber harvesting. Prohibit bikes and horse traffic.

## **HARMON DEN PROJECT MAPS**

# Harmon Den Proposed Road Management



— Add to System as D1:  
— Add to System as D3 (add gate):  
— Add to System as D5 (add gate):  
— Decommission:  
— Decommission FSR 3522 near Groundhog Creek off I-40 under Alt C  
 9999 roads are non-system roads

### Legend

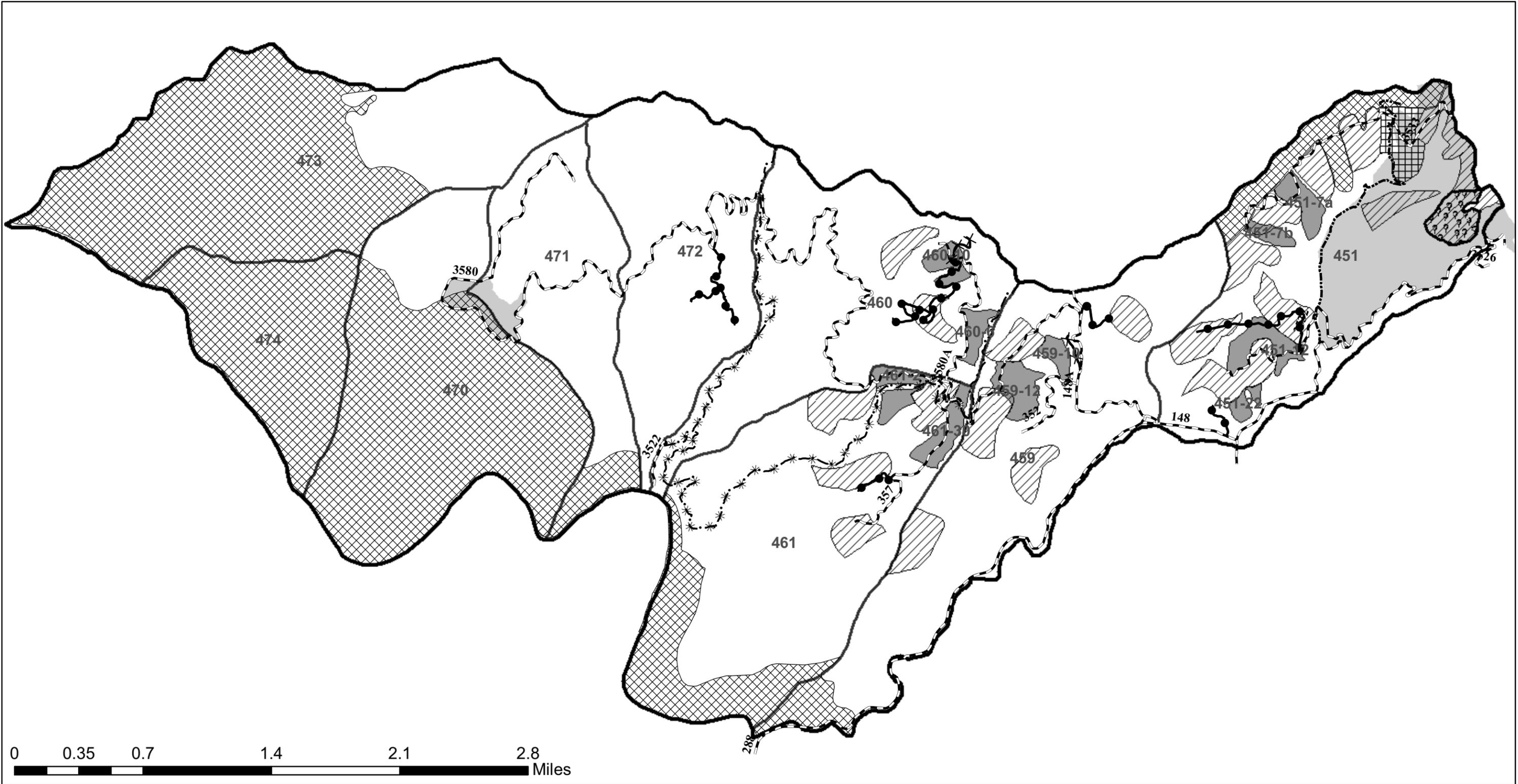
- Forest System Roads
- Forest System Trails
- Appalachian Trail Corridor MA14
- Existing Unclassified Roads
- Overstory Removal Unit
- TSI - Vine Control, Release, NNIS & Crown Touch Release Stands
- Two-Age Regeneration Units

**1 inch equals 2,500 feet**

tm0iii 08/25/08

This GIS product was completed from various sources and may be corrected, updated, modified or replaced at any time. For specific data source dates and/or additional information, contact the Forest GIS Coordinator, National Forests in North Carolina, Asheville, NC.

# Harmon Den Project - Alt B



- |                   |                       |                             |                                |
|-------------------|-----------------------|-----------------------------|--------------------------------|
| Analysis Area     | Cerulean Habitat      | Existing FS Roads           | Groundhog and Rube Rock Trails |
| Compartments      | TSI                   | Roads Being Added to System | Section to be Decommissioned   |
| Two Age Harvest   | Proposed Rx Burns     | Roads Being Decommissioned  | Cherry Creek Trail Relocation  |
| Overstory Removal | Designated Old Growth |                             |                                |

Prepared by: AWW - 9/2008

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