United States Department of Agriculture

Forest Service

September 2005

Environmental Assessment

Baldwin Gap Project

Pisgah Ranger District, Pisgah National Forest
Buncombe County, North Carolina

Baldwin Gap Project

Environmental Assessment

Location of Action:	Pisgah Ranger District Pisgah National Forest Buncombe County, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Randy Burgess District Ranger Pisgah Ranger District 1001 Pisgah Highway Pisgah Forest, NC 28768 (828) 877-3265
For More Information:	Ted Oprean Project Leader (828) 877-3265 (828) 884-7527 (fax) Michael Hutchins ID Team Leader (828) 682-6146 (828) 682-9179 (fax)
Send Electronic Comments to:	comments-southern-north-carolina-pisgah-pisgah@fs.fed.us

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CHAPTER 1 – PURPOSE AND NEED

1.1 Background

This EA documents the results of site-specific analyses concerning proposed activities of the Baldwin Gap Project on the Pisgah Ranger District, Pisgah National Forest.

The ~6,674 acres for analysis is in Forest Plan Analysis Area (AA) 1 and within the Bill Moore Creek administrative watershed about five miles southwest of Asheville, North Carolina, within the 1,370 acre Compartment 1, Buncombe County (see Vicinity Map at the end of the Chapter). The Forest Plan AA contains Compartments 1, 2, 3, 4, 5, and 6 and may be different geographic boundaries from the AAs individual resources analyze effects to—analysis, project, and activity areas are defined at the end of Appendix A, Biological Evaluation. The Forest Plan AA contains Forest Plan Management Areas (MA), each of which has unique goals and appropriate management direction and standards to achieve these goals as described in the Land and Resource Management Plan, Amendment 5 for the Nantahala and Pisgah National Forests North Carolina (1994), hereafter called the Forest Plan (Forest Plan, pages III-54 – III-56). The following MAs are within the Forest Plan AA for this project: MA 3B, 4C, and 18. Management Area 3B is managed to "*Emphasize sustainable supply of timber, but with few roads open and limited disturbance associated with motorized vehicles. This management area also provides for the habitat needs of wildlife such as wild turkey, deer, a variety of small mammals, and other species that will benefit from a managed forest with limited motorized access. A sustainable supply of timber is achieved through regulating the growth and removal of trees through time. Access to the forest is desired during the time timber is harvested, though most roads are closed at other times. Although a regulated forest is desired, some natural forest settings will be present. The visitor may encounter forest management activities in progress, including timber harvest, road building and timber stand improvement. Wildlife compatible with or that benefit from these conditions, such as deer, raccoon, and other small mammals are likely to be present. Black bear also use these areas, though they do not provide the best black bear habitat. Recreationists use these areas for hiking, mountain biking, horseback riding, hunting and other activities. The visitor may encounter other forest users, but not as frequently as in areas with open roads.* [W]*ildlife which thrive in a young- to middle-aged forest will be favored through appropriate forest management practices. Through the restriction of motorized access in this management area, habitat can be provided for wildlife species that are sensitive to human disturbance.*" (Forest Plan, page III-71). The timber sale and related watershed and wildlife enhancement proposals are located within MA 3B. Management Area 4C is managed to "[e]*mphasize visually pleasing scenery and habitats for wildlife management requiring older forests. This land is not suitable for timber production at this time in order to meet visual quality objectives, or the lands are not cost efficient for timber production*." (Forest Plan, page III-77). No ground disturbing activities are proposed within these MA 4C lands; however, small patch old growth designation is proposed within them. Management Area 18 lands are embedded in other management areas. These lands are to be "*...actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems. For example, timber management can only occur in this area if needed to maintain or enhance riparian habitat values*" (Forest Plan, page III-179).

This EA tiers to the Final Environmental Impact Statement (FEIS) for the Forest Plan and to the FEIS for Vegetation Management in the Appalachian Mountains (VMAM).

1.2 Project Record

This EA incorporates by reference the project record (40 CFR 1502.21). 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 determine the Forest-wide population trends for MIS species. The project record is located at the Appalachian Ranger District Office in Burnsville, North Carolina.

1.3 Proposed Action

The Proposed Action (Alternative B) has been developed to meet the Purpose and Need (Section 1.4 below) by: improving existing stand conditions while providing a continuous supply of sawtimber; improving distribution and percent of early successional habitat; identifying old growth; reducing non-native plant species; controlling/managing pest populations; and improving wildlife habitat and aquatic-related resources. Maps of the Proposed Action are located at the end of Chapter 2.

The following table summarizes harvest-related information for the Proposed Action:

Table 1-1: Summary of Harvest-related Information – Proposed Action

Stand	Acres	Treatment	Logging System
Regeneration Harvest			
1-15	12	Two-age[1]	Tractor
1-18	13	Two-age	Tractor
1-20[3]	15	Group selection	Tractor
1-23	28	Two-age	Tractor
1-34	31	Two-age	Skyline
1-45	12	Two-age	Skyline
Total Regeneration	**111**		
Intermediate Harvest			
1-4[2]	33	Sanitation thin	Tractor
1-16	10	Sanitation thin	Tractor
1-20[3]	62	Sanitation thin	Tractor
1-25	15	Sanitation thin	Tractor
1-27	23	Sanitation thin	Tractor
1-31	31	Sanitation thin	Tractor
1-40	40	Sanitation thin	Tractor
1-47	32	Sanitation thin	Tractor
Total Intermediate	**246**		
Improvement			
1-1	67	Timber stand improvement[4]	n/a
1-2	103	Timber stand improvement	
1-3	35	Timber stand improvement	
1-5	22	Timber stand improvement	
1-7	27	Timber stand improvement	

Stand	Acres	Treatment	Logging System
1-8	17	Timber stand improvement	n/a
1-9	14	Timber stand improvement	
1-10	19	Timber stand improvement	
1-22	10	Timber stand improvement	
1-29	44	Timber stand improvement	
Total Improvement	**358**		
Oak Shelterwood			
1-11	27	Pre-harvest Oak Shelterwood[5]	n/a
1-17	52	Pre-harvest Oak Shelterwood	
1-25	13	Pre-harvest Oak Shelterwood	
1-27	23	Pre-harvest Oak Shelterwood	
1-35	21	Pre-harvest Oak Shelterwood	
1-39	30	Pre-harvest Oak Shelterwood	
1-40	46	Pre-harvest Oak Shelterwood	
1-44	38	Pre-harvest Oak Shelterwood	
1-46	15	Pre-harvest Oak Shelterwood	
Total Oak Shelterwood	**265**		
Invasives			
1-4	29	Control invasives[6]	n/a
1-6	16	Control invasives	
1-7	27	Control invasives	
1-8	17	Control invasives	
1-9	14	Control invasives	
1-10	19	Control invasives	
1-16	12	Control invasives	
1-17	52	Control invasives	
1-22	10	Control invasives	
1-25	16	Control invasives	
1-27	19	Control invasives	
1-28	10	Control invasives	
1-31	30	Control invasives	
1-35	21	Control invasives	
1-40	46	Control invasives	
1-46	15	Control invasives	
1-47	24	Control invasives	
Existing roads	<3	Control invasives	
Total Invasives	**380**		
Wildlife Habitat			
1-15	0.8	Linear Wildlife Opening	n/a
1-25	0.6	Linear Wildlife Opening	
Total Wildlife Habitat	**1.4**		
Prescribed Burning			
1-4	29	Prescribed Burning	n/a
Total Prescribed Burning	**29**		

1 = 15-20 ft^2 of basal area retained per acre
2 = Treat white pine stumps with Sporax
3 = Includes 15 acres of group selection prescription with thinning between group cuts
4 = Stand improvement with Triclopyr and chainsaw/hand ax
5 = Oak treatment with Triclopyr and hand tools
6 = Control with Triclopyr and Glyphosate

In addition, the Proposed Action would:

- ◊ Site prepare and release with herbicide and hand tools all two-age and group selection regenerated stands;
- ◊ Construct ¼ mile of new system road, reconstruct 8.0 miles of existing system road, and construct 1.0 mile of temporary road;
- ◊ Designate stands 1-13 and 1-14 as small patch old growth (88 acres);
- ◊ Develop 1.4 acres of linear wildlife openings converted from temporary roads;
- ◊ Stabilize about 1 mile of stream within the Baldwin Field Branch drainage, including the main channel and several of its tributary streams. Since several stream reaches within this drainage are devoid of in-stream structure typically provided by logs, streams are experiencing notable levels of erosion and subsequent deposition within the channel to the point of degrading channel physical integrity. This proposed work would include the installation of large wood (>4" diameter) and rock (small boulder sizes) within the channel to enhance channel stability and improve aquatic habitat. Equipment used on the project would include a small sized tracked excavator for the placement of structures and a dump truck to haul logs and rock to the site. Recontour about 0.2 miles of the old road bed that parallels lower Baldwin Field Branch. Replace the existing culvert on the Baldwin Field Road (between stands 1-20 and 1-23) with a bottomless arch pipe to provide fish passage; and
- ◊ Develop two connector bike/horse trails to provide a loop opportunity with the North Boundary trail/road and the Baldwin Field road based on available funding and following harvest activities. These connector trails (about 0.4 miles) and system roads they access (about 6.1 miles) would allow non-motorized multiple recreation uses (hike/bike/horse) in the Baldwin Gap area (about 6.5 miles total) unless the system roads are posted otherwise. There would be no other trails in the Baldwin Gap area available for bike/horse use. The roads where non-motorized travel is permitted would be available for future forest management purposes. Existing “user created” trails would be rehabilitated and closed following harvest activities and as funding allows.

1.4 Purpose and Need for Action

The purpose of this proposal is to:

- ◊ Provide habitat conditions for species such as eastern wild turkey, ruffed grouse, white-tailed deer and travel corridors and foraging habitat for black bear across the planning area by dispersing early successional habitat across the landscape by regulating the amount of 0-10 year age class (desired amount is 5%-15% or 68-205 acres for Compartment 1). Desired wildlife habitat would also be provided by managing the area in permanent grass and forb openings for species such as eastern wild turkey (desired amount is 3% or 41 acres for Compartment 1). It is important to note that Forest Plan standards schedule to revisit each stand at a 10-year interval (Forest Plan standard 1a, page III-75);
- ◊ Manage to emphasize quality hardwood sawtimber as the primary product;
- ◊ Control/manage pest populations by using prescribed fire and herbicides;
- ◊ Provide stocking density and species variety through timber stand improvement practices;
- ◊ Enhance habitat for aquatic species populations and diversity by using habitat restoration and improvement; and
- ◊ Provide non-motorized recreational opportunities, specifically providing for horseback and bicycle riding on closed system roads, construct trails to connect existing system roads as

funding allows, and rehabilitate existing "user created" trails following harvest activities as funding allows.

1.4.1 Why Here, Why Now?

The existing condition of the Baldwin Gap area (Compartment 1 within Forest Plan Analysis Area (AA) 1) has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Baldwin Gap area was chosen at this time for vegetation management over other areas on the Pisgah Ranger District because of its planned order of entry in the Nantahala and Pisgah National Forests, A Schedule of Entry by Forest Plan AA. The last appreciable entry in the Forest Plan AA was in 1992 (approximately 83 acres in size) and in Compartment 1 was in 1981 (approximately 162 acres in size).

1. The Forest Plan provides for entry into Management Area 3B stands every 10 years (Forest Plan, III-75) to 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). This is accomplished by regulating the amount of 0-10 age class to meet early succession habitat standards with direction to disperse early successional habitat of at least 5% but not to exceed 15% of early successional habitat at 3 geographic scales: the analysis area, management area, and compartment (Forest Plan, pages III-29 - 31). There are no stands in Compartment 1 that currently meet Forest Plan standards for early successional habitat since there are no stands within the 0-10 age class and Analysis Area 1 currently has less than 1% of its acreage in the 0-10 age class. Treatment is needed to bring vegetation in the project and analysis areas into compliance with Forest Plan direction. The Proposed Action was developed to use active management to move resources in the Baldwin Gap area towards the desired future condition. Regenerating stands 1-15, 1-18, 1-23, 1-34, and 1-45 would provide early successional habitat for the next 10 to 20 years where the residual stand maintains 15-20 ft^2 of basal area per acre. Management Area 3B direction calls for using timber management practices as the primary tool to create desirable habitat (Forest Plan, III-74), and MA 3B standards call for a desired density of 3% for permanent grass and forb openings. Currently there are no permanent grass and forb openings within the Baldwin Gap area. Maintaining proposed temporary roads to access stands 1-15 and 1-25 as linear wildlife fields following harvest activities would increase the existing grass/forb habitat in Compartment 1. Management Area 3B direction is to emphasize quality hardwood sawtimber as the primary product. Quality hardwood sawtimber begins to occur when the following range of sizes is reached:

Table 1-2: Quality Hardwood Sawtimber (Forest Plan, page III-75)

Management Type	Product Size Range (diameter at breast height in inches)
Upland Hardwoods	18 – 20
Cove Hardwoods	20 – 22
Yellow Pine	16 – 18
White Pine	18 – 20
Virginia Pine	12 – 16
Spruce-Fir	16 – 18

2. Forest-wide direction calls for using prescribed burning and Integrated Pest Management to manage pest populations (Forest Plan, III-52). Currently within several timber stands the non-native plant species oriental bittersweet is established and thriving. Use of hand-sprayed herbicides (Triclopyr and Glyphosate) throughout the Baldwin Gap area and prescribed burning in stand 1-4 would begin to control and reduce the spread of oriental bittersweet.
3. Forest-wide direction provides for stocking control, stocking density, and species variety through timber stand improvement practices (Forest Plan, III-36 and 37). Currently, there are 10 stands, approximately 358 acres in the sapling/pole timber stage that are overstocked, contain sprout clumps, and/or non-native species. Timber stand improvement would reduce competition, improve growth, and regulate stocking density, and control species variety to favor oaks and other hard and soft mast producing species.
4. Forest-wide standards call for using habitat restoration, improvement, and reintroduction to re-establish or expand native species population and diversity (Forest Plan, III-24). Currently, aquatic habitat and populations within the compartment are suppressed. Installing large wood (>4" diameter) and rock (small boulder sizes) within the channel, recontouring about 1,000 feet of an old woods road paralleling the stream, and installing a bottomless arch culvert between stands 1-20 and 1-23 would enhance channel stability and improve aquatic habitat.
5. Management Area 3B direction calls for providing non-motorized recreation opportunities including hunting, access for fishing, wildlife viewing, horseback riding, bicycle riding, and hiking; and to construct new trails for horseback riding or bicycles primarily when needed to connect existing roads or trails (Forest Plan, III-73 and 74). Currently there is unmanaged trail use in the Baldwin Gap area, coming from the Bent Creek Experimental Forest on the east side and adjacent private property on the South Hominy Community on the west side. This unmanaged use has created several undesignated, user-created trails—as a result, impacts, such as downcutting and sedimentation, are occurring in Baldwin Branch and the headwaters of Bill Moore Cove Creek. Developing two new connector trails within the Baldwin Gap area to connect with North Boundary (identified as both Forest Service Trail #135 and Forest Service Road #485) would improve non-motorized recreation in the Baldwin Gap area and would establish approved trails in compliance with the Forest Plan (Forest Plan page 111-73). This action is consistent with the desired condition for MA 3B, which in part provides trails for recreationists to [u]*se these areas for hiking, mountain biking, horseback riding, hunting and other activities*; although [t]*he visitor may encounter forest management activities in progress, including timber harvest, road building and timber stand improvement* (Forest Plan, III-71).

1.5 Decision to be Made

The decision to be made is whether to implement the proposed action as described above, or some other combination of activities which will meet the purpose and need, or to defer any action at this time.

1.6 Public Involvement

The proposal was listed in each Schedule of Proposed Actions since October 2002. The proposal was provided to the public (including the Biltmore Lakes Development) and other agencies for

comment during scoping from March 25, 2005 thru April 25, 2005—thirteen individual comments were received during scoping—three additional comments (and a petition signed by 21 individuals against the proposal) were received two months later.

On July 28, 2005, a 30-day notice and comment period was initiated for the proposal.

Using comments received from the public, agencies, and organizations during this period as well as internal review, the interdisciplinary team (IDT) developed a list of issues to address.

1.7 Issues

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 during scoping have been reviewed and a determination on significance was made. The issue tracking sheet in the project record lists each comment received and the determination of significance.

1.7.1 Significant Issues

1.7.1.1 Significant Issue #1: Water Quality and Aquatic Habitat – *Constructing and reconstructing roads and logging on steep slopes could decrease water quality due to increase in erosion*

Indicators

- ◊ Miles of road construction
- ◊ Miles of road reconstruction
- ◊ Acres harvested on steep slopes

1.7.1.2 Significant Issue #2: Wildlife – *Construction of connector trails and trail use on gated roads could create additional disturbance to wildlife*

The proposal does not create enough early successional habitat and grass/forb habitat for dependent species

Indicators

- ◊ Acres of early successional habitat created (two-age harvest)
- ◊ Percent of grass/forb developed
- ◊ Miles of new trail developed

1.7.1.3 Significant Issue #3: Non-native Plants – *Non-native plants are established in the Baldwin Gap area and road construction/reconstruction (including temporary roads), regenerating stands, and new wildlife openings will open the forest and could result in the spread of non-native plants, especially oriental bittersweet*

Indicators

- ◊ Acres of new openings created
- ◊ Miles of road construction and reconstruction

1.7.1.4 Significant Issue #4: Recreation/Logging Conflicts *Haul use of North Boundary Road/Trail could temporarily change the character of the trail use in the area*

Indicator

◊ Haul routes identified

1.7.2 Other Issues

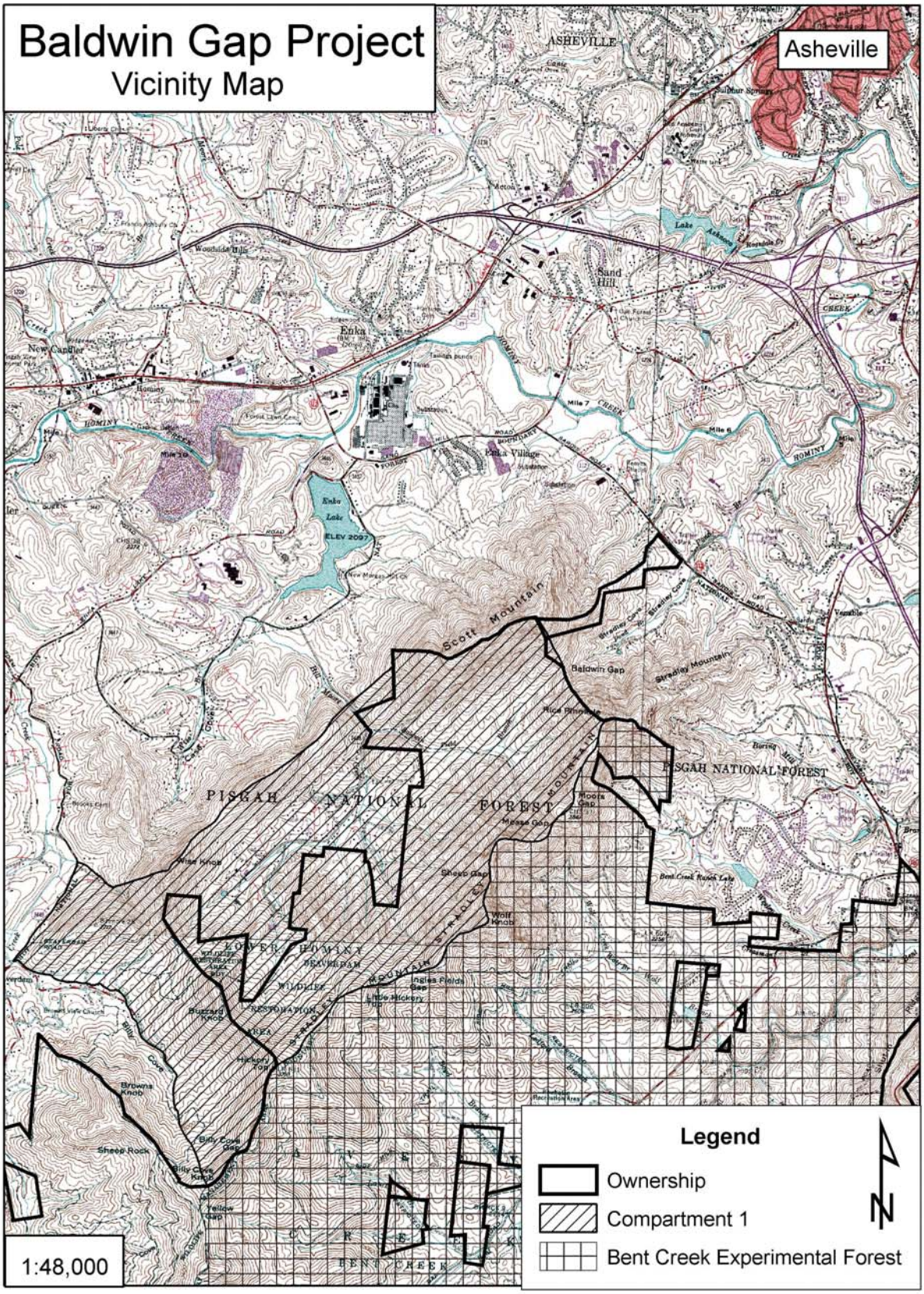
1.7.2.1 Pesticides – *Runoff from pesticide application (herbicides/fungicide) could impact private lands or humans*

1.7.2.2 Soil Resources – *Constructing and reconstructing roads and logging related activities may impact soils*

1.7.2.3 Cultural Resources – *Constructing and reconstructing roads and logging related activities may impact cultural resources*

1.7.2.4 Scenery Resources – *Logging related activities may impact scenery resources*

1.7.2.5 Air Quality – *Prescribed fire may impact air quality in the watershed*


Baldwin Gap Project
Vicinity Map
Asheville
ASHEVILLE
Sand Hill
Enka
New Candler
Enka Village
Enka Lake
ELEV 2097
Scott Mountain
Baldwin Gap
Stradley Mountain
PISGAH NATIONAL FOREST
Moore Gap
Mosse Gap
Sheep Gap
Wolf Knob
Bent Creek Rock Lake
Wise Knob
LOWER HOMINY
WILDLIFE RESTORATION AREA
WILDCAT RESTORATION AREA
Ingles Fields Gap
Little Hickory Top
Buzzard Knob
Hickory Top
Browns Knob
Billy Goat Gap
Billy Goat Knob
Sheep Rock
Yellow Gap
BENT CREEK
Legend
Ownership
Compartment 1
Bent Creek Experimental Forest
N
1:48,000

CHAPTER 2 – ALTERNATIVES

Chapter 2 is the "heart" of this EA (40 CFR 1502.14) and describes alternatives the agency considered in addition to the proposed action. This chapter also compares each alternative.

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 proposed action, and by the significant issues responding to the proposed action. An alternative to the proposed action should (1) reasonably respond to the purpose and need and (2) address one or more key issues. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

The interdisciplinary team (IDT) considered seven alternatives. Following internal review, three alternatives were developed in detail and three were eliminated from detailed study.

2.2 Alternatives Considered in Detail

2.2.1 Alternative A – No Action

Under this alternative, the projects described in the proposed action (Section 1.3, Chapter 1) would not be accomplished.

2.2.2 Alternative B – Proposed Action

Specific activities and locations of the Proposed Action (Alternative B) are located in Section 1.3, Chapter 1 above—maps of the Proposed Action are located at the end of this chapter. Section 2.5 below compares the alternatives.

2.2.3 Alternative C

Alternative C was developed to address the issue of potential impacts caused by developing new openings on spread of non-native plants and potential impacts to trail users caused by log trucks hauling on the North Boundary Road (FSR 485). Specific activities and locations are displayed in the following table and in the Alternative C maps located at the end of this Chapter. Section 2.5 below compares the alternatives.

Table 2-2: Summary of Alternative C

Stand	Acres	Treatment	Logging System
Regeneration Harvest			
1-16	10	Two-age[1]	Tractor
1-18	10	Two-age	Tractor
1-20[3]	15	Group selection	Tractor
1-23	27	Two-age	Tractor
1-27	19	Two-age	Tractor
Total Regeneration	**81**		
Intermediate Harvest			
1-4[2]	29	Sanitation thin	Tractor
1-20[3]	47	Sanitation thin	Tractor

Stand	Acres	Treatment	Logging System
1-31	30	Sanitation thin	Tractor
1-35	21	Sanitation thin	Tractor/Skyline
1-47	24	Sanitation thin	Tractor
Total Intermediate	**151**		
Improvement			
1-1	67	Timber stand improvement[4]	n/a
1-2	103	Timber stand improvement	
1-3	35	Timber stand improvement	
1-5	22	Timber stand improvement	
1-7	27	Timber stand improvement	
1-8	17	Timber stand improvement	
1-9	14	Timber stand improvement	
1-10	19	Timber stand improvement	
1-22	10	Timber stand improvement	
1-29	44	Timber stand improvement	
Total Improvement	**358**		
Oak Shelterwood			
1-11	27	Pre-harvest Oak Shelterwood[5]	n/a
1-15	12	Pre-Harvest Oak Shelterwood	
1-17	52	Pre-harvest Oak Shelterwood	
1-25	13	Pre-harvest Oak Shelterwood	
1-27	23	Pre-harvest Oak Shelterwood	
1-35	21	Pre-harvest Oak Shelterwood	
1-44	38	Pre-harvest Oak Shelterwood	
1-46	15	Pre-harvest Oak Shelterwood	
Total Shelterwood	**201**		
Invasives			
1-4	29	Control invasives[6]	n/a
1-6	28	Control invasives	
1-7	27	Control invasives	
1-8	17	Control invasives	
1-9	14	Control invasives	
1-10	19	Control invasives	
1-16	10	Control invasives	
1-17	52	Control invasives	
1-22	10	Control invasives	
1-25	16	Control invasives	
1-27	19	Control invasives	
1-28	10	Control invasives	
1-31	30	Control invasives	
1-35	21	Control invasives	
1-46	15	Control invasives	
1-47	24	Control invasives	
Existing roads	<3	Control invasives	
Total Invasives	**344**		
Wildlife Habitat			
Total Wildlife Habitat	**0**		
Prescribed Burning			
1-4	29	Prescribed Burning	n/a
Total Prescribed Burning	**29**		

1 = 15-20 ft^2 of basal area retained per acre
2 = Treat white pine stumps with Sporax
3 = Includes 15 acres of group selection prescription with thinning between group cuts
4 = Stand improvement with Triclopyr and chainsaw/hand ax
5 = Oak treatment with Triclopyr and hand tools
6 = Control with Triclopyr, Glyphosate, and manual methods where feasible

In addition, Alternative C would:

- Reduce the amount of herbicide and use manual methods where feasible;
- Site prepare and release with herbicide and hand tools all two-age and group selection regenerated stands;
- Reconstruct 4.7 miles of existing system road;
- Designate stands 1-13 and 1-14 as small patch old growth (88 acres);
- Stabilize about 1 mile of stream within the Baldwin Field Branch drainage, including the main channel and several of its tributary streams. Since several stream reaches within this drainage are devoid of in-stream structure typically provided by logs, streams are experiencing notable levels of erosion and subsequent deposition within the channel to the point of degrading channel physical integrity. This proposed work would include the installation of large wood (>4" diameter) and rock (small boulder sizes) within the channel to enhance channel stability and improve aquatic habitat. Equipment used on the project would include a small sized tracked excavator for the placement of structures and a dump truck to haul logs and rock to the site. Recontour about 0.2 miles of the old road bed that parallels lower Baldwin Field Branch. Replace the existing culvert on the Baldwin Field Road (between stands 1-20 and 1-23) with a bottomless arch pipe to provide fish passage; and
- Develop two connector bike/horse trails to provide a loop opportunity with the North Boundary trail/road and the Baldwin Field road based on available funding and following harvest activities. These connector trails (about 0.4 miles) and system roads they access (about 6.1 miles) would allow non-motorized multiple recreation uses (hike/bike/horse) in the Baldwin Gap area (about 6.5 miles total) unless the system roads are posted otherwise. There would be no other trails in the Baldwin Gap area available for bike/horse use. The roads where non-motorized travel is permitted would be available for future forest management purposes. Existing "user created" trails would be rehabilitated and closed following harvest activities and as funding allows.

2.2.4 Alternative D

Alternative D was developed to address the issue of early successional habitat, percent of permanent grass and forb habitat developed, and potential impacts to wildlife habitat as a result of trail use. Specific activities and locations are displayed in the following table and in the Alternative D map located at the end of this Chapter. Section 2.5 below compares the alternatives.

Table 2-3: Summary of Alternative D

Stand	Acres	Treatment	Logging System
Regeneration Harvest			
1-16	10	Two-age[1]	Tractor
1-18	10	Two-age	Tractor
1-20[3]	15	Group selection	Tractor

Stand	Acres	Treatment	Logging System
1-23	27	Two-age	Tractor
1-27	19	Two-age	Tractor
1-34	31	Two-age	Skyline
1-44	28	Two-age	Skyline
1-45	12	Two-age	Skyline
Total Two-age	**152**		
Intermediate Harvest			
1-4[2]	29	Sanitation thin	Tractor
1-15	12	Sanitation thin	Tractor
1-20[3]	47	Sanitation thin	Tractor
1-25	15	Sanitation thin	Tractor
1-31	30	Sanitation thin	Tractor
1-35	21	Sanitation thin	Tractor/Skyline
1-47	24	Sanitation thin	Tractor
Total Intermediate	**178**		
Improvement			
1-1	67	Timber stand improvement[4]	n/a
1-2	103	Timber stand improvement	
1-3	35	Timber stand improvement	
1-5	22	Timber stand improvement	
1-7	27	Timber stand improvement	
1-8	17	Timber stand improvement	
1-9	14	Timber stand improvement	
1-10	19	Timber stand improvement	
1-22	10	Timber stand improvement	
1-29	44	Timber stand improvement	
Total Improvement	**358**		
Oak Shelterwood			
1-11	27	Pre-harvest Oak Shelterwood[5]	n/a
1-17	52	Pre-harvest Oak Shelterwood	
1-35	21	Pre-harvest Oak Shelterwood	
1-46	15	Pre-harvest Oak Shelterwood	
Total Shelterwood	**115**		
Invasives			
1-4	29	Control invasives[6]	n/a
1-6	28	Control invasives	
1-7	27	Control invasives	
1-8	17	Control invasives	
1-9	14	Control invasives	
1-10	19	Control invasives	
1-16	10	Control invasives	
1-17	52	Control invasives	
1-19	37	Control invasives	
1-22	10	Control invasives	
1-25	16	Control invasives	
1-27	19	Control invasives	
1-28	10	Control invasives	
1-30	21	Control invasives	
1-31	30	Control invasives	
1-35	21	Control invasives	
1-46	15	Control invasives	

Stand	Acres	Treatment	Logging System
1-47	24	Control invasives	n/a
Existing roads	<3	Control invasives	
Total Invasives	**402**		
Wildlife Habitat			
1-15	0.8	Linear wildlife opening	n/a
1-19	3.0	Wildlife fields	
1-25	0.6	Linear wildlife opening	
1-30	3.0	Wildlife fields	
Total Wildlife Habitat	**7.4**		
Prescribed Burning			
1-4	29	Prescribed Burning	n/a
1-20	36	Prescribed Burning	
Total Prescribed Burning	**65**		

1 = 15-20 ft^2 of basal area retained per acre
2 = Treat white pine stumps with Sporax
3 = Includes 15 acres of group selection prescription with thinning between group cuts
4 = Stand improvement with Triclopyr and chainsaw/hand ax
5 = Oak treatment with Triclopyr and hand tools
6 = Control with Triclopyr and Glyphosate

In addition, Alternative D would:

- Site prepare and release with herbicide and hand tools all two-age and group selection regenerated stands;
- Reconstruct 8.0 miles of existing system road and construct 1.0 mile of temporary road;
- Designate stands 1-13 and 1-14 as small patch old growth (88 acres);
- Develop 1.4 acres of linear wildlife openings converted from temporary roads;
- Develop one wildlife field in Stand 1-30 and several fields (including a "savannah" in between fields) in Stand 1-19 (6 acres total);
- Seed system and temporary roads north of Stand 1-20 up to top of Scott Mountain for permanent grass/forb;
- Stabilize about 1 mile of stream within the Baldwin Field Branch drainage, including the main channel and several of its tributary streams. Since several stream reaches within this drainage are devoid of in-stream structure typically provided by logs, streams are experiencing notable levels of erosion and subsequent deposition within the channel to the point of degrading channel physical integrity. This proposed work would include the installation of large wood (>4" diameter) and rock (small boulder sizes) within the channel to enhance channel stability and improve aquatic habitat. Equipment used on the project would include a small sized tracked excavator for the placement of structures and a dump truck to haul logs and rock to the site. Recontour about 0.2 miles of the old road bed that parallels lower Baldwin Field Branch. Replace the existing culvert on the Baldwin Field Road (between stands 1-20 and 1-23) with a bottomless arch pipe to provide fish passage; and
- System roads (about 6.1 miles) in the Baldwin Gap area would serve as non-motorized multi-use trails unless posted otherwise and existing "user created" trails would be rehabilitated and closed following harvest activities and as funding allows.

2.3 Alternatives Considered but Eliminated from Detailed Study

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

2.3.1 Alternative 1 – Watershed Restoration without Harvesting, Road Construction, or Pesticide Use

Alternative 1 focused on an ecosystem restoration proposal without commercial timber harvest, road construction, or pesticide use. Manual pre-harvest oak shelterwood; manual invasive plant control; prescribed burning; old growth designation; stabilization of Baldwin Field Branch; development of two connector trails and designation of approved trails on existing roads would still occur. This alternative was eliminated from detailed study because it did not meet the Baldwin Gap Purpose and Need (Section 1.4, Chapter 1) for dispersing early successional habitat across the landscape, improving grass/forb habitat; managing to emphasize high quality hardwood sawtimber; nor providing stocking density and species variety treatments. It is also unreasonable to assume that funding would be available to accomplish the silvicultural, watershed, wildlife, and recreation improvements and impractical and cost-inefficient to attempt to manually control the excessive amount of invasive non-native plants in the Baldwin Gap area and annosus root rot infestation in Stand 1-4. The use of goats to control invasive plants may have adverse effects to native riparian vegetation. Alternative A – No Action meets portions of this alternative.

2.4 Project Design Features and Monitoring Common to Action Alternatives

Specific project design features are necessary for wildlife, terrestrial, and botanical resources (Appendix A), prescribed fire, and pesticide use (listed in Appendix F). The action alternatives share these project design features, and unless noted otherwise in the decision document, they would become mandatory if the responsible official selects an action alternative.

Project Design Features

- Protect rock outcrops which are potential habitat for eastern small-footed bat and eastern woodrat. This would be achieved during lay out of the harvest units by having a wildlife biologist establish buffers around rock outcrops.
- Retain snags at a rate of two snags per acre in harvest units where present, or reserve green trees for snag recruitment.
- Riparian perennial stream buffers in planned harvest units are essential to protect populations of the regionally sensitive species *Trillium rugelii*.
- Trees accidentally felled across stream channels (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 unit is complete.
- Skid roads would avoid stream crossings and paralleling perennial channels within designated riparian areas. Skid trails and temporary roads may cross ephemeral streams or

spring seeps that feed theses streams. Temporary stream crossings should be used across ephemeral channels or revegetated immediately after disturbance to avoid the potential for sedimentation of down slope aquatic resources. 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). Revegetation would include seed and mulch.

- ◊ Landings and skid trails should be vegetated as soon as possible after use to avoid off-site soil movement.
- ◊ Temporary roads (if needed) would be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers would be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.
- ◊ Native plants would be utilized in wildlife improvement and roadside erosion control plantings.
- ◊ Four Class I and one Class II (unevaluated) cultural sites would be flagged and avoided during harvest related activities.
- ◊ Scenery design features located in Section 3.7, Chapter 3 would be applied under the action alternatives.

Monitoring

Botanical

- ◊ National objectives include reducing impacts from invasive species and to improve the effectiveness of treating selected invasive species on the Nation's forests and grasslands. Within the Baldwin Gap area, oriental bittersweet is the invasive plant species that would receive priority for control efforts. In stands with oriental bittersweet, control plots would be established to monitor control efforts. Plots would be established before control treatment, checked during treatment, and within nine months after treatment. A post-treatment evaluation report will be completed and filed in the project file according to direction in the Forest Service Handbook 2109.14 Chapter 70 paragraph 72 – POST-TREATMENT EVALUATION. It is expected that up to three applications would be required within about a five year period to allow overstory canopies to close; keeping oriental bittersweet from reaching the canopies.

Water Resource

- ◊ Once harvest activities are completed, harvested units and roads providing access to them would be field reviewed by an analysis team to determine BMP implementation and effectiveness.
- ◊ These units and roads must have experienced at least one rainfall storm event to ensure they went through a period of runoff.
- ◊ The analysis team would determine if the measure, as applied, was successful in achieving its objective – reducing erosion and eliminating transport of sediment to stream channels.
- ◊ BMPs that do not meet the objective would be promptly corrected.
- ◊ Results of this monitoring would feed back into current/future activities and BMP design, and would be presented in the annual monitoring report.

2.5 Comparison of Alternatives

The following tables provide a comparison between the alternatives:

Table 2-4: Comparison of Alternative Actions

Stand	Treatment Prescription	Logging System	Alt A	Alt B	Alt C	Alt D
Regeneration Harvest						
Total Acres of Two Age Harvest Proposed			**0**	**111**	**81**	**152**
Intermediate Harvest						
Total Acres of Sanitation Thinning Harvest Proposed			**0**	**246**	**151**	**178**
Total Acres of Harvest Proposed			**0**	**357**	**232**	**330**
Total Volume Proposed (ccf)			**0**	**3,163**	**2,362**	**3,847**
Improvement						
Total Acres of TSI Proposed			**0**	**358**	**358**	**358**
Oak Shelterwood						
Total Acres of Pre-harvest Oak Shelterwood Proposed			**0**	**265**	**201**	**115**
Invasives						
Total Acres of Invasives Controlled			**0**	**380**	**344**	**402**
Wildlife Habitat						
	Linear Wildlife Opening	n/a	0	1.4	0	1.4
	Wildlife Fields	n/a	0	0	0	6
Total Acres of Wildlife Habitat Developed			**0**	**1.4**	**0**	**7.4**
Prescribed Burning						
Total Acres of Prescribed Burning			**0**	**29**	**29**	**65**
Bike/Horse Trails Designated						
Miles of System Roads Available as Multi-use Non-motorized Trails in the Baldwin Gap Area[1]			**0**	**6.5**	**6.5**	**0**
Road Management						
Road Construction Miles			0	0.25	0	0
Temp Road Construction Miles			0	1.0	0	1.0
Road Reconstruction Miles			0	8.0	4.7	8.0

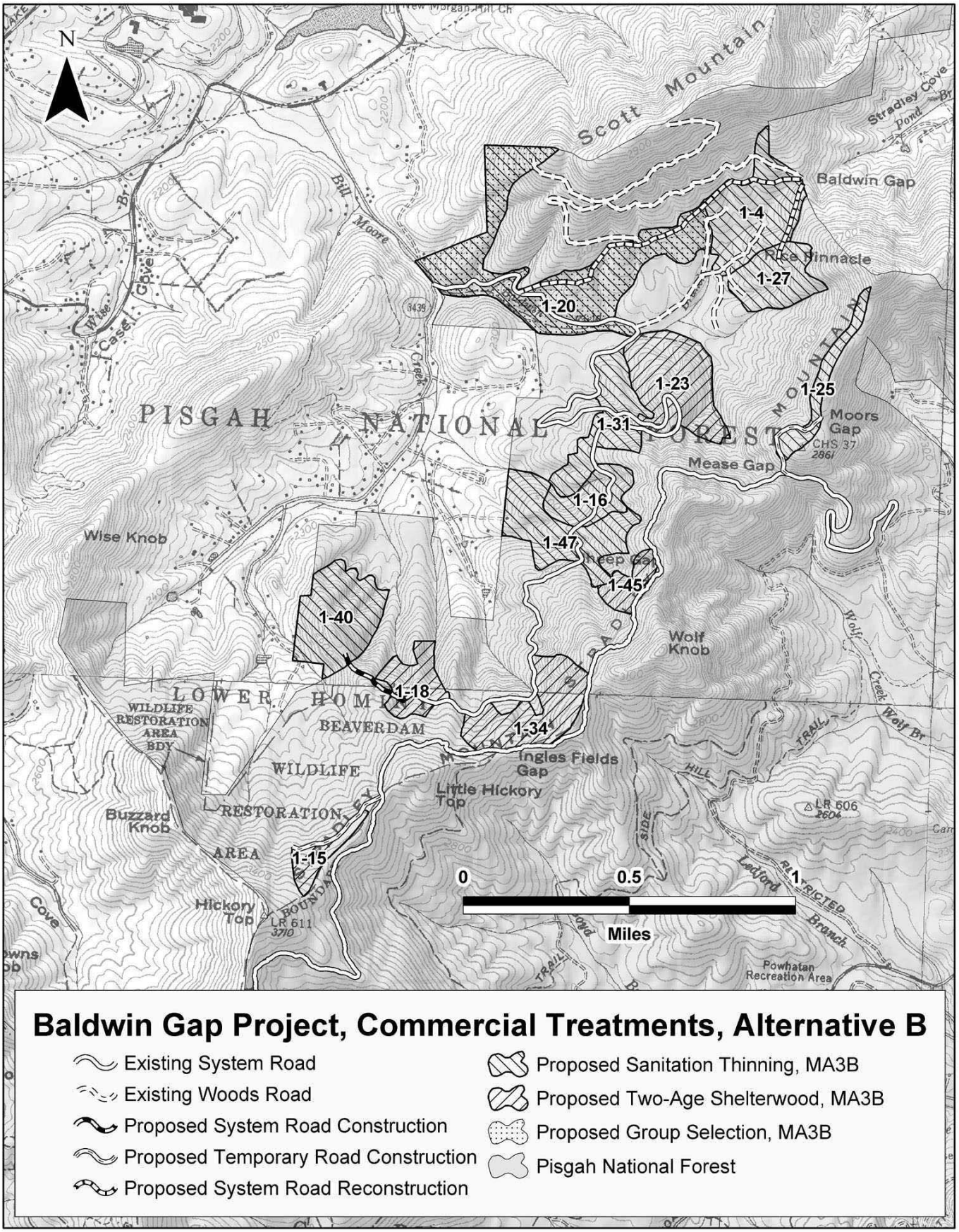
1 Includes about 0.4 miles of new trail construction (2 connectors)—system roads are available as multi-use non-motorized trails unless otherwise posted. System roads where trail use is permitted would be available for logging purposes in the future. Existing "user created" trails would be rehabilitated and closed following harvest activities and as funding allows.

Table 2-5: Comparison of Alternatives with the Purpose and Need Elements (see Section 1.4 above)

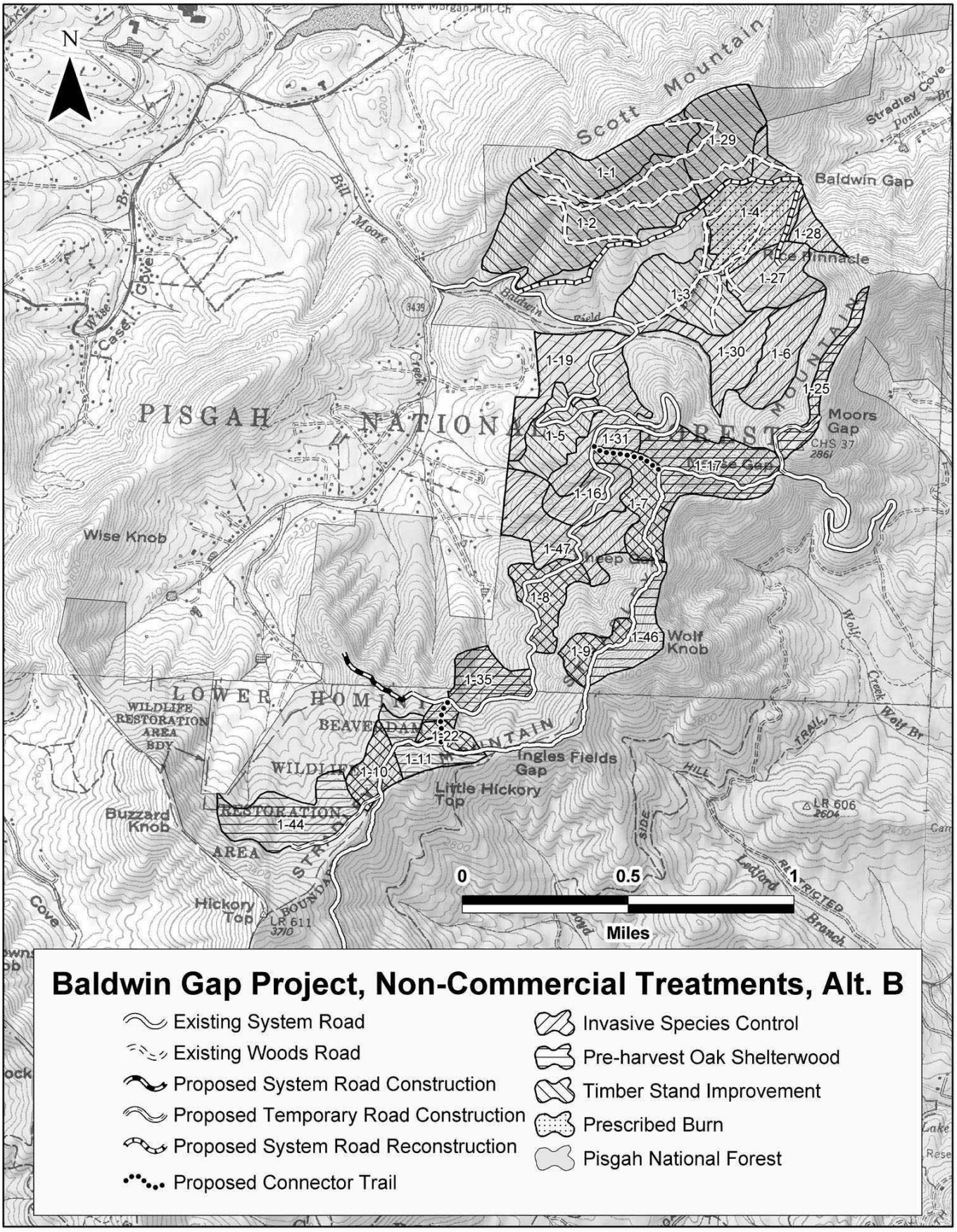
Purpose and Need Element	Alternative A	Alternative B	Alternative C	Alternative D
1) Provide habitat conditions for species such	Does not develop additional early	Develops 111 acres of early successional	Develops 81 acres of early successional	Develops 152 acres of early successional

Purpose and Need Element	Alternative A	Alternative B	Alternative C	Alternative D
as eastern wild turkey, ruffed grouse, white-tailed deer and travel corridors and foraging habitat for black bear across the planning area by dispersing early successional habitat across the landscape by regulating the amount of 0-10 year age class (desired amount is 5%-15% or 68-205 acres for Compartment 1). Desired wildlife habitat would also be provided by managing the area in permanent grass and forb openings for species such as eastern wild turkey (desired amount is 3% or 41 acres for Compartment 1).	successional habitat or grass and forb habitat – the existing condition would be maintained in the compartment.	habitat and 1.6 acres of grass and forb habitat. Purpose and need would be met, but not maximized in the compartment.	habitat and 0 acres of grass and forb habitat. Purpose and need would be met for early successional habitat, but at a lower level than Alternatives B and D; existing grass and forb habitat would not be improved in the compartment.	habitat and 7.4 acres of grass and forb habitat. Purpose and need would be met to the greatest extent, but still not maximized in the compartment.
2) Manage to emphasize quality hardwood sawtimber as the primary product.	Does not manage to emphasize quality hardwood sawtimber as no timber products are proposed – existing condition would be maintained in the compartment.	Purpose and need would be met by harvesting (through two-age and thinning) 357 acres.	Purpose and need would be met by harvesting (through two-age and thinning) 232 acres—less acres than Alternatives B and D.	Purpose and need would be met by harvesting (through two-age and thinning) 330 acres—less acres than Alternative B but more acres than Alternative C.
3) Control/manage pest populations by using prescribed fire and herbicides.	Does not control/manage pest populations – existing condition would be maintained.	Purpose and need would be met by applying pesticides on up to 380 acres and burning 29 acres.	Purpose and need would be met by applying pesticides on up to 344 acres and burning 29 acres—less acres than Alternatives B and D.	Purpose and need would be met by applying pesticides on up to 402 acres and burning 65 acres—more acres than Alternatives B and C.
4) Provide stocking density and species variety through timber stand improvement practices.	Does not provide active stocking density and species variety – existing condition would be maintained.	Purpose and need would be met by performing 358 acres of stand improvement and 265 acres of pre-harvest oak treatment.	Purpose and need would be met by performing 358 acres of stand improvement and 201 acres of pre-harvest oak treatment—less oak treatment than Alternative B.	Purpose and need would be met by performing 358 acres of stand improvement and 115 acres of pre-harvest oak treatment—less oak treatment than Alternatives B and C.
5) Enhance habitat for aquatic species populations and diversity by using habitat restoration and improvement.	Does not provide aquatic watershed enhancement – existing condition would be maintained.	Purpose and need would be met by stabilizing 1 mile of Baldwin Field Branch and its tributaries by installing rock and large wood, replacing culverts, and recontouring 0.2 miles of old road bed.	Purpose and need would be met by stabilizing 1 mile of Baldwin Field Branch and its tributaries by installing rock and large wood, replacing culverts, and recontouring 0.2 miles of old road bed.	Purpose and need would be met by stabilizing 1 mile of Baldwin Field Branch and its tributaries by installing rock and large wood, replacing culverts, and recontouring 0.2 miles of old road bed.
6) Provide non-motorized recreational opportunities, specifically providing for horseback and bicycle	Does not provide additional non-motorized recreation	Develops two connector bike/horse trails and designates 6.5 miles for	Develops two connector bike/horse trails and designates 6.5 miles for	Does not provide additional non-motorized recreation opportunities for

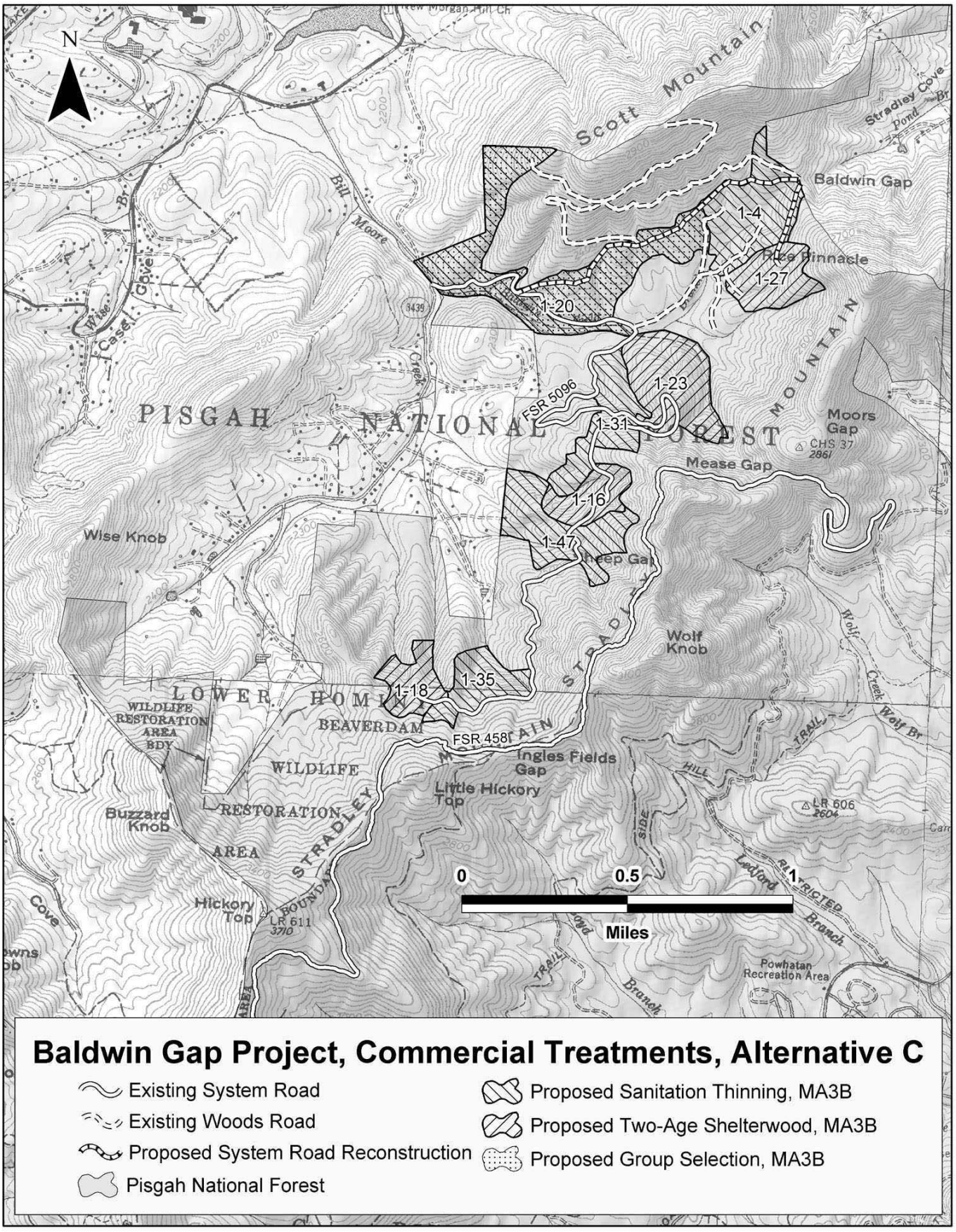
Purpose and Need Element	Alternative A	Alternative B	Alternative C	Alternative D
riding on closed system roads, construct trails to connect existing system roads as funding allows, and rehabilitate existing "user created" trails following harvest activities as funding allows.	opportunities for horseback and bicycle use on closed roads and does not rehabilitate existing "user created" trails.	horse/bicycle/hiking use and rehabilitees existing "user created" trails.	horse/bicycle/hiking use and rehabilitees existing "user created" trails.	horseback and bicycle use on closed roads – existing "user created" trails would be rehabilitated.



E. Crews June 2, 2005



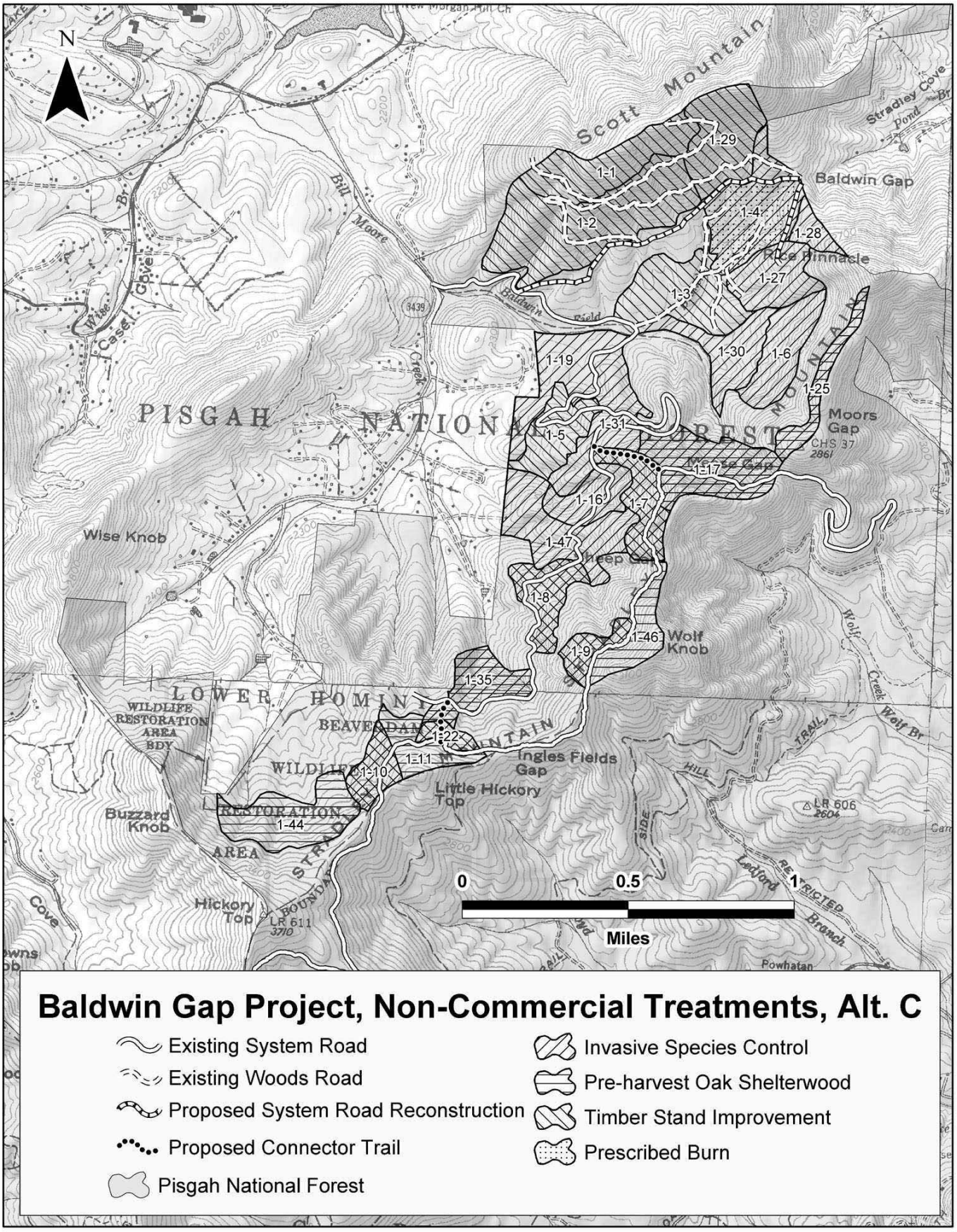
E. Crews June 2, 2005



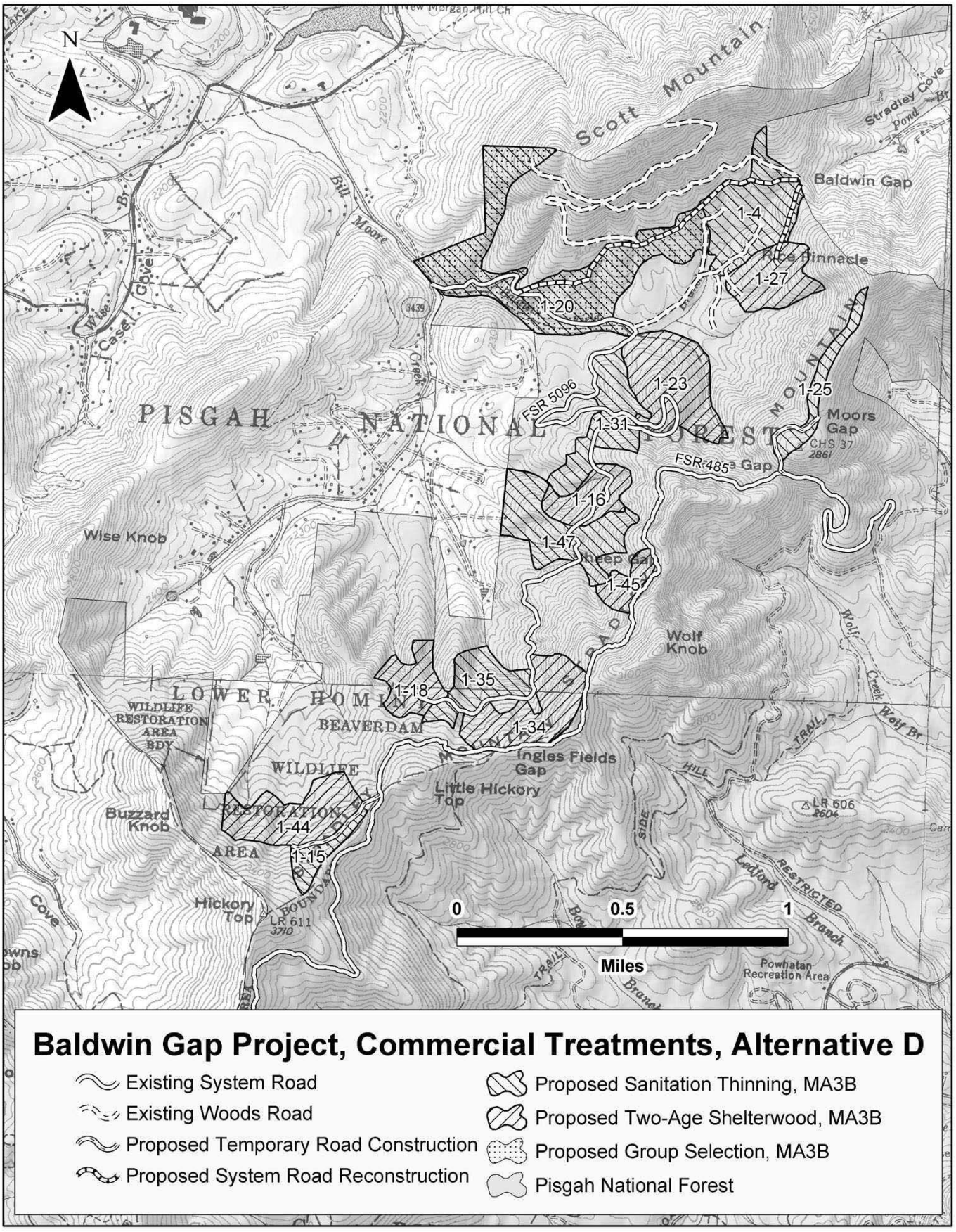
Baldwin Gap Project, Commercial Treatments, Alternative C

- Existing System Road
- Existing Woods Road
- Proposed System Road Reconstruction
- Pisgah National Forest
- Proposed Sanitation Thinning, MA3B
- Proposed Two-Age Shelterwood, MA3B
- Proposed Group Selection, MA3B

E. Crews June 2, 2005



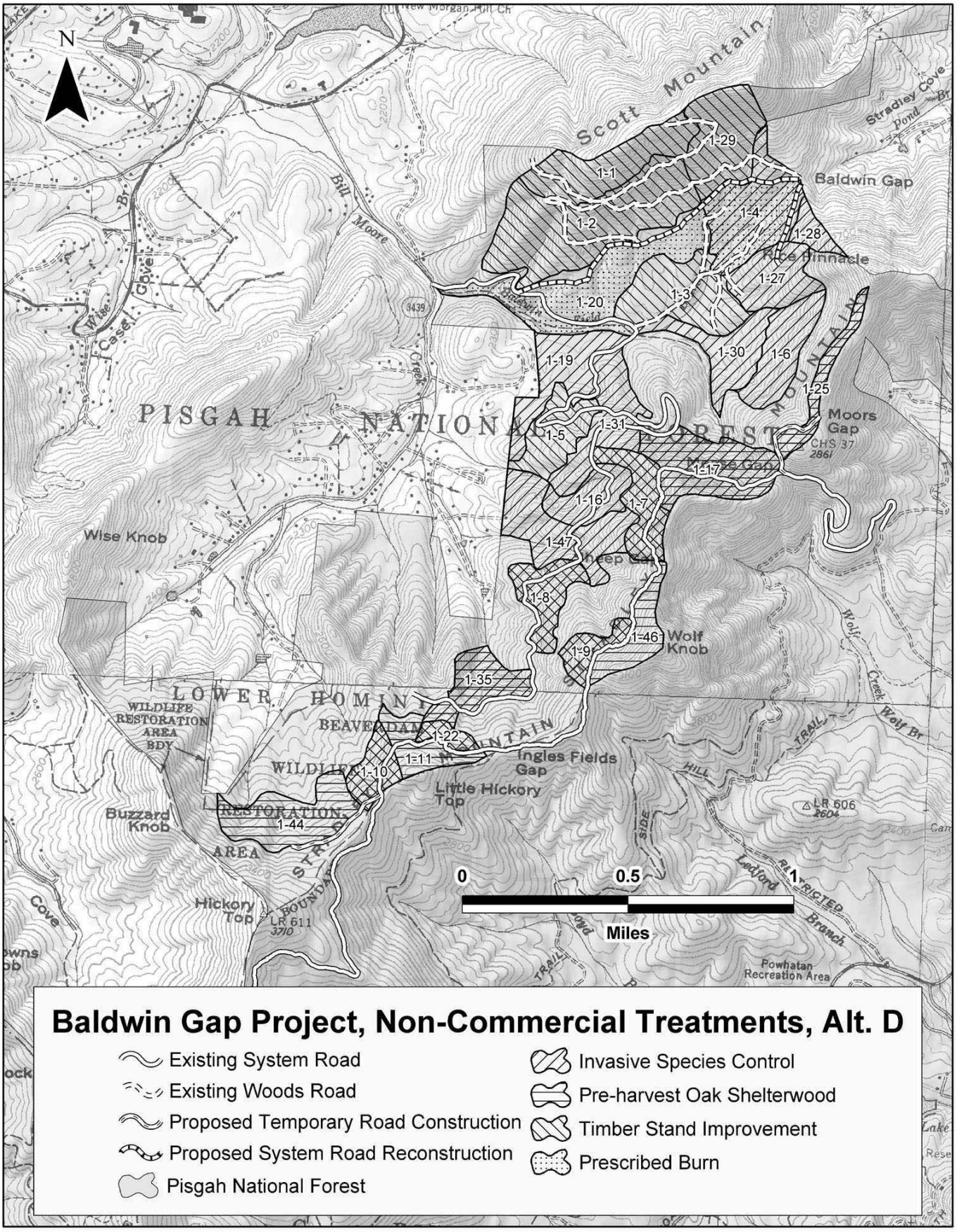
E. Crews June 2, 2005



Baldwin Gap Project, Commercial Treatments, Alternative D

- Existing System Road
- Existing Woods Road
- Proposed Temporary Road Construction
- Proposed System Road Reconstruction
- Proposed Sanitation Thinning, MA3B
- Proposed Two-Age Shelterwood, MA3B
- Proposed Group Selection, MA3B
- Pisgah National Forest

E. Crews, May 26, 2005



E. Crews June 2, 2005

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

Included in this chapter are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources. Reports from different resource specialists supplied information for portions of the analysis in this chapter. Definitions of activity area and analysis area (AA) are located in Appendix A, Biological Evaluation below.

3.1 Hydrology and Aquatic Habitat

Hydrology Existing Condition

The proposal is within the Bill Moore Creek drainage of the South Hominy Creek Sub-Watershed (6^{th} level hydrologic unit). The hydrologic analysis area (AA) is the Bill Moore drainage downstream to Enka Lake. Historically, the Bill Moore Creek drainage was completely logged near the turn of the century. Early logging activities required many roads and skid trails to be developed on the landscape. These activities likely exposed soil and increased compaction within the watershed, and thus increased sources of sediment and rates of storm water runoff. Since main travel routes were constructed predominantly in the relatively flat valley bottoms, adverse impacts to adjacent stream channels was likely heavy during and within the first 5 to 10 years after construction when logging occurred. Following the clearing of land, farming in valley bottoms occurred as the Bill Moore Creek drainage was settled. Both farming and valley bottom roads caused stream reaches to be straightened from their natural meander pattern. As a result, in-stream erosion increased and aquatic habitat quality degraded. These conditions persist today in much of the watershed with additional impacts occurring from land development.

Presently the headwater areas of the eastern portion of the watershed are predominantly forested lands managed by the U.S. Forest Service. In these areas, farming has been eliminated, but the legacy of that and early logging practices are still present on portions of the landscape. The Baldwin Field Branch drainage, tributary to Bill Moore Creek, in particular has several stream reaches that show signs of channel instability, evidenced by excessive stream bed and bank erosion. These stream reaches occur in timber stands 1-20 and 1-4 of the analysis area. Another stream reach showing evidence of channel instability is a smaller tributary to Bill Moore Creek that has been impacted by farming and logging in the past and a recent landslide near its origin.

In the headwaters of the Bill Moore Creek drainage, on National Forest System (NFS) lands only, there are 3.2 miles of closed road. Roads can act as conduits for delivery of more water and sediment to the channel than it has naturally received, and thus roads can influence channel stability and water quality. The roads on NFS lands are predominantly stable due to well-vegetated surfaces, with the exception of road/stream crossings where culverts have plugged and stream flow has eroded the road fill material.

Protected water uses were designated by the State of North Carolina, Department of Environment and Natural Resources for all state waters, including those in the Bill Moore Creek drainage. These are inclusive of the following: aquatic life propagation and maintenance of biological integrity, wildlife, secondary recreation (swimming on an infrequent basis), agriculture, and water supply for drinking, culinary, or food processing. In addition to these protected water uses, water quality in Hominy Creek is to be maintained and protected to sustain and allow for trout propagation and survival of stocked trout on a year-round basis.

Bill Moore Creek is not listed as "water quality limited" by the N.C. Department of Environment and Natural Resources, Division of Water Quality as of the latest 303(d) listing of stream channels impaired from meeting State water quality standards. Therefore, all protected water uses are currently identified as "supported" at some level.

Aquatic Habitat Existing Condition

Existing data for aquatic resources within the aquatic AA 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 mostly as a historical reference—project-specific surveys were also conducted.

Project information was obtained from Ted Oprean, U.S. Forest Service (USFS) Forester. Lorie Stroup, USFS Fisheries Biologist and Kerri Lyda and Jamie Summer , USFS Fisheries Technicians conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas on the Fall of 2004 (August and October) and the Spring of 2005 (March, April and May). The 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. Baldwin Gap and Bill Moore Creek were surveyed for fish using a backpack electrofishing machine.

Additional information specifically addressing aquatic MIS was obtained from North Carolina Wildlife Resources Commission (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.

Substrate within activity area waters (following table) 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 (PETS) species, MIS, as well as other aquatic organisms. A map of the unnamed tributary (UT) streams in the activity areas is located at the end of the chapter.

Table 3-1: Forest Plan Watershed 27 (Bill Moore Creek)

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Areas	Miles in Analysis Area	DEM Classification*
Baldwin Field Branch	01- 4, 23	0.87	1.2	C
UT 1	01- 20	0.15	0.23	C
UT 2	01- 20	0.23	0.27	C
UT 3	01- 20	0.30	0.38	C
UT 4	01- 20	0.19	0.30	C
UT 5	01- 04	0.19	0.23	C
UT 6	01- 27	0.038	0.21	C
UT 7	01- 27	0.19	0.49	C
UT 8	01- 23	0.38	0.38	C
UT 9	01- 23	0.17	0.17	C
UT10	01- 23, 31	0.23	0.34	C
Bill Moore Creek	01	0.15	2.61	C
UT 1	01- 40	0.04	0.95	C

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Areas	Miles in Analysis Area	DEM Classification*
UT 2	01- 18		0.53	C
UT 3	01- 18	0.04	0.72	C
UT 4	01- 35	0.19	0.76	C
UT 5	01- 47, 45	0.30	0.42	C
UT 6	01- 16	0.38	0.61	C
Wise Branch	01		0.23	C

*The NC Department of Environmental Management (DEM) 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.

Fish habitat exists within the aquatic biological AA and activity areas of Baldwin Field Branch and the aquatic biological AA of Bill Moore Creek. There is limited habitat for fish species within other activity area waters due to small stream size and restricted flow regimes. Activity area waters provide habitat for macroinvertebrates.

Fish surveys were conducted using a backpack electro-fishing device on June 10, 2005, from the confluence of Baldwin Field Branch and Bill Moore Creek at the lower site and from approximately 100 meters downstream of the crossing on FSR (Forest Service Road) 5096 to upstream 30 meters of the crossing on FSR 5096. Species captured at the lower site included: *Hypentelium nigricans* (northern hogsucker), *Nocomis micropogon* (river chub), *Rhinichthys atratulus* (blacknose dace), *Rhinichthys cataractae* (longnose dace), *Cottus bairdi* (mottled sculpin) and *Lepomis macrochirus* (bluegill). Above the culvert on FS5096 (the upper site), *Nocomis micropogon* (river chub), *Rhinichthys atratulus* (blacknose dace), *Rhinichthys cataractae* (longnose dace), *Cottus bairdi* (mottled sculpin) were found.

A historical survey in Baldwin Field Branch was conducted in 1993 by USFS personnel and the NCWRC as a part of the early 1990s brook trout distribution surveys. One rainbow trout was found during 100 meters of survey. Odonate surveys were conducted by the USFS under contract with Virginia Commonwealth University on the Pisgah and Nantahala National Forests. Three sites were taken in the vicinity of the Baldwin Gap Project in 2003.

Activity area specific aquatic macroinvertebrates were sampled by the USFS in the fall (2004) and the spring (2005). Sample locations were predetermined based on location of project activity sites. Sites were located within or downstream of proposed project activities. Samples were collected by walking stream reaches and sampling various habitats by turning over rocks, investigating leaf packs and using a serber net for depositional habitats.

Baldwin Field Branch

Baldwin Field Branch is located within stands 1-20 and 1-4 and adjacent to stand 1-23. Forest Service Road 5096 crosses Baldwin Field Branch. Habitat data was taken from two sites within stand 20. The average width of Baldwin Field Branch is approximately 7 feet. Substrate consists of 55% sand and silt, 28% gravel, 12% cobble, and 5% large cobble. The pool to riffle ratio is approximately 1:3 in the lower section and 1:2 upstream in stand 1-20. Fish habitat exists within Baldwin Field Branch to 50 meters above the culvert crossing.

Each UT to Baldwin Branch was surveyed for aquatic habitat and organisms. These 10 unnamed tributaries are characterized by higher gradients and restricted flow regimes. Substrate in all of these tributaries is characterized by cobble embedded with silt and sand. These streams also displayed high concentrations of sand and silt embedding the cobble substrate. The highest embeddedness recorded was 80% with the lowest at 40%. A greater percentage of riffle habitats

exist within these tributaries as opposed to the amount of pool habitat, which is to be expected in smaller tributaries. No fish habitat is present within these tributaries with the exception of UT 1 Baldwin Field Branch which displays minimal habitat for fish from the confluence of Baldwin Field Branch upstream approximately 100 feet.

Bill Moore Creek

Visual habitat estimations within Bill Moore Creek and the unnamed tributaries associated with this project were conducted during the fall of 2004 and the spring of 2005. Substrate within Bill Moore Creek consisted of 60% sand and silt, 30% small cobble and 10% boulders. Streams from stands 1-40, 1-18, 1-35, 1-34, 1-47, 1-45, 1-16 and Baldwin Field Branch itself flow into the main stem of Bill Moore Creek. Bill Moore Creek supports a wide variety of fish species.

The UT to Bill Moore Creek (UT 1 Bill Moore Creek) associated with stand 1-40 and the section of this tributary that runs through the stand contains no fish habitat due to restricted flow regimes and little flow. Substrate consists of 50% cobble with 50% sand and silt. Below USFS property boundaries, this stream flows adjacent to unpaved driveways and homes contributing to various sources of off site movement of soil.

UT 2 Bill Moore Creek is located below stand 1-18 and within the drainage area of stand 1-40. There is little to no fish habitat within this stream due to restricted flow regimes and high gradient. Substrate consists of 50% gravel, 40% cobble, and 10% sand and silt.

UT 3 Bill Moore Creek does not become perennial until well below the activity area of stand 1-18 within the analysis area (approximately 300 meters).

UT 4 Bill Moore Creek is located within stand 1-35. Within the activity areas there is no fish habitat available due to restricted flow regimes and high gradient. The substrate consisted of 50% gravel, 40% sand and silt, 10% cobble.

UT 5 Bill Moore Creek is located within stands 1-45 and 1-47. Within the analysis area are restricted flow regimes and high gradient which contributes to the lack of fish habitat. Substrate within UT 5 consists of 50% large cobble, 20% gravel, 20% silt, and 10% small cobble.

UT 6 Bill Moore Creek is located adjacent to stand 16. No fish habitat was noted during activity area surveys. Substrate consists of 40% silt, 40% large cobble, and 10% gravel.

Wise Branch

Wise Branch is included in the analysis area since Bill Moore Creek flows into Wise Branch approximately 0.95 miles downstream of the activity areas. Wise Branch is heavily impacted by development and livestock grazing that occurs upstream. Substrate is 100% embedded with silt and sand.

Culverts along FSRs 5096, 485, an old crossing in UT 2 Baldwin Field Branch on the old woods road in stand 1-20, the roads themselves, and existing old roads and skid trails in the activity areas are the existing threats to streams and drainages. According to USFS Hydrologist, Brady Dodd, historical land slide activity has caused some degradation of water quality due to sedimentation. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. It is suspected that sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial water since both of the roads (FSRs 5096 and 485) are closed to all vehicle traffic except for administrative and fire control traffic (i.e. road disturbance is limited).

3.1.1 Hydrology Effects Analysis

Introduction

Direct and indirect effects to stream channels were analyzed at specific stream reaches within the Bill Moore Creek drainage. Cumulative Watershed Effects (CWE) would be analyzed at the outlet of Bill Moore Creek into Enka Lake, approximately a 7th level hydrologic unit. Below this point, it is assumed that if any effects from the proposed activities did occur, they would be masked or diluted to the point that ties with potential site disturbance would not be apparent. As a result, the effects analysis for road impacts to water quality does not extend below this location.

Alternative A – No Action

Direct and Indirect Effects

Existing trends would persist with changes occurring naturally. It is likely that currently unstable stream reaches would continue on a slow trend of recovery interrupted and set back by storm runoff events that would continue to erode stream channels and unstable road crossings. Thus, erosion and sedimentation from roads and streams would remain above pre-disturbance levels.

Cumulative Effects

This alternative would allow current direct and indirect effects to continue and thus would continue to contribute to cumulative effects. Sediment produced from the erosion of unstable stream reaches and road sections would continue to add to the degradation of water quality and aquatic habitat in Bill Moore Creek and to the sedimentation of Enka Lake. The current trend of residential development within the drainage has the likelihood of changing both the hydrologic and sediment regime of Bill Moore Creek because of an increase in ground compaction in the drainage and subsequent runoff. There are two proposed actions to improve hydrologic conditions in the area: 1) placing stone by hand along a 0.1 mile section of Bill Moore Creek to stabilize its streambanks and reduce sedimentation, and 2) replacing two culverts, installing rolling dips, and placing aggregate along about 1/3 mile of Baldwin Branch Road (FSR 5096) in relation to the September 2004 storms. Both of these actions are expected to have long-term benefits to hydrologic resources by reducing sediment potential and improving hydrologic functioning. There are no other known foreseeable actions in the activity areas that could adversely affect hydrologic functions.

Alternative B – Proposed Action

Direct and Indirect Effects

Summary: Alternative B is not likely to increase long-term sediment loading to stream channels from the proposed road and trail construction. Although road reconstruction and decommissioning, and in-stream structure placement have the potential to deliver sediment to streams during and just after construction, it is expected that current sediment loading to streams would decrease because of this work since sites of erosion would be stabilized. Therefore, Alternative B would decrease sediment.

Alternative B would construct ¼ mile of new system road, reconstruct 8.0 miles of existing system road, and construct 1.0 mile of temporary road. Since all proposed road construction (system and temporary) is located well above all stream inception points (springs and seeps), there is not likely to be connectivity of new roads to streams. Although the new road(s) would increase surface runoff because of an increase in ground compaction and potentially intercept sub-surface flow, the implementation of road construction BMPs would mitigate potential water

and sediment transport to downstream channels. Best Management Practices for road construction include out-sloped roads with broad based dips to frequently shed water off the road and where ditch lines are necessary, adequately spaced ditch relief culverts would be placed to avoid concentrating runoff.

All constructed temporary roads would be maintained as linear wildlife openings following the timber sale. Since the road prism would remain on the landscape, modification of hydrologic processes, e.g., runoff and erosion would remain. Effects would be mostly mitigated by out-sloping the road, thus eliminating the need for an inboard ditch line and relief culverts, a heavy growth of grass, and very infrequent vehicle traffic. The short-term road density in the Baldwin Field Branch drainage would slightly increase due to the construction of the temporary road near Moors Gap, but due to the location and design of the road the increase in drainage density would not have an effect on the hydrologic and sediment regimes.

The proposed reconstruction of 8.0 miles of road in the hydrologic AA has the potential to increase sediment inputs to streams, predominantly during the replacement of culverts. During the replacement of road crossings, BMPs would be implemented to minimize increases in turbidity and sedimentation. Thus, it is anticipated that the accomplishment of this work would have small increases in sediment loading to the stream channels based on effective implementation of BMPs. Also, the proposed reconstruction would have a long-term (beyond one-year) benefit to the current sediment yields in all affected drainages since existing chronic sources of sediment would be notably reduced.

This alternative proposes to construct two multi-purpose connector trails. These trails would be constructed on two different spurs off the main ridge of Stradley Mountain where there would not be a connection of trail runoff to streams in the adjacent valley bottoms due to the extensive distance between the two. Construction of the connector trails would reduce the current use of unauthorized “user created” trails that appear to be contributing to water resource damage. All other unauthorized user created trails would be closed and rehabilitated.

Alternative B proposes to decommission about 0.2 miles of the old road bed that parallels lower Baldwin Field Branch. This road bed has confined the channel with fill material and limited growth of desired streamside vegetation. As a result, the streamside area is dominated by rhododendron. The removal of the compacted road bed would reduce surface runoff and confinement of the lower reach of Baldwin Field Branch. The act of decommissioning the road bed would have the potential to increase sediment loading to the stream since road material would be excavated from the fill slope and placed on the cut slope, all of which is within 100 feet of the channel. Standard BMPs would be implemented per a developed Erosion and Sedimentation Control Plan, approved by the State of North Carolina to minimize sediment transport to the stream. These measures would include timing work to occur when it is not raining, the placement of silt fences along the entire length of ground disturbance, seeding and mulching all disturbed soil, and planting the area with trees and shrubs. This proposed work would reduce road density in the Baldwin Field Branch drainage, reduce the risk of catastrophic road failure, and improve riparian conditions.

Additionally, this alternative proposes to stabilize about one mile of stream within the Baldwin Field Branch drainage, including the main channel and several of its tributary streams. This proposed work would include the installation of large wood (>4" diameter) and rock (small boulder sizes) within the channel to enhance channel stability and improve aquatic habitat. This work would be implemented using a small sized tracked excavator for the placement of structures in the channel and a dump truck to haul logs and rock to the site. The excavator would

have to travel off of the existing road network where needed to access the channel; however, no new roads would be made and compaction of the ground would be light. The dump truck would remain on the road network. Placement of these structures is likely to cause in-stream erosion as stream flow surges around the new structures and diversity of the streambed profile is improved with the formation of pools and riffles. Since the structures are also designed to trap and store sediment and woody debris, a balance in erosion and deposition in the channel is expected within the first few years of construction.

Cumulative Effects

Since the implementation of this alternative would not have adverse direct and indirect effects on the existing sediment regime, this alternative would not have measurable cumulative effects on lower Bill Moore Creek or Enka Lake. This alternative would improve current direct and indirect effects of sedimentation produced from the erosion of unstable stream reaches and road sections in the Bill Moore Creek drainage. Residential development including roads are currently occurring in a 19 acre subdivision about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area (Biltmore Lakes area). These developments are likely to create notable changes in the flow and sediment runoff from the affected drainages because of an increase in compacted area. Since the Baldwin Gap proposal would not contribute to the current trend in water resource degradation associated with residential development within the drainage, the proposal would not have adverse effects on the private land developments or private residences. There are two separate proposed actions to improve hydrologic conditions in the area: 1) placing stone by hand along a 0.1 mile section of Bill Moore Creek to stabilize its streambanks and reduce sedimentation, and 2) replacing two culverts, installing rolling dips, and placing aggregate along about 1/3 mile of Baldwin Branch Road (FSR 5096) in relation to the September 2004 storms. Both of these actions are expected to have long-term benefits to hydrologic resources by reducing sediment potential and improving hydrologic functioning. There are no other known foreseeable actions in the activity areas that could adversely affect hydrologic functions.

Alternative C

Direct and Indirect Effects

Summary: Road reconstruction and decommissioning, and in-stream structure placement proposed in Alternative C have the potential to deliver sediment to streams during and just after construction. However, it is expected that sedimentation to streams would decrease overall because sites of erosion would be stabilized. Therefore, Alternative C would have a positive effect on water quality.

Alternative C would reconstruct 4.7 miles of existing system road. The proposed reconstruction in the hydrologic AA has the potential to increase sediment inputs to streams, predominantly during the replacement of culverts. During the replacement of road crossings, BMPs would be implemented to minimize increases in turbidity and sedimentation. For example, stream flow would be pumped around the construction site to facilitate working in dry conditions. Thus, it is anticipated that the accomplishment of this work would have small increases in sediment loading to the stream channels based on effective implementation of BMPs. Also, the proposed reconstruction would have a long-term (beyond one-year) benefit to the current sediment yields in all affected drainages since existing chronic sources of sediment would be notably reduced.

This alternative proposes to construct two multi-purpose connector trails. These trails would be constructed on two different spurs off the main ridge of Stradley Mountain where there would

not be a connection of trail runoff to streams in the adjacent valley bottoms due to the extensive distance between the two. Construction of the connector trails would reduce the current use of unauthorized "user created" trails that appear to be contributing to water resource damage. All other unauthorized user created trails would be closed and rehabilitated.

This alternative proposes to decommission about 0.2 miles of the old road bed that parallels lower Baldwin Field Branch. This road bed has confined the channel with fill material and limited growth of desired streamside vegetation. As a result, the streamside area is dominated by rhododendron. The removal of the compacted road bed would reduce surface runoff and confinement of the lower reach of Baldwin Field Branch. The act of decommissioning the road bed would have the potential to increase sediment loading to the stream since road material would be excavated from the fill slope and placed on the cut slope, all of which is within 100 feet of the channel. Standard BMPs would be implemented per a developed Erosion and Sedimentation Control Plan, approved by the State of North Carolina to minimize sediment transport to the stream. These measures would include timing work to occur when it is not raining, the placement of silt fence along the entire length of ground disturbance, seeding and mulching all disturbed soil, and planting the area with trees and shrubs. This proposed work would reduce road density in the Baldwin Field Branch drainage, reduce the risk of catastrophic road failure, and improve riparian conditions.

Additionally, this alternative proposes to stabilize about one mile of stream within the Baldwin Field Branch drainage, including the main channel and several of its tributary streams. This proposed work would include the installation of large wood (>4" diameter) and rock (small boulder sizes) within the channel to enhance channel stability and improve aquatic habitat. This work would be implemented using a small sized tracked excavator for the placement of structures in the channel and a dump truck to haul logs and rock to the site. The excavator would have to travel off of the existing road network where needed to access the channel; however, no new roads would be made and compaction of the ground would be light. The dump truck would remain on the road network. Placement of these structures is likely to cause in-stream erosion as stream flow surges around the new structures and diversity of the streambed profile is improved with the formation of pools and riffles. Since the structures are also designed to trap and store sediment and woody debris, a balance in erosion and deposition in the channel is expected within the first few years of construction.

Cumulative Effects

Since the implementation of this alternative would not have adverse direct and indirect effects on the existing sediment regime, this alternative would not have long-term measurable adverse cumulative effects downstream on lower Bill Moore Creek or Enka Lake. This alternative would improve current direct and indirect effects of sedimentation produced from the erosion of unstable stream reaches and road sections in the Bill Moore Creek drainage. Residential development is currently occurring in a 19 acre subdivision about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area (Biltmore Lakes area). These developments are likely to create notable changes in the flow and sediment runoff from the affected drainages because of an increase in compacted area. Since the Baldwin Gap proposal would not contribute to the current trend in water resource degradation associated with residential development within the drainage, the proposal would not have adverse effects on the private land developments or private residences. There are two separate proposed actions to improve hydrologic conditions in the area: 1) placing stone by hand along a 0.1 mile section of Bill Moore Creek to stabilize its streambanks and reduce sedimentation, and

2) replacing two culverts, installing rolling dips, and placing aggregate along about 1/3 mile of Baldwin Branch Road (FSR 5096) in relation to the September 2004 storms. Both of these actions are expected to have long-term benefits to hydrologic resources by reducing sediment potential and improving hydrologic functioning. There are no other known foreseeable actions in the activity areas that could adversely affect hydrologic functioning.

Alternative D

Direct, Indirect, & Cumulative Effects

Since Alternative D proposes the same road and stream treatments as Alternative B (but does not propose the two connector trails), please see disclosures in Alternative B above for impacts to water quality as a result of the road network.

3.1.2 Aquatic Habitat Effects Analysis

Aquatic Habitat Effects Summary

The following table summarizes expected effects on the aquatic resource:

Table 3-2: Summary of Potential Effects to Aquatic Resources by Project Alternatives

Issue	Alternative A	Alternative B	Alternative C	Alternative D
Effects on aquatic MIS	Existing habitat and population trends continue.	Existing habitat would improve with watershed enhancement and stream bank stability at crossings. Population trends continue.	Same as Alt B	Same as Alt B
Effects on water quality (associated with the amount of soil disturbance)	Slight risk of degradation from undesignated connector trails.	Turbidity and sediment loading may increase slightly during culvert installation and implementation of watershed project. Should diminish downstream and cease with site rehabilitation.	Same as Alt B	Same as Alt B
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May temporarily affect aquatic habitat in Baldwin Branch and tributaries (during restoration) but would improve over time.	Same as Alt B	Same as Alt B
Effects to riparian areas	Remain in present state. Aquatic habitat would improve, as riparian areas grow older.	Remain in present state except at stream crossings. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.	Same as Alt B	Same as Alt B

Issue	Alternative A	Alternative B	Alternative C	Alternative D
Effects of herbicide	No treatment would likely cause the replacement of native riparian vegetation with exotics.	No impact as no spraying would occur within 30 horizontal feet of streams.	Same as Alt B	Same as Alt B
Effects of prescribed burning	No impact	Burning activity within riparian areas would not be intense enough to destroy riparian vegetation	Same as Alt B	Same as Alt B

Introduction

Examples of direct effects of a proposed action on aquatic species include, but are not limited to, activities such as crushing individual insects, fish, or redds during stream crossing installation. Such effects are more likely to occur to less mobile aquatic organisms such as aquatic insects, freshwater mussels, and fish eggs and larvae, whereas more mobile species such as crayfish, aquatic salamanders, and juvenile and adult fish are often able to escape direct effects by simply leaving the area. Direct effects may also include changes in the quality, quantity, or diversity of habitat available resulting from sedimentation. It is important to note that effects to aquatic habitats from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

Examples of indirect effects of a proposed action on aquatic species include, but are not limited to, altered reproductive or foraging success and increased occurrence of disease as a result of sedimentation, degraded water quality, and altered community structure as a result of migration. Indirect effects may also include changes in the quality, quantity, or diversity of habitat available resulting from changes in riparian vegetation. Specifically, the transport of LWD, an integral component of aquatic habitat diversity, to stream channels is a function of riparian vegetation structure and composition.

Sedimentation of aquatic habitats within the activity areas may occur with the maintenance of existing system roads, the reconstruction of roads and skid trails, and the replacement of culverts. There would also be a temporary fluctuation in sediment and turbidity during the cleaning of a pipe intake on UT 1 Baldwin Field Branch on FSR 5096. Sediment loading and turbidity can result in the loss of interstitial habitat within the substrate and cause direct mortality by the crushing or smothering of less mobile organisms such as aquatic invertebrates, fish eggs and juveniles. Long term, this project would have the potential to positively cumulative effect the aquatic resources within the area if any of the action alternatives are implemented. These include, correcting erosion issues caused by the tropical storms of 2004 on FSR 5096. Also, improvements to water quality are expected by the elimination of undesignated connector trails into the Baldwin Gap area from North Boundary Road.

3.1.3 Effects of Access on Aquatic Resources

Alternative A

Implementation of Alternative A would perpetuate the existing condition described above. Aquatic habitat quality, quantity, and populations would continue in their natural dynamic patterns. There would be no impacts upon the 10 Forest Concern (FC) species.

Alternative B

Direct Effects

Access to the proposed units would involve the construction of ¼ mile of new system road, the reconstruction of 8.0 miles of existing system road, and the construction of 1.0 mile of temporary road as well as the development of skid trails and log landings. The ¼ mile of new road construction is proposed for the Lower Hominy Area connecting stand 40 to FSR 5096. The location of this new construction is up near a ridge and away from any aquatic resources. Riparian areas have been identified as 100 feet on either side of perennial channels and 30 feet on either side of intermittent channels. No activity, including the placement of log landings and skid trails, would occur in this area with the exception of access at stream crossings. There are no new stream crossings associated with this alternative; however, there are some culverts that would be replaced with larger, better hydrologically functioning pipes. The sizes for these pipes have been determined using the *Forest Culvert Sizing Protoco*l which considers species present and need for aquatic organism passage. The replacement of the culvert in Baldwin Field Branch was considered during the preliminary development of this project; however, after further field surveys and investigations, the crossing in Baldwin Field Branch would remain and be improved. Large river stones would be placed at the outfall of the pipe in order to develop and simulate a more natural stream crossing. This would benefit aquatic organism's long term because the improved crossing would be more likely to allow for the passage of aquatic organisms through the pipe upstream. The replacement of the culverts on FSR 5096, Baldwin Gap Road, and Baldwin Fields Road would reduce, if not eliminate, the risk of future failures and reduce the existing stream bank erosion that currently exists. Impacts are expected to be reduced due to implementation of Forest Plan standards (BMPs) and Forest Practices Guidelines listed in Section 3.1.3 below, and project design features listed in Section 2.4, Chapter 2.

The drainage on all roads within the Baldwin Gap area would be designed so water flows off the roaded area and enters into vegetation rather than directly into activity area streams.

More mobile aquatic species such as aquatic salamanders, crayfish, and fish would emigrate downstream away from the disturbed area during culvert installation. The loss of less mobile individuals such as macroinvertebrates would likely occur during this process, but is not expected to adversely affect population viability because only individuals would be directly impacted, not entire populations.

Access through stand 20 would require the reconstruction of an existing woods road. This reconstruction has potential to directly improve existing crossings that are incised and causing stream bank erosion. Properly sized pipes or stringer bridges would be placed at these crossings and stream banks would be immediately seeded for rehabilitation of the site. This woods road would cross unnamed tributaries (UTs) to Baldwin Field Branch 2, 3, 4 and 5. Habitat within and downstream of these crossing sites would improve since existing erosion at the old crossings would be rehabilitated.

Indirect Effects

There may be short-term (less than 1-2 years) off-site movement of soil into activity area waters from road construction, road reconstruction, and culvert replacements. 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 be covered with sediments. 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). If habitat complexity is lost through

sedimentation, a shift in the aquatic insect community could occur that favors tolerant macroinvertebrates. Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost due to reduced habitat or suffocation. This can result in the loss of, or reduced, year-class strength, which can lead to accelerated population fluctuations and suppressed population levels. Over time, these species would recolonize areas as habitat conditions improve a couple seasons following implementation.

Smaller, less mobile organisms may not be able to move to more suitable habitat. Individuals of these species may decline locally or be lost through reduced productivity. These may recolonize from reaches of undisturbed streams as conditions improve with site rehabilitation. Implementation of contract clauses and erosion control precautions described above would minimize sediment effects and accelerate site rehabilitation.

Skid trails and the temporary road construction may also cross ephemeral streams or spring seeps that feed these streams and others in the Baldwin Gap area. If heavy rains occur while these ephemeral crossings are exposed, bare soil can be transported down slope to intermittent and ephemeral stream channels. Temporary stream crossings should be used across ephemeral channels or revegetated immediately after disturbance to avoid the potential for sedimentation of down slope aquatic resources. 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). Revegetation would include seed and mulch.

Alternatives C & D

These alternatives are the same in regards to access impacts on aquatic resources because the stream crossings listed above would occur under them. Please see the discussion above for impacts to aquatic resources from access.

3.1.4 Effects of Timber Harvest on Aquatic Resources

Alternative A

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

Alternative B

North Carolina Forest Practices Guidelines (NC-FPGs) and Forest Plan standards (BMPs) would be implemented during harvest activities. Applications of BMPs are intended to meet performance standards of the state regulations. Visible sediment derived from timber harvesting, defined by state regulations, should not occur because the riparian areas should filter out any sediment prior to reaching streams.

There is no plan to harvest within any 100 foot riparian area of perennial streams within the Baldwin Gap Timber Sale area. Stand 23 was evaluated by an interdisciplinary team of Brady Dodd, USFS Hydrologist, Lorie Stroup, USFS Fisheries Biologist, David Danley, USFS Botanist and Christine Kelly, Former USFS Wildlife Biologist for riparian resources and to map the riparian area on UT 9 Baldwin Field Branch. The team decided that the riparian area is 100 linear feet from the stream's edge. Therefore, the Forest Plan's recommendation of considering riparian areas 100 horizontal feet on each side would hold true for UT 9 Baldwin Field Branch in stand 23. According to FEIS Volume I 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" (page IV-36).

Alternative C

Effects to aquatic resources would generally be similar to Alternative B. Even though stands 25, 15, 34, 40, and 45 would drop from treatment and road construction would drop, from an aquatics stand point, there would likely be no difference between Alternatives B and C. Both alternatives would protect aquatic resources with a 30 foot buffer around intermittent streams and a 100 foot buffer on perennial streams. The implementation of Alternative C would likely decrease the amount of surface run-off than Alternative B, but the amount would be immeasurable and neither alternative would have any adverse impacts to aquatic resources. No skidding would occur across these drains and trees would be directionally felled away from them, further reducing the risk of sediment reaching streams.

Alternative D

Alternative D includes the same harvesting treatments as Alternative B with the addition of linear wildlife fields on access roads, a permanent wildlife field in stand 30, and several fields in stand 19. The riparian areas of perennial streams within stands 30 and 19 have not been mapped by an ID team—therefore they would be100 horizontal feet from the stream's edge. Since the riparian areas would be 100 feet, the development of the wildlife fields within stands 30 and 19 would have no indirect or direct effects on the aquatic resources within Baldwin Field Branch or its tributaries. Effects discussed in Alternative B would also apply to Alternative D.

3.1.5 Effects of Timber Harvest on Riparian Areas

Alternative A

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

Alternatives B

There is no plan to harvest within the 100 foot riparian area of any analysis or activity area streams. The only cutting within the riparian areas would be associated with stream crossings discussed above. There is the possibility that as trees are cut, they would cross a stream channel or spring. While large woody debris (LWD) in and adjacent to stream channels is desirable for aquatic habitat diversity, it needs to be of the same scale as the channel size and type so it would not cause flow restrictions and erosion. If the scales of the trees and stream channels do not match it is possible that leaving large tree boles in the channels and across springs could result in flow obstruction. This can lead to accelerated bank scouring and failure, and subsequently, sedimentation of local and downstream channels. To avoid the potential for this habitat loss, trees accidentally felled across stream channels or springs would be removed. "Drag lanes" (area where log is being moved from its fell site) should not be designated for the removal of these trees to avoid severe bank disturbance. Rather, trees should be removed individually, from where they fell. It is unlikely that pulling individual trees across would result in permanent stream bank damage. Any damage done to stream banks is expected to be temporary as there is an abundance of herbaceous vegetation along the banks that would quickly recolonize bare soil.

Alternative C

Effects to the riparian areas of aquatic resources would generally be the same as Alternative B. Alternative C does drop some of the road reconstruction and the new and temporary road

construction; however, the riparian areas associated with stream crossings would remain the same regardless of the alternative. The stream crossings associated with Alternative B are the same for Alternative C.

Alternative D

Effects to riparian areas of aquatic resources would be the same as Alternative B since there is no plan to harvest or build wildlife openings in the 100 foot riparian area of any activity area streams. The stream crossings associated with Alternative B are the same for Alternative D.

3.1.6 Effects of Herbicides, Prescribed Burning, Watershed Improvement, and Connector Trails

Alternative A

The existing condition of aquatic resources has been described above. Natural fluctuations in population stability, and habitat quality and quantity would continue. It is expected that encroachment of oriental bittersweet throughout riparian areas in the aquatic biological AA would likely continue as a result of non-treatment, including burning and the use of herbicides (personal communication with USFS Botanist, David Danley 2005).

Alternatives B, C, and D

Use of Herbicides

Herbicides are proposed in all action alternatives for the Baldwin Gap Timber Sale. Herbicide use for silvicultural treatments and their impacts to aquatic resources is analyzed in detail in the Vegetation Management Environmental Impact Statement for the Southern Appalachians (VMEIS). Included in this document is a detailed analysis of the effects of silvicultural treatments on aquatic resources. Please refer to this document for a description of such effects. No herbicide would be used within 30 feet of any perennial or intermittent streams within the activity areas, reducing potential for direct impacts to water quality (see also Section 3.4 below). Hand pulling may occur within 30 feet to prevent the elimination of native riparian vegetation by oriental bittersweet. No pulling would occur on stream banks to prevent erosion.

Prescribed Burning

All action alternatives involve prescribe burning—stand 4 in Alternatives B and C and stands 20 and 4 in Alternative D. No fireline construction with dozers is planned and some handline is proposed; however, much of the prescribed burns would be contained by existing access roads and streams within the activity areas. If firelines in riparian areas are needed, they would be constructed with hand tools. If mineral soil is disturbed within riparian areas, rehabilitation would occur after burning to reduce the possibility for erosion to occur (Forest Plan, page III-189). Late winter or early spring burns typically exhibit low fire intensities. Any burning within riparian areas is not expected to be intense enough to destroy riparian vegetation and no measurable effects to aquatic resources from this activity are expected.

Watershed Project Baldwin Field Branch and Tributaries

All action alternatives include a stream channel stabilization project in Baldwin Field Branch and its tributaries. Large woody debris within a stream is defined as woody debris greater than or equal to 10 centimeters in diameter (Meehan, 1991). Large wood contributes to structure and hiding cover, maintains physical stability and provides a range of habitats for stream organisms (Dolloff, 1986). Since Baldwin Field Branch and most of its tributaries are devoid of LWD, the structures would provide for a well balanced pool: riffle ratio. A well balanced ratio of these two

habitats allows for species diversity and healthier aquatic populations. Along with the LWD, rocks may be used in various locations in the stream channels. The implementation of this project would enhance channel stability and improve aquatic habitat.

Another aspect of the watershed project is recontouring and decommissioning approximately 0.2 miles of old road bed that parallels lower Baldwin Field Branch. This would eliminate some existing sources of erosion into that stream as well as return the riparian area to a more natural and hydrologically functioning state.

Individual aquatic organisms may be lost during project implementation; however, the long-term benefits of improving habitat would far out weigh short-term impacts. These benefits include: reconnection with the natural floodplain, enhancement of aquatic organism habitat, reduction of sedimentation, and prevention of future erosion and bank instability.

Development of Connector Trail from North Boundary Road

Alternatives A and D would not provide a connector trail for horseback and mountain bike use. Currently there are no "designated" trails connecting North Boundary Road to the Baldwin Field area. In the absence of such connectors, there have been various undesignated areas carved out through the woods, two of which go directly down stream channels. These undesignated and unmaintained access areas are creating erosion and destroying these stream channels. If Alternative A is selected for the Baldwin Gap Project, the undesignated connectors located within these drainage areas would be a continued source of erosion. The direct impact of use within the drain would likely crush individuals and could have adverse impacts on populations of aquatic macroinvertebrates. Alternative D would not designate the connector trails, but would rehabilitate user created trails—Alternative A would neither designate the connector trails nor rehabilitate user created trails.

The implementation of Alternatives B or C would address the existing concern of user created connectors. The designated connectors proposed with these two alternatives would be located at a proper grade with switchbacks and would be located outside the 100 foot riparian area of perennial streams. The undesignated routes would be closed and rehabilitated. The development of the two designated connectors would reduce the amount of off-site movement of soil and eliminate direct impacts caused by individuals within the channel.

3.1.7 Aquatic Threatened, Endangered, Sensitive and Forest Concern Species

Twenty-nine "rare" aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Buncombe County. These species are disclosed in Attachment 1 of the aquatic resource report located in the project record and contains occurrence information for "rare" aquatic species on the Pisgah National Forest. Of the 29 aquatic species included on the original list for analysis, 19 were dropped as a result of a low likelihood of occurrence evaluation based on preferred habitat elements and field survey results. This process is summarized in Attachment 3 of the aquatic resource report.

Because of the amount of suitable habitat available across North Carolina and the Southern Appalachian Mountains, a majority of the members of the sensitive (S) and Forest Concern (FC) aquatic insect community analyzed for this project have been under-sampled across North Carolina and their ranges, and therefore are listed with limited distributions. However, habitat descriptions for these species indicate they may be more widespread in Mountain Province waters with several extending their ranges into the Piedmont Province.

Potential Effects of Proposed Alternatives

There are no aquatic proposed, endangered, threatened, or sensitive (PETS) species within the aquatic biological AA or activity areas of the Baldwin Gap Timber Project. During activity and AA specific surveys, there were no FC aquatic organisms found. However, 10 FC species are included in this analysis due to their habitat preferences and the presence of this habitat within the aquatic biological AA or activity areas.

Activities within the Baldwin Gap area would follow the riparian area guidelines along perennial and intermittent streams as stated in the Forest Plan and NC BMPs. As stated above, no PETS or FC aquatic species were present during surveys, but habitat for FC exists. Aquatic insects present during culvert installation may suffer mortality, but Forest-wide viability is expected to be maintained. Installing culverts may also cause a temporary fluctuation in turbidity (one season or less), but it is not expected to impact any of the area's aquatic resources long-term and is expected to be limited to the affected sites and during installation activities.

Alternative A

No culverts would be replaced and no road reconstruction or construction would occur. There would be no direct or indirect effects to any PETS or FC aquatic species.

Alternative B

There are 13 existing crossings associated with the implementation of this project. Though no PETS or FC aquatic species were found during activity area surveys, habitat exists. If present, individuals may be impacted by the replacement and enhancement of stream crossings associated with this project. Although individuals may be present there would be no effect to the viability of these species across the Forest as a result of project implementation. Therefore, there would be no adverse effects of Alternative B to populations of aquatic PETS or FC species.

Alternative C

Alternative C drops any new road construction and reduces the amount of road reconstruction. There would be 12 crossings associated with the implementation of this alternative. Though no PETS or FC aquatic species were found during activity area surveys, habitat exists. If present, individuals may be impacted by the replacement and enhancement of stream crossings associated with this project. Although individuals may be present, there would be no effect to the viability of these species across the Forest as a result of project implementation. Therefore, there would be no effects of Alternative C to populations of aquatic PETS or FC species.

Alternative D

Alternative D has the same amount of stream crossings and drainage crossings associated with Alternative B. Please refer to the Alternative B discussions above.

The following table displays effects determinations for PETS and FC species:

Table 3-3: Determination of Effect of Each Alternative on the Evaluated Threatened and Endangered, Sensitive Species, and Forest Concern Species

Species	Alternative A	Alternative B	Alternative C	Alternative D
Federally Threatened and Endangered (T&E) Species				
None present	None known	None known	None known	None known
2002 Region 8 Regional Forester's Sensitive (S) Species List				
None present	None known	None known	None known	None known
Forest Concern (FC) Species				

Species	Alternative A	Alternative B	Alternative C	Alternative D
Micrasema burksi (a caddisfly)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Cordulegaster erronea (tiger spiketail)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Dromogomphus spoliatus (flag-tailed spinyleg)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Gomphus consanguis (Cherokee clubtail)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Ophiogomphus asperses (Brook snaketail)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Ophiogomphus mainensis (Maine snaketail)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Macdunnoa brunnea (a mayfly)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Barbaetis benfieldi (Benfield's bearded small minnow mayfly)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Ephemerella berneri (a mayfly)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.
Serratella spicilosa (Spicilose serratellan mayfly)	No Impact. Existing condition would continue.	*May impact individuals.	*May impact individuals.	*May impact individuals.

*No "rare" species were found at the crossings in the activity areas but they have been included because the species' habitat exists within or immediately below the crossings. Although crossing replacements may impact individuals, implementation would not affect viability across the Forest

3.1.8 Aquatic Habitat Cumulative Effects

It is very unlikely that, given the location and types of management proposed, any long-term effects on aquatic species or habitat would be measurable, and therefore contribute to cumulative effects.

Past timber projects within compartment 1 date back from the 1970s to 1981 and have not been observed to be causing adverse cumulative effects since they occurred so long ago. Other disturbances within the aquatic biological AA include several private residences, absence of riparian vegetation on Bill Moore Creek, and channelization of Baldwin Field Branch, Bill Moore Creek and their tributaries. Baldwin Field Branch was once surrounded by fields and farmed. The stream channel was straightened or "channelized" causing erosion and stream bank instability. Bill Moore Creek is surrounded by private residences and flows next to State Road (SR) 3439. No impacts are expected to occur in the Wolf Creek or Ledford Branch drainages as they are in a different watershed within the Bent Creek Experimental Forest and only hauling would occur within that watershed under Alternatives B and D.

Other impacts to the aquatic biological AA streams include illegal off road vehicle (ORV) use, use of undesignated trails located in drainage areas, the replacement of native riparian area vegetation with invasive exotics and a 19 acre clearing being developed for housing and the Biltmore Lakes Development. Off-site movement of soil into aquatic biological AA waters is occurring as a result of these activities. USFS law enforcement officials are addressing the illegal ORV use on the National Forest and have issued citations for this illegal use within the past year. It is expected that illegal ORV use would continue and off-site movement of soil would occur on undesignated trails. The Baldwin Gap project includes closing and rehabilitating undesignated trails which is expected to improve habitat within two intermittent channels that are currently carrying sediments into Baldwin Field Branch during storm events.

Treatment of exotic invasive plants is proposed with all action alternatives of the Baldwin Gap Project. Treatment of these exotics could prevent the further displacement of native riparian vegetation. Cumulatively the treatment of exotic invasive plants within the Baldwin Gap area is expected to preserve valuable riparian vegetation. This riparian vegetation is important to stream temperature, nutrient input and habitat.

Development has historically and is presently impacting aquatic biological AA streams. The recent Biltmore Lakes development has increased the amount of impervious surfaces within the watershed. The Biltmore Lakes and the 19 acre subdivision being developed within the watershed are subject to county erosion control regulations and storm water disposal standards. The Enka Lake impoundment acts as a trap for sediments caused by off-site movement of soil from the disturbed areas into analysis area streams. Enka Lake has likely changed the species composition within the aquatic analysis area. Analysis area streams have become more adapted to cool and warm water habitat, thus supporting species that might be different from what was there prior to the impounding of Wise Branch into Biltmore Lake. It is expected that the habitat trends and species composition would continue.

Two tropical storms moved through the activity and aquatic biological AA during September of 2004 during an 8 day period. These storms released up to 14 inches of rain within 48 hours each time. Stream water levels within the French Broad River drainage were extremely high, causing flooding and damage to streambanks. This damage included landslides and stream crossing displacement contributing to high amounts of sediment within the stream systems. Streams within the Baldwin Gap area were affected by the storm events. As observed in other watersheds

across the Pisgah National Forest, these large storms (100-year floods or greater) often act as a "restart mechanism" for cumulative effects—meaning substrates in the upper reaches of the tributaries to Bill Moore Creek and Baldwin Field Branch have been cleaned or washed out, creating habitat for aquatic organisms which rely on interstitial space (the space between substrate particles). Interstitial space is especially important for trout species which spawn over clean substrates that allow for oxygen to reach the eggs and juveniles.

The Baldwin Gap Project action alternatives propose to improve aquatic habitat within Baldwin Field Branch and its tributaries by the implementation of a watershed restoration project. As a result, the expected cumulative effects should not be any greater than the direct and indirect effects disclosed above and there should be no adverse cumulative effects to the analysis area aquatic resources, based on the project's design features included in this analysis. There are two separate proposed actions to improve hydrologic conditions in the area: 1) placing stone by hand along a 0.1 mile section of Bill Moore Creek to stabilize its streambanks and reduce sedimentation, and 2) replacing two culverts, installing rolling dips, and placing aggregate along about 1/3 mile of Baldwin Branch Road (FSR 5096) in relation to the September 2004 storms. Both of these actions are expected to have long-term benefits to aquatic resources by reducing sediment potential and improving movement of aquatic organisms. There are no other known foreseeable actions in the activity areas that could adversely affect aquatic habitat.

3.2 Wildlife

Existing Condition

Currently, there are ten T&E species, 38 S species on the Regional Forester's S species (August 7, 2001 list), and 57 FC species for the Nantahala and Pisgah National Forests. These 105 species were originally considered for evaluation of this project. Fifty seven of these 105 species do not occur in Buncombe County according to the North Carolina Natural Heritage Program and the U.S. Fish and Wildlife Service (wildlife analysis, Attachment A, project record). There would be no direct, indirect, or cumulative effects to these 57 species if the project was implemented because they do not occur in Buncombe County.

Four T&E, 19 S, and 24 FC species are listed as known to occur, have occurred in the past but have not been found in recent years, or likely to occur in Buncombe County. Of these 47 species, only 13 (one E, 6 S, and 6 FC) species or their associated habitats may occur within the activity areas based on surveys. These species are located in the following table and are analyzed further.

Table 3-4: Known and Potential Rare (TESFC) Wildlife Species in Buncombe County Evaluated for this Proposal

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered Species			
Puma concolor couguar	Mammal	Extensive forests, remote areas	May occur in activity areas
August 7, 2001 Regional Forester's Wildlife Sensitive Species			
Corynorhinus rafinesquii	Mammal	Roosts in caves, mines, and hollow trees usually near water	May occur in activity areas
Myotis leibii leibii	Mammal	Roosts in hollow trees, rock outcrops, bridges (warmer months); caves and mines (winter)	May occur in activity areas
Callophyrs irus	Butterfly	Open woods and borders, usually in	May occur in activity areas

Species	Type	Natural Community or Habitat	Occurrence
		dry situations; host plant-lupines, (*Lupinus*) and wild indigos (*Baptisia*)	
Speyeria diana	Butterfly	Rich woods and adjacent edges and openings; host plants violet (*Viola*)	May occur in activity areas
Nesticus silvanus	Arachnid	Apparently endemic to southern mountains of NC	May occur in activity areas
Scudderia septentrionalis	Katydid	Forests	May occur in activity areas
Forest Concern (Locally Rare) Wildlife Species			
Neotama floridana haematoreia	Mammal	Rocky places in deciduous or mixed forests, in southern mountains and adjacent Piedmont	May occur in activity areas
Dendroica cerulea	Bird	Mature hardwood forests; steep slopes and coves in mountains [breeding season only]	May occur in activity areas
Sphyrapicus varius appalachiensis	Bird	Mature, open hardwoods with scattered dead trees [breeding season only]	May occur in activity areas
Autochton cellus	Butterfly	Moist woods near streams; host plant-hog peanut (*Amphicarpa bracteata)*	May occur in activity areas
Celastrina nigra	Butterfly	Rich, moist deciduous forests; host plant-goat's beard (*Aruncus dioicus*)	May occur in activity areas
Phyciodes batesii maconensis	Butterfly	Rocky ridges, woodland openings, at higher elevations; host plants-Asters, mainly *Aster undulates*	May occur in activity areas

Several snags or hollow trees exist within the activity areas. Hollow trees serve as potential roost sites for eastern small-footed bats and Rafinesque's big-eared bats. Yellow-bellied sapsuckers also rely on dead trees in mature open woods. There is evidence of foraging by yellow-bellied sapsuckers within the Baldwin Gap area, based on surveys conducted by Mae Lee Hafer, Forest Wildlife Biologist.

Several rock outcrops and small boulder fields exist in the activity areas that are potential habitat for eastern woodrat. The rock outcrops may also provide roosting habitat for the small-footed bat as well. Dusky azure occurs in shady and moist deciduous woods, where eggs are laid on the host plant *Aruncus dioicus* (goat's beard). Adults feed on flower nectar, including wild geranium. The caterpillar's host, *Aruncus*, does occur in the Baldwin Gap area, per Dave Danley, Forest Service Botanist. Dave Danley also found wild indigo (*Baptisia tinctoria*), which may serve as a host plant for the frosted elfin. Tawny crescent occurs on rocky ridges, woodland openings at higher elevations, and its host plant is asters, mainly *Aster undulates*. This aster was found in the montane oak-hickory forests in the Baldwin Gap area. Golden-banded skipper occurs in moist woods and floodplains, and its host plant is hog peanut (*Amphicarpa bracteata*), which was found in the rich cove forests. Cerulean warblers use mature hardwood forests with canopy gaps.

There is currently unauthorized horse, bike, and ORV use in the activity areas occurring on old woods roads and "user-created" trails. The unauthorized use primarily comes from the Bent Creek Experimental Forest, but also from adjacent residences.

The following effects analysis focuses on FC wildlife species. Additional information and effects analyses on T&E and S wildlife species is disclosed in the Biological Evaluation (Appendix A), and additional information and effects analyses on wildlife management indicator species (MIS) is disclosed in Section 3.10, which also includes disclosures on MIS that prefer early-successional and grass/forb habitat.

3.2.1 Forest Concern Species

Direct, Indirect and Cumulative Effects

Alternative A - No Action

The no action alternative would maintain the status quo for the activity areas. None of the current habitat would change; therefore, there would be no direct, indirect, or cumulative impacts to any FC species.

Alternatives B, C, and D

Eastern Woodrat

The eastern woodrat is associated with boulder fields in deciduous or mixed forests. Suitable rocky habitat for the eastern woodrat exists in the wildlife biological AA. Direct impacts to the woodrat could occur if a tree dropped on top of a rocky area where woodrats inhabited, thus disturbing or even squashing woodrats. Otherwise, woodrats are highly mobile animals, and the likelihood of a felled tree directly harming a woodrat is very slim. Woodrats forage at night on a variety of foods, including leaves of trees, shrubs and forbs, fruit, berries, bark, tubers, nuts, mushrooms, and plant buds. Indirect effects could include changing microhabitat conditions of rock outcrops/boulder fields where woodrats may nest. Removing the cover from rock outcrops could possibly expose the nest site to predators, thus decreasing the amount of shelter afforded the nesting area. There is direction in the Forest Plan (page III-23) to protect rock outcrops when identified as unique habitat. The project has been designed to comply with this direction. No rock outcrops would be destroyed or altered as a result of implementing any of the action alternatives, and rock outcrops that are suitable as nesting habitat for woodrats would be protected with a buffer (Section 2.3, Chapter 2).

No eastern woodrats or their sign (e.g., nests, food caches, trails) were found during surveys of the Baldwin Gap activity areas. Past timber sales in the wildlife biological AA include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, woodrats could be disturbed or killed from the falling of trees onto rocks that they are nesting in, or the removal of trees over rock outcrops would remove protective cover or change the microclimate of the rock outcrops. These impacts would have dissipated over time as trees grew back.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological AA on NFS lands that could affect this species. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. If rock outcrops are blasted to develop residential building sites, then there could be direct impacts should a woodrat be occupying the site at the time of the blast, or there could be a loss of suitable habitat.

Cumulatively, the past projects, current proposal, and activities on private land could impact local populations of woodrats. Viability across the Forest for woodrats would be unaffected because the total cumulative effect of past actions, proposed actions, and activities on private land would occur in a localized area. The project is also designed to protect rock outcrops within the Baldwin Gap area.

Cerulean Warbler

Cerulean warblers are typically found in mature forested areas with large and tall trees of broad-leaved, deciduous species and an open understory; however, they may also inhabit wet bottomlands, some second-growth forests, and mesic upland slopes. They also prefer small canopy gaps within a mature stand. Cerulean warblers eat insects in the foliage and a small amount of plant material in the winter. They nest high in the canopy on a lateral limb of a deciduous tree above an open area. Direct impacts from project activities include destroying nests in trees that are felled. The likelihood of directly affecting an adult cerulean warbler is very slim since these birds are highly mobile.

Indirect impacts may include the decrease of habitat from timber harvesting as mature trees are harvested. Depending on the alternative chosen, 66-137 acres would be harvested by the two-age method, and 15 acres would be regenerated through group selection. Group selection would simulate canopy openings, and this activity may increase habitat. Two-age harvesting would remove older stands, leaving a few scattered trees within the unit. This type of harvest is generally not favorable for cerulean warblers. However, cerulean warblers have come into stands that have been shelterwood-harvested where a higher basal area was left. Two-age harvest would occur on only 1-2% of the wildlife biological AA. Prescribed burning (on 29 or 65 acres) would also increase cerulean habitat by creating an open understory. This would occur on 0.4-1% of the wildlife biological AA. Prescribed fire and group selection harvest would offset the habitat being lost through two-age harvesting.

No cerulean warblers were detected during surveys of the Baldwin Gap area. Past timber sales in the wildlife biological AA include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, nests could be destroyed from the falling of trees containing nests. Also, the amount of habitat would decrease as a result of harvest methods chosen to regenerate stands.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological AA on NFS lands that could affect this species. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. Theoretically, residential development could possibly increase the amount of habitat for cerulean warblers by maintaining large deciduous hardwoods on house lots with an open understory (yards).

Cumulatively, the past projects, current proposal, and activities on private land could impact local populations of cerulean warblers. Viability across the Forest for ceruleans would be unaffected because the total cumulative effect of past actions, proposed actions, and activities on private land would occur in a localized area. Group selection harvest and prescribed burning would offset habitat loss from two-age harvest. Also, private land may contribute to increasing cerulean warbler habitat through the maintenance of large hardwoods and an open understory.

Yellow-bellied Sapsucker

The yellow-bellied sapsucker occurs in mature open woods with scattered dead trees. There is no shortage of mature forests and dead trees within the Baldwin Gap area. Evidence of

sapsucker foraging was found during surveys by Mae Lee Hafer, Forest Wildlife Biologist. Snags are not in short supply across the wildlife biological AA as a result of recent storms and pest infestations. If these woodpeckers are in trees during logging operations, they could die as a result of trees being cut or knocked down. Removal of snags or hollow trees due to logging could indirectly affect these woodpeckers by eliminating nesting and foraging trees. Although the action alternatives would harvest mature trees, snags are protected according to Forest Plan standards (page III-23). The thinning proposed would open the forest, which may create more suitable habitat for the sapsucker. Also, prescribe fire would create an open understory on 29-65 acres within the Baldwin Gap activity areas.

The Baldwin Gap project proposes to harvest from 232-357 acres (dependent on which alternative is implemented). This only represents 3-5% of the wildlife biological AA. There is a Forest Plan standard to maintain large snags and cavity trees within the Baldwin Gap area during harvest activities (page III-23), and no activities will occur within 30 feet of riparian areas (page III-187) where many snags occur. The project has been designed to fully comply with these standards. Implementation of any of the action alternatives may affect possible nesting and forage trees, but more snags would be created as the forest ages and other natural events (i.e., storms, insects, and disease) occur. Individuals may be impacted, but this would not lead to a loss of viability due to the small area affected.

Past timber sales in the wildlife biological AA include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, sapsuckers could be killed from the falling of trees that they are nesting in, or possible nest or forage trees would be removed from use.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological AA on NFS lands that could affect this species. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. There is a great likelihood that snags in residential developments would be removed because they pose a threat to human life and property. This could decrease the amount of nesting and foraging habitat for the sapsucker.

Cumulatively, the past projects, current proposal, and activities on private land could impact local populations of yellow-bellied sapsuckers. Viability across the Forest for this species would be unaffected because the total cumulative effect of past actions, proposed actions, and activities on private land would occur in a localized area. The project is designed to protect snags within the Baldwin Gap area, and snags would continue to be recruited through natural means, thus mitigating any loss of habitat.

Golden-banded Skipper, Dusky Azure, and Tawny Crescent

The golden-banded skipper occurs in moist woods near streams, and its host plant is hog peanut (*Amphicarpa bracteata*). Hog peanut does occur in the Baldwin Gap area in rich coves. No golden-banded skippers were found during surveys of the Baldwin Gap area, and none have ever been reported from Buncombe County. The likelihood that they occur in the Baldwin Gap area is very slim. Females lay eggs in strings of 2-7 at the base of host plant leaflets. Caterpillars live in shelters of rolled or tied leaves and emerge at night to feed on leaves.

The dusky azure occurs in rich moist deciduous forests, and its host plant is goat's beard (*Aruncus dioicus*). Goat's beard does occur in the Baldwin Gap area. No dusky azures were found during surveys of the Baldwin Gap area, and none have ever been recorded from

Buncombe County. The likelihood that they occur within the Baldwin Gap area is very slim. Eggs are laid singly under young leaflets of host plant. Caterpillars feed on leaves.

The tawny crescent is found on rocky ridges and woodland openings at higher elevations, and its host plant is asters, mainly *Aster undulates*. *Aster undulates* was found in the Baldwin Gap area in the montane oak-hickory forest. No tawny crescents were found during surveys of the Baldwin Gap area, and there is one record from Buncombe County that is 30 years old.

Any activities that may directly crush plants with egg masses or caterpillars could affect golden-banded skippers, dusky azures, and tawny crescents. Also, overwintering caterpillars could be destroyed with any ground-disturbing activity. The harvesting proposed in cove hardwoods (70-141 acres, or 1-2% of the wildlife biological AA depending on the action alternative) would open the forest and create drier conditions as sunlight is allowed to reach the forest floor. *Aster undulatus* likes dry woods and clearings which would be created by harvest activities. *Aruncus dioicus* easily grows in average, medium wet to wet, well-drained soil in full sun to partial shade. These conditions may still persist after a harvest operation, especially where trees are left in units. *Amphicarpa bracteata* is a common understory plant in upland oak woodlands, especially where there is a history of burns. It likes open woods and thickets, which would be created by areas where thinning and prescribed burning are proposed.

Individual butterflies might be impacted by management activities being implemented with any of the action alternatives as a result of the direct effects to *Aster undulates*, *Aruncus dioicus*, and *Amphicarpa bracteata*. The tawny crescent and *Aster undulates* prefer more open conditions, so by opening up the woods through harvesting and thinning, more suitable conditions for the tawny crescent would be created in the long-term. No harvest activities would occur within 30 feet of riparian areas (Forest Plan, page III-187), and the project has been designed to comply with this standard. This would help ensure that populations of *Amphicarpa bracteata* growing near streams would be protected, thus maintaining habitat for the golden-banded skipper. The dusky azure may be impacted in the short-term if *Aruncus dioicus* is affected by harvesting. But, after about two years, this plant should start to grow back if it did not persist through the logging process.

Past timber sales in the wildlife biological AA include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, some activities could have crushed plants with eggs or caterpillars, or overwintering caterpillars could have been run over. Opening up the forest through timber harvest may have increased habitat for the tawny crescent, but decreased habitat for golden-banded skipper and the dusky azure in the short-term.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological AA on NFS lands that could affect these species. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project would permanently convert from that of forested habitat to residential communities. Activities on private land could directly impact the golden-banded skipper, dusky azure, and tawny crescent habitat in a similar manner to activities on NFS lands. However, it is doubtful that habitat would be improved for these butterflies by the development of manicured lawns.

Cumulatively, the past projects, current proposal, and activities on private land could directly impact local populations of golden-banded skipper, dusky azure, and tawny crescent during implementation. However, activities on NFS lands could help improve habitat in the long-term by creating more open, drier forest conditions for the tawny crescent. Although timber activities

may decrease habitat for the dusky azure, the impacts should be short-term. Riparian habitat for the golden-banded skipper would be protected through project design. Viability across the forest for this butterfly would be unaffected because the total cumulative effect of past actions, proposed actions and activities on private land would occur in a localized area.

3.3 Non-native Plants

Existing Condition

There are 124 species of non-native plants 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 have benefits for wildlife and erosion control. However, as succession progresses, most ruderal (weedy) species tend to become much less prevalent and generally do not persist or spread to other areas.

The persistence and spread 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) by the introduction of a "non-native species" or 2) by modifying the ecosystem in such a way that a non-native species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah and Nantahala National Forests, 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). The proliferation of these species can have devastating and long lasting effects on natural communities and native species. Kudzu, *Pueraria montana*, is a familiar example of this sort of non-native persistent species. Consideration was given to the possible effect this proposal may have to non-native species.

Eight species on the Regional Forester's non-native plant species are known within the analysis area. The non-native plants *Microstegium vinineum*, *Lonicera japonica,* and *Allium vineale* (field garlic) are so well established in parts of the AA that control by any currently known method is entirely impractical. It is not known what effect, if any, this proposal would have on the populations of *Microstegium vinineum*, *Lonicera japonica,* and *Allium vineale* within the botanical biological AA. The populations of *Lespedeza cuneata*, *Lolium arundinaceum,* and *Coronilla varia* are not expected to be invasive within natural communities. Therefore, it is not recommended that these species be controlled.

The presence and distribution of *Celastrus orbiculatus* (oriental bittersweet) within the botanical biological AA is particularly alarming. Bittersweet is an aggressive non-native invasive vine often invading open or disturbed areas. Natural tree-fall canopy gaps can be invaded. Once invaded, bittersweet can persist in shade, growing up trees and killing them by girdling the bark. In older infections, mature trees can be killed. Within the botanical biological AA, bittersweet is very common and well established along old roads, the alluvial forest along Baldwin Fields Branch, Rich Cove Forests and other natural openings. It is particularly abundant in stands 1-4, 1-27, and 1-23. At present, bittersweet is making a large impact on native species and natural communities within the botanical biological AA. It is expected that this negative trend of bittersweet growth would continue with or without planned activities. The following table displays non-native invasive plant species in the activity areas:

Table 3-6 – Non-native Species in the Baldwin Gap Area

Species	Regional Category[1]	Location in Activity Areas

Species	Regional Category[1]	Location in Activity Areas
Lespedeza cuneata Sericea	1	All roadsides throughout botanical biological AA
Paulownia tomentosa Princess tree	1	Infection limited to area near old road (stand 1-16)
Lolium arundinaceum Tall fescue	1	Old roads
Lonicera japonica Japanese honeysuckle	1	Alluvial Forest along Baldwin Fields Branch, woods roads, throughout botanical biological AA
Microstegium vinineum Japanese stilt grass	1	Mostly in Alluvial Forests and coves. Very well established in botanical biological AA
Celastrus orbiculatus Bittersweet	1	Mostly in Alluvial Forests and Rich Coves. Very well established in botanical biological AA.
Rosa multiflora Multi floral rose	1	Alluvial Forest along Baldwin Fields Branch, woods roads, throughout botanical biological AA
Miscanthus sinensis Plume grass	2	Baldwin Fields Branch road
Allium vineale Field garlic	1	Scattered small populations near old roads
Coronilla varia Crown vetch	2	Found only along system roads

1 Regional categories have specific legal ramifications as per Regional Forester memo dated May, 2001

The following effects analysis focuses on non-native plant species. Additional information and effects analysis on T&E plant species is disclosed in the BE, Appendix A, and additional information and effects analysis on MIS is disclosed in Appendix G.

3.3.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative no actions are proposed. There would be no potential increase in non-native 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, especially bittersweet. It is expected that non-native plant species, especially bittersweet would continue to increase with or without planned activities. There are no other known foreseeable actions in the activity areas that could adversely affect non-native plants.

3.3.2 Alternatives B, C, and D – Direct and Indirect Effects

The action alternatives all propose to treat non-native plants. The following table displays the actions and the maximum acreages of proposed herbicide and manual treatment by alternative:

Table 3-7 – Treatment of Non-native Species in the Baldwin Gap Activity Areas by Alternative

Species	Treatment	Alt B	Alt C	Alt D
Lespedeza cuneata Sericea	This species does not display invasive tendencies. Not recommended to control.	0	0	0
Paulownia tomentosa Princess tree	Control all populations prior to ground disturbance	<1 acre	<1 acre	<1 acre
Lolium arundinaceum Tall fescue	This species does not display invasive tendencies. Not recommended to control.	0	0	0
Lonicera japonica Japanese honeysuckle	No effective control method known. No recommendation to control.	0	0	0
Microstegium vinineum Japanese stilt grass	No effective control method known. No recommendation to control.	0	0	0

Species	Treatment	Alt B	Alt C	Alt D
Celastrus orbiculatus Bittersweet	Treat all stands infected with oriental bittersweet.	377	341	399
Rosa multiflora Multi floral rose	An effective control method is doubtful. No recommendation to control.	0	0	0
Miscanthus sinensis Plume grass	Would be eliminated during road reconstruction of Baldwin Fields Branch road	<1 acre	<1 acre	<1 acre
Allium vineale Field garlic	This species does not display invasive tendencies. Not recommended to control	0	0	0
Coronilla varia Crown vetch	This species does not display invasive tendencies. Not recommended to control	0	0	0

The proposed control of bittersweet may have a long enough delaying effect upon the growth of this vine within those stands that are treated to allow tree canopies to be re-established. Once the tree canopies are established, bittersweet has more difficulty spreading within a stand. It is not expected that these proposed control procedures would eliminate bittersweet within the botanical biological AA or contribute to a major reduction in trend within the botanical biological AA. However, the control procedures may make a substantial difference within the treated stands than if no control actions were implemented.

The other way in which non-native plants may persist in the area is 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. To reduce this effect, it is recommenced that native plants 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 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.

3.3.3 Cumulative Effects

The cumulative effect the action alternatives (B, C, and D) would have on exotic invasive plants can be ascertained by comparison to Forest-wide condition and trend of exotic invasive plants. Suitable habitat for most exotic invasive plant species can be defined as areas with ground disturbing activities such as road construction, recent timber regeneration (0-10 years) areas and wildlife field construction (MIS Report, pages 784-785). Therefore, the proposal would generate exotic invasive suitable habitat as follows: Alt. B, 111 acres and 1.25 miles of new or temporary road; Alt. C, 81 acres and no miles of new or temporary road; Alt D, 152 acres, 1.25 miles of new or temporary road, and 7.4 acres of wildlife fields. Forest-wide suitable habitat for exotic invasive plants is 2,684 miles of road and 22,874 acres are in 0-10 age class across the Forest (MIS Report, pages 781-784). Thus, the cumulative effect or increase of exotic invasive habitat would be <0.7% for all action alternatives. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area (Biltmore Lakes area). The potential cumulative effects of these two developments combined with potential effects of the Baldwin Gap proposal are

expected to be minimal and immeasurable. There are no other known foreseeable actions in the activity areas that could adversely affect non-native plants.

3.4 Pesticides

Existing Condition

The Baldwin Gap area is currently experiencing invasive, non-native plant infestations; including extreme levels of oriental bittersweet (see Section 3.3 above). White pine trees in stand 1-4 are also experiencing annosus root rot. On April 13, 2005, Michelle Cram, Plant Pathologist reviewed stand 1-4, and reported the following: *The mortality rate of eastern white pine on the west aspect is expected to reach 100% over the next 3 to 5 years. The remaining white pine in the stand is expected to have continued losses (mortality and value) over the next 20 years from a combination of age and diseases already present in the stand. Salvage of the white pine component would be the only treatment to avoid this future loss of value. If management chooses to leave some of the white pine on the east aspect and bottom of the cove, then the fungicide borax (Sporax) is recommended to protect stumps from colonization by H. annosum*.

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 exotic plant species and annosus root rot would likely continue to spread in the AA. There are no other known foreseeable actions in the activity areas that could affect pesticide use.

3.4.2 Alternatives B, C, and D Direct, Indirect, and Cumulative Effects

The following table displays expected maximum acreages herbicide (Glyphosate and Triclopyr) and Sporax fungicide would be manually applied by alternative—herbicide treatment for non-native invasive species would occur three consecutive years for maximum control:

Table 3-8: Maximum Acres of Pesticides Applied Manually by Alternative[1]

Pesticide	Alternative B	Alternative C	Alternative D
Triclopyr/Glyphosate (ac)[2]	764	667	804
Sporax (ac)	29	29	29

1 – Not all acreage is treated, i.e. buffers along streams and "non-target" species would not be treated. Pesticides are applied manually and would not be applied aerially (see also Appendix F)

2 – Acres include timber stand improvement, site preparation, non-native invasive species, and wildlife fields

Use of pesticides 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, and Forest Plan standards and guidelines (Forest Plan, page III-181). The use of pesticides poses some risk to wildlife, water quality, and humans; however, any pesticides applied 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 pesticides. Other factors reducing risk is the low level of active ingredient per acre and placement of notice signs in areas where pesticides have been applied. The signs include

information on the pesticide used, when it was applied, and who to contact for additional information (see also Appendix F, Standard Mitigation Measures for Prescribed Fire and Pesticide Use). Herbicide with the active ingredients Glyphosate and Triclopyr are not considered soil active. 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 private residences downstream. 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 document tiers. Current pesticide information for Glyphosate and Triclopyr may be found at: http://www.fs.fed.us/foresthealth/pesticide/risk.shtml

Sporax (product name containing borax) inhibits growth of fungi by preventing the production of annosus root rot spores. Sporax is applied to stumps within a day after cutting in a granular form by shaking it onto pine trees infected with annosus root rot at a rate of about 1 pound per 50 feet of stump surface, or about 1 pound per acre. The following information was taken from the pesticide fact sheet prepared for the USDA Forest Service by Information Ventures, Inc available at http://infoventures.com/e-hlth/pestcide/borax.html: Borax is generally active in the soil. Boron from borax is absorbed from the soil by plants—boron is usually found in soils, and is an essential plant nutrient. Soil naturally contains boron at a concentration of 5 to 150 parts per million (ppm). Borax remains unchanged in the soil for varying lengths of time, depending on soil acidity and rainfall. The average persistence is 1 year or more. Borax is less persistent in acid soils and in areas with high rainfall. Under high rainfall conditions, borax may leach rapidly. Soil microorganisms do not break down borax. The main break-down product of borax in the soil is boron. Boron is found in most natural soils. At high levels, borax could be toxic to many soil microorganisms. Borax and other boron compounds at high levels may kill plants. However, boron is an essential nutrient for plants, and boron compounds (including borax) occur widely in nature. Boron is taken up from soil by plants in proportion to the amount of boron in the soil. Borax is practically nontoxic to fish, and practically nontoxic to aquatic invertebrate animals. It does not build up (bioaccumulate) in fish. Borax is practically nontoxic to birds and mammals. It is relatively nontoxic to bees, but relatively high concentrations of boron compounds are toxic to insects. Borax is not classified as an agent that causes cancer, genetic damage, or birth defects. Studies have indicated that chronic exposure to borax may cause reproductive damage and infertility. There is insufficient information available on the potential for adverse health effects from contacting or consuming treated vegetation, water, or animals. Chronic exposure to borax caused chronic eczema in industrial workers. Workers chronically exposed to borax dust developed respiratory irritation. Symptoms of chronic poisoning include nausea, vomiting, loss of appetite, digestive disturbances, and a rash. Applicators and handlers must wear long-sleeved shirts, long pants, shoes, socks, waterproof gloves, and should wash thoroughly after handling. The Sporax formulation is exempt from the Worker Protection Standard because it is applied to a harvested area which is not used for food, feed, or fiber.

Impacts of pesticide 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 pesticides associated with the action alternatives if no spills occur within riparian areas—no pesticides would be applied within 100 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 be mixed at the pesticide storage building at the Pisgah Ranger District Work Center and not in the field and applicators do not carry concentrated amounts of herbicide in the field.

In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. There are no other known foreseeable actions in the activity areas that could affect pesticide use with this proposal.

The use of Sporax is expected to occur once within stand 1-4; the use of herbicides to control competing vegetation is expected to occur once; and the use of herbicides to control non-native invasive plants are expected to occur 3 consecutive years to ensure control. The impacts of pesticide use are expected to remain localized and are not expected to move off-site and cause adverse cumulative impacts with possible pesticide use on private lands in the area because they would be properly applied as per MSDSs, product labels, risk assessments, fact sheets, mitigation measures contained in the VMAM FEIS, and Forest Plan standards and guidelines—the Forest Service is unaware of any large-scale pesticide use proposed on private lands within the watershed that could cause adverse cumulative effects.

3.5 Soil Resources

Existing Condition

The following table displays soil map units and their characteristics the proposal may affect:

Table 3-9: Comparison of Soil Map Units[1]

Map Unit Name	Soil Map Symbol	Avg. Slope Percent	Characteristics
Tate	121D	15-30	These moderately steep, very deep, well drained soils are on high stream terraces, benches, fans, and coves. They formed in colluvium and alluvium weathered form granite, gneiss, and schist. They have a loamy surface layer and subsoil. A large amount of gravels and cobbles are present. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Toecane-Tusquitee	181E	30-50	This map unit consists of steep Greenlee soils and Tusquitee soils on coves, benches, and fans. These soils formed in colluvium from granite, gneiss, and schist. Greenlee soils are along drainage ways and Tusquitee soils are in crowned areas. Both soils are very deep and well drained. They have a loamy surface layer and subsoil. A large amount of gravel, cobbles, and stones are present throughout these soils. Many stones are scattered over the surface. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Evard-Cowee	788D,E,F	15-95	This map unit consists of moderately steep Evard soils and Cowee soils on uplands. These soils formed in residuum from granite, schist, and gneiss. Evard soils are very deep and well drained. They have a loamy

Map Unit Name	Soil Map Symbol	Avg. Slope Percent	Characteristics
			surface layer and subsoil. Occasional stones are scattered over the surface. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Cowee soils are moderately deep and well drained. They have a loamy surface layer and subsoil. Occasional stones are scattered over the surface. Soft bedrock is within a depth of 20 to 40 inches. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Edneyville-Chestnut	803D,E,F	15-95	This map unit consists of moderately steep Edneyville soils and Chestnut soils on uplands. These soils formed in residuum weathered from granite, schist, and gneiss. Edneyville soils are very deep and well drained. They have a loamy surface layer with a large amount of gravel and a loamy subsoil. Occasional stones are scattered over the surface. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Chestnut soils are moderately deep and well drained. They have a loamy surface layer and subsoil. A large amount of gravel and cobbles are present throughout these soils. Occasional stones are scattered over the surface. Soft bedrock is within a depth of 20 to 40 inches. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.
Porters-Unaka	841D,E,F	15-95	This map unit consists of steep Porters soils and Unaka soils on uplands. They formed in residuum weathered from granite, schist, and gneiss. Porters soils are deep and well drained. They have a loamy surface layer and subsoil. Occasional stones are scattered over the surface. Hard bedrock is within a depth of 40 to 60 inches. Permeability is moderately rapid and shrink-swell potential is low. Seasonal high water table is below 6.0 feet. Unaka soils are moderately deep and well drained. They have a loamy surface layer and subsoil. Occasional stones are scattered over the surface. Hard bedrock is within a depth of 20 to 40 inches. Permeability is moderate and shrink-swell potential is low. Seasonal high water table is below 6.0 feet.

1 – Soil mapping unit information taken from USDA Natural Resource Conservation Service reports. These reports are based on information collected in the field by soil scientists.

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to soils resources as no ground disturbing actions are proposed. There are no known foreseeable actions in the activity areas that could adversely affect soils.

3.5.2 Alternatives B, C, and D

The following table displays acres of soil map units affected by action alternative by proposed activity:

Table 3-10: Acres of Soil Map Units Newly Affected by Action Alternatives

Soil Map Unit Symbol	Proposed Activity	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
121D	Intermediate Harvest	11	11	22
121D	Regeneration Harvest	4	0	0
Total Acres 121 Affected		**15**	**11**	**22**
181E	Intermediate Harvest	0	5	5
Total Acres 181 Affected		**0**	**5**	**5**
788D,E	Regeneration Harvest[1]	38	61	61
788D,E	Intermediate Harvest	144	69	56

Soil Map Unit Symbol	Proposed Activity	Alternative B (acres)	Alternative C (acres)	Alternative D (acres)
788D,E	Trail Construction	0.2	0.2	0
788D,E	Road Construction	0.25	0	0.25
Total Acres 788 Affected		**182.5**	**130.2**	**117.25**
803D,E	Regeneration Harvest[2]	9	2	12
803F	Regeneration Harvest	20	8	20
803D,E	Intermediate Harvest	80	50	67
803F	Intermediate Harvest	0	14	14
803D,E	Trail Construction	0.2	0.2	0
803D,E	Temporary Road Construction[3]	1	0	1
Total Acres 803 Affected		**110.2**	**74.2**	**114**
841D,E	Regeneration Harvest[2]	6	0	1
841F	Regeneration Harvest	34	10	58
841D,E	Intermediate Harvest	12	0	2
841F	Intermediate Harvest	0	2	12
841D,E	Trail Construction	0.2	0.2	0
841D,E	Road Construction	0.25	0	0.25
841D,E	Temporary Road Construction[2]	1	0	1
Total Acres 841 Affected		**53.5**	**12.2**	**74.25**

1 – Includes 15 acres of group selection harvest
2 – Includes 43 total acres of skyline harvest
3 – To be maintained as linear wildlife openings following harvest

Direct and Indirect Effects

There are no long-term adverse effects to the soil resource in the Baldwin Gap area as a result of the action alternatives because the action alternatives have been designed to minimize soil disturbance by adhering to Forest Plan direction and standards; implementing established Best Management Practices (BMPs); and ensuring soil protection clauses from the timber sale contract are adequately implemented. The Forest Plan provides direction to [m]*inimize soil damage by designing all facilities to prevent damage; constructing and maintaining all facilities to prevent substantial soil movement; and exposing the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). The action alternatives propose ground disturbing actions on five general soil map units with various amounts of intensity as disclosed in the previous table. Within the 6,674 acre analysis area, Alternative B proposes no more than 5.4% ground disturbance, Alternative C 3.5%, and Alternative D 4.9%. These percentages would likely be lower due to skyline harvesting, as per Forest Plan standard 7a on page II-34 (less area disturbed due to narrower log yarding corridors) and designated tractor logging corridors. Designated corridors eliminate tractor logging equipment impacting every acre in each timber stand. In addition, each of the soil map units affected are either deep to very deep and are well drained; indicating soil stability, and a reduced potential for erodibility and compaction. There would be some compaction and possible soil movement with proposed activities, but these are expected to be minimal and short-term due to freeze/thaw and revegetation.

Cumulative Effects

The action alternatives are not expected to have adverse cumulative effects because the direct and indirect effects of each alternative on the soils resource would not be cumulatively added to past harvest actions since there has been no harvest-related activity in the Baldwin Gap area for almost 24 years. About 335 acres have been regeneration harvested from 1970 to 1981 and about 276 acres have been thinned. Each harvested stand has since reforested and is not

contributing adverse cumulative effects to the soils resource. There have been about 10 miles of road constructed and reconstructed in the Baldwin Gap area since 1970. Many of the roads are unclassified and have since grown in—none are open to motorized vehicles. There should be no adverse cumulative effects to the soils resource as a result of the existing road network and the proposed road activity due to implementation of Forest Plan standards, BMPs, and implementation of timber sale clauses. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. There are two separate proposed actions to improve hydrologic conditions in the area: 1) placing stone by hand along a 0.1 mile section of Bill Moore Creek to stabilize its streambanks and reduce sedimentation, and 2) replacing two culverts, installing rolling dips, and placing aggregate along about 1/3 mile of Baldwin Branch Road (FSR 5096) in relation to the September 2004 storms. Both of these actions are expected to have long-term benefits to soil resources by reducing sediment potential. There are no other known foreseeable actions in the activity areas that could adversely affect soils.

3.6 Cultural Resources

Existing Condition

Within the Baldwin Gap area, 28 cultural sites were identified; of which 4 are Class I—eligible for the National Register of Historic Places (NRHP), one is Class II—unevaluated; requires protection until, or if, an excavation is performed to determine eligibility to the NRHP; and the remaining 23 are Class III—not eligible to the NRHP.

3.6.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to cultural resources as no ground disturbing activities are proposed. There are no known foreseeable actions in the activity areas that could adversely affect cultural resources.

3.6.2 Alternatives B, C, and D – Direct, Indirect, and Cumulative Effects

Under the action alternatives, there would be no direct, indirect, or cumulative effects to cultural resources as the Class I and II sites would be flagged and avoided as per project design features listed in Section 2.4, Chapter 2. There are no expected ground disturbing actions proposed in the Baldwin Gap area in the foreseeable future. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. There are no known foreseeable actions in the activity areas that could adversely affect cultural resources.

3.7 Scenery Resources

Existing Condition

The proposal is located on the Pisgah National Forest's Pisgah Ranger District, between Bent Creek Experimental Forest and Enka, NC. Management areas in the Baldwin Gap area include

3B, 4C, and 18. All proposed activities are located within MA 3B. Additional scenery analysis is located in the scenery report, project record.

In the Baldwin Gap area, Management Area 3B has an assigned a VQO of Modification (M) for all Sensitivity Levels (SL) and Distance Zones (DZ). Under Modification VQO management activities may visually dominate the original characteristic landscape. However, activities of vegetative and landform 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 area or character type. Additional parts of these activities such as roads, slash, root wads, etc. must remain visually subordinate. These requirements must be met within three growing seasons. Refer to the Nantahala and Pisgah Land and Resource Management Plan Amendment 5 (LRMP) for specific definitions of Visual Management System terminology, and Management Area standards.

Field surveys and computer analysis were used to identify viewpoints (VP) and determine visibility of proposed management activities. All travel corridors, water bodies and use areas in and around the Baldwin Gap area were considered for potential viewpoints.

The following list identifies the location of VPs considered in the analysis. This is a comprehensive list of analyzed viewpoints. Analysis revealed that proposed activities are not visible from all locations, or that several VPs may have similar views. Therefore some listed VPs are not shown in the "Effects by Alternative" section of this report. Of the 32 VPs analyzed, computer simulations were done for 6 of these locations. Some of the views would be seen as the viewer is moving (in a vehicle, walking, horseback, bicycle, etc.), others are from stationary vistas. Views may be 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, viewer position, slope, size, shape and type of proposed harvest or road, landing, etc. All of these factors are considered when determining what activities would meet assigned VQOs or what project design feature would be required.

Viewpoints

1, 2, 33:	SR 3439 and adjacent residential area
3, 5, 17, 18, 22, 23:	Enka (Biltmore) Lake area and surrounding roads
13, 14, 21:	Scott Mt. (Biltmore Lake development)
9, 10, 15, 16:	SR 3447 and church
11, 19, 20:	Residential development NE of Wise Knob
4, 6, 8, 12:	Enka Lake Rd and schools
24, 25:	US 19/23/74
26:	Sand Hill Road

Viewpoints 1, 2, 5, 6, 11 & 12 offered the most revealing views or were representative of similar nearby VPs in their area, and analyzed using computer simulations for each alternative. These locations are shown on the attached viewpoint location map. Computer simulations used for this analysis are part of the project record and available on request.

3.7.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative no action would occur and all VQOs would be met. There are no known foreseeable actions in the activity areas that could adversely affect scenery.

3.7.2 Alternative B – Direct and Indirect Effects

This alternative proposes two-age harvests with 15-20 square feet of residual basal area per acre on 111 acres (which includes 15 acres of group selection harvest of 0.5-1.0 acre openings); thinning on 246 acres; prescribed burn on 29 acres; and a variety of wildlife and other non-commercial treatments. All commercially harvested areas would be tractor or skyline logged with 0.25 miles of system road construction, 8.0 miles of system road reconstruction, and 1.0 miles of temporary road construction.

With implementation of scenery design features, all actions in this alternative would meet assigned VQOs from all VPs analyzed. Visible management activities in this alternative would be similar to those in Alternative D. However, it would have more visible acres of regeneration harvest and potentially visible roads than Alternative C.

Table 3-11: Alternative B Scenery Analysis

Unit #	Proposed Treatment	Logging Method	View Point	Distance Zone	Visual Quality Objective	Management Area	Design Feature*
1-15	Two-Age	Tractor	1, 5, 6, 11, 32	FG, MG	M	3B	1, 8
1-18	Two-Age	Tractor	1, 2, 6, 11	MG	M	3B	4, 8
1-23	Two-Age	Tractor	1, 11, 12	MG	M	3B	4
1-34	Two-Age	Skyline	1, 2, 5, 6, 11, 12, 27, 28	FG, MG	M	3B	1-8
1-45	Two-Age	Skyline	1, 2, 5, 6, 11, 12, 29	FG, MG	M	3B	2-6, 8
1-4	Thin	Tractor	2, 11	MG	M	3B	None
1-16	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None
1-20	Thin/Group Select	Tractor	2, 5, 6, 11, 12	FG, MG	M	3B	None
1-25	Thin	Tractor	2, 11	MG	M	3B	None
1-27	Thin	Tractor	2, 11	MG	M	3B	None
1-31	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None
1-40	Thin	Tractor	1, 11	FG, MG	M	3B	None
1-47	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None

* See also Section 2.4, Chapter 2.

1. Move upper boundary one tree-height off of ridge to create a “leave strip” below the ridge. Some trees may be removed from the “leave strip” to feather edges of upper unit boundary.
2. Limit size of openings along North Boundary Trail 135 (FSR 485) to 500 linear feet. This mitigation would work in conjunction with #’s 1, 4 & 6.
3. Lop and scatter, or burn logging debris to within 4 ft. of the ground, for 50 feet beyond the edge of Trail 135 (FSR 485).
4. Screen roads, skid roads and decking areas, i.e. vegetative screen between road and viewpoint (usually on downhill side).
5. Scatter residual logging debris around log landing within 4 feet of ground where seen in the foreground from Trail 135.
6. Minimize size of cable landings, and where possible, place on top of ridge to minimize cut/fill banks. Screen cable landings to extent possible, by limiting number of skyline corridors and leaving trees between them.
7. Increase reserve ba/ac, add inclusion near center of unit, or move lower boundary upslope.
8. Feather upper unit boundary.

3.7.3 Alternative C – Direct and Indirect Effects

This alternative proposes two-age harvests with 15-20 square feet of residual basal area per acre on 81 acres (which includes 15 acres of group selection harvest of 0.5-1.0 acre openings); thinning on 151 acres; prescribed burn on 29 acres; and a variety of wildlife and other non-commercial treatments. All commercially harvested areas would be tractor or skyline logged with 4.7 miles of system road reconstruction.

With implementation of scenery design features, all actions in this alternative would meet assigned VQOs from all VPs analyzed. Since it has fewer visible acres of regeneration harvest, scenery impacts from this alternative would be less than those of Alternatives B or D.

Table 3-12: Alternative C Scenery Analysis

Unit #	Proposed Treatment	Logging Method	View Point	Distance Zone	Visual Quality Objective	Management Area	Design Feature*
1-16	Two-Age	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	4, 8
1-18	Two-Age	Tractor	1, 2, 6, 11	MG	M	3B	4, 8
1-23	Two-Age	Tractor	1, 11, 12	MG	M	3B	4
1-27	Two-Age	Tractor	2, 11	MG	M	3B	8
1-4	Thin	Tractor	2, 11	MG	M	3B	None
1-20	Thin/Group Select	Tractor	2, 5, 6,11, 12	FG, MG	M	3B	None
1-31	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None
1-35	Thin	Tractor	1, 2, 6, 11, 12	M	M	3B	None
1-47	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None

* See also Section 2.4, Chapter 2.

1. Move upper boundary one tree-height off of ridge to create a "leave strip" below the ridge. Some trees may be removed from the "leave strip" to feather edges of upper unit boundary.
2. Limit size of openings along North Boundary Trail 135 (FSR 485) to 500 linear feet. This mitigation would work in conjunction with #'s 1, 4 & 6.
3. Lop and scatter, or burn logging debris to within 4 ft. of the ground, for 50 feet beyond the edge of Trail 135 (FSR 485).
4. Screen roads, skid roads and decking areas, i.e. vegetative screen between road and viewpoint (usually on downhill side).
5. Scatter residual logging debris around log landing within 4 feet of ground where seen in the foreground from Trail 135.
6. Minimize size of cable landings, and where possible, place on top of ridge to minimize cut/fill banks. Screen cable landings to extent possible, by limiting number of skyline corridors and leaving trees between them.
7. Increase reserve ba/ac, add inclusion near center of unit, or move lower boundary upslope.
8. Feather upper unit boundary.

3.7.4 Alternative D – Direct and Indirect Effects

This alternative proposes two-age harvests with 15-20 square feet of residual basal area per acre on 152 acres (which includes 15 acres of group selection harvest of 0.5-1.0 acre openings); thinning on 178 acres, prescribed burn on 65 acres, and a variety of wildlife and other non-commercial treatments. All commercially harvested areas would be tractor or skyline logged with 8.0 miles of system road reconstruction and 1.0 miles of temporary road construction.

With implementation of scenery design features, all actions in this alternative would meet assigned VQOs from all VPs analyzed. Of the three action alternatives, this proposal would have the greatest amount of potentially visible road and regeneration harvest acres.

Table 3-13: Alternative D Scenery Analysis

Unit #	Proposed Treatment	Logging Method	View Point	Distance Zone	Visual Quality Objective	Management Area	Design Feature*
1-16	Two-Age	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	4, 7**, 8
1-18	Two-Age	Tractor	1, 2, 6, 11	MG	M	3B	4, 8
1-23	Two-Age	Tractor	1, 11, 12	MG	M	3B	4
1-27	Two-Age	Tractor	2, 11	MG	M	3B	8

1-34	Two-Age	Skyline	1, 2, 5, 6, 11, 12, 27, 28	FG, MG	M	3B	1-8
1-44	Two-Age	Skyline	1, 5, 6, 11, 12	MG	M	3B	4, 6, 8
1-45	Two-Age	Skyline	1, 2, 5, 6, 11, 12, 29	FG, MG	M	3B	2-6, 8
1-4	Thin	Tractor	2, 11	MG	M	3B	None
1-16	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None
1-20	Thin / Group Select	Tractor	2, 5, 6, 11, 12	FG, MG	M	3B	None
1-25	Thin	Tractor	2, 11	MG	M	3B	None
1-27	Thin	Tractor	2, 11	MG	M	3B	None
1-31	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None
1-40	Thin	Tractor	1, 11	FG, MG	M	3B	None
1-47	Thin	Tractor	1, 2, 6, 11, 12	FG, MG	M	3B	None

* See also Section 2.4, Chapter 2.

** Mitigation added on this alternative to reduce cumulative impacts of visible regeneration areas

1. Move upper boundary one tree-height off of ridge to create a "leave strip" below the ridge. Some trees may be removed from the "leave strip" to feather edges of upper unit boundary.
2. Limit size of openings along North Boundary Trail 135 (FSR485) to 500 linear feet. This mitigation would work in conjunction with #'s 1, 4 & 6.
3. Lop and scatter, or burn logging debris to within 4 ft. of the ground, for 50 feet beyond the edge of Trail 135 (FSR485).
4. Screen roads, skid roads and decking areas, i.e. vegetative screen between road and viewpoint (usually on downhill side).
5. Scatter residual logging debris around log landing within 4 feet of ground where seen in the foreground from Trail 135.
6. Minimize size of cable landings, and where possible, place on top of ridge to minimize cut/fill banks. Screen cable landings to extent possible, by limiting number of skyline corridors and leaving trees between them.
7. Increase reserve ba/ac, add inclusion near center of unit, or move lower boundary upslope.
8. Feather upper unit boundary.

3.7.5 Cumulative Effects

As previously stated, past timber harvest areas, clearings, roads, structures, and other landscape modifications are visible on private and National Forest Lands from most VPs analyzed. 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 action alternatives would create openings, or the canopy may appear thinner. However, scenery mitigation is designed with consideration for cumulative effects of proposed, existing and foreseeable future landscape modifications. If the proposed actions in each alternative are implemented with the identified scenery design features, the assigned M VQO would be met even where these treatments would be seen in conjunction with other proposed, existing and future landscape modifications. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. The proposal is not permanently converting forested areas to residential areas—the harvest areas would regenerate with tree cover over time. There are no other known foreseeable actions in the activity areas that could adversely affect scenery.

3.8 Air Quality

Existing Condition

The USDA Forest Service (FS) has proposed the Baldwin Gap project in the Bent Creek Experimental Forest (adjacent to Asheville, North Carolina). The FS proposes to use vegetation

manipulations and prescribed fires to control/manage pest (i.e. invasive plant species) populations.

The estimated population in Asheville was 68,889 people in 2000, while Buncombe County was estimate to have 212,672 people in 2003. As the following table discloses, ambient monitoring results for 2002 through 2004 for data collected in Asheville indicates both the 24-hour and the annual average National Ambient Air Quality Standard (NAAQS) is not being exceeded.

Table 3-14: Monitoring Results for Fine Particles ($PM_{2.5}$) for the Years 2002 through 2004[1]

Location	2002 24-hour (ug/m^3)	2003 24-hour (ug/m^3)	2004 24-hour (ug/m^3)	24-hour 3-year Average	2002 Annual Average (ug/m^3)	2003 Annual Average (ug/m^3)	2004 Annual Average (ug/m^3)	Annual 3-year Average
Buncombe County	42	29	24	31.7	14.5	12.7	12.0	13.07

1 The National Ambient Air Quality Standard is violated if the average of 3-years of annual average is 15 ug/m^3 or greater (multiple community oriented monitors can be averaged together), or the 3-year average of the 24-hour concentration for the 98th percentile (using the maximum population oriented monitor in an area) is the 65 ug/m^3 or greater. Data obtained from http://www.epa.gov/air/data/monvals.html?st~NC~North%20Carolina.

Smoke produced from burning wood, other vegetation, and organic matter is made up of a complex mixture of water, gases, and particulate matter. When a person views a smoke plume from a fire they are seeing a large amount of water vapor being released. However, mixed among the water vapor are gases (such as carbon monoxide) and fine particles produced when wood and other organic matter are consumed. About 70 percent of the particulate matter released from smoke contains fine particles; primarily in the form of volatile organic compounds or elemental carbon.

The VSMOKE and VSMOKE-GIS atmospheric dispersion models were used to evaluate the maximum impact proposed prescribed fires may have on air quality and visibility. The results from the analysis are likely to over-estimate the impacts to air quality and visibility if the conditions on the day the prescribed fires are similar to the inputs into the models. Also, the impacts would be less if the mixing height and transport wind speeds are greater on the day of the prescribed fire than the values used in the modeling analysis. Additional information relating to the VSMOKE modeling analysis is located in the project record.

The initial analysis of the proposed projects indicated that any unhealthy smoke concentrations or visibility impairment are likely to remain on National Forest System lands. Also, no smoke sensitive targets are likely to be impacted by the proposed project. A more detailed smoke management analysis (as part of a prescribed fire plan) would be prepared if an action alternative is selected.

3.8.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative there would be no prescribed burning and thus no direct, indirect, or cumulative effects contributed to air quality. Air quality within the area would remain at current levels. There are no other known foreseeable actions in the activity areas that could adversely affect air quality.

3.8.2 Alternatives B, C, and D – Direct, Indirect, and Cumulative Effects

Each of the action alternatives propose prescribed burning. The following table (based on the VSMOKE model) displays estimated fine particulates (PM 2.5), carbon dioxide (CO), and visibility downwind (southeast) and within 1,056 feet of the burns:

Table 3-15: Acres and VSMOKE Estimates for PM2.5, CO, and Visibility at 1,056 Feet Downwind (southeast) of Prescribed Burn

Stand	Acres	PM2.5[a]	CO[b]	Crossplume Visibility[3]	Contrast Ratio[4]	Alt B Burn?	Alt C Burn?	Alt D Burn?
1-4	29	160.85	5.55	22.28	0.90	Yes	Yes	Yes
1-20	36	166.87	5.68	22.18	0.89	No	No	Yes
Minimum Level to be Assigned Green[c] by the EPA		40.17 (1-4) 38.06 (1-20)	4.46 (1-4) 4.40 (1-20)	21.69 (1-4) 21.48 (1-20)	0.84 (1-4) 0.81 (1-20)			
Upper Extreme Level		360.94 (1-4) 353.10 (1-20)	7.76 (1-4) 7.82 (1-20)	21.69 (1-4) 21.48 (1-20)	0.84 (1-4) 0.81 (1-20)			
Minimum Distance to be Assigned Green[c] by the EPA		4,118' (1-4) 5,174' (1-20)	2,587' (1-4) 3,274' (1-20)	317'	317'			
Upper Extreme Distance		317'	317'	317'	317'			

a = Fine particulate matter
b = Carbon monoxide
c = Green rating from EPA's Air Quality Index indicates minimal potential to affect human health

Stand 1-4

The proposed prescribed fires would temporally release (less than 25 hours) fine particulate matter and other pollutants into the atmosphere. High concentrations of fine particulates released from prescribed or wildfires can be of concern because it can have an adverse impact to a person's health.

Direct, indirect, and cumulative smoke effects for Alternatives B and C would occur only from stand 1-4. Direct, indirect, and cumulative smoke effects for Alternative D would occur from stands 1-4 and 1-20. The Pisgah RD anticipates burning about 500 acres spring 2006 in the South Mills River area (Otter Hole Prescribed Burn), but the effects of that burn with the Baldwin Gap burn are not expected to be major since the two areas are over 13 miles from each other and most of the effects are expected to be dissipated enough prior to potential accumulation.

The smoke dispersion modeling analysis (using VSMOKE and VSMOKE-GIS) for this project was performed for 4 acres to be burned on April 15, 2006, between 4:00 and 5:00 pm. This time period was chosen since this would be the period with the maximum amount fine particulates (PM2.5) and carbon monoxide released from the prescribed fire. A total of 29 acres would have a prescribed fire treatment between the 10:00 am and 6:00 pm with a fire rate spread of about 3 to 4 acres per hour.

The time period being analyzed has daytime dispersion characteristics to disperse the pollutants from the fire and is the time period of maximum emissions of fine particulate matter (PM2.5). The emission rate of PM2.5 this hour was 11 grams/second and carbon monoxide was 133 grams/second. The heat release rate was 2500.587 megawatts. Both emission rates and the heat release rates were calculated using the Fire Emission Production Simulator (FEPS) model assuming broadcast burning of natural fuels. The estimated background concentration of fine particles and carbon monoxide of the air carried with the winds into the fire are 20 micrograms/cubic meter and 4 parts per million, respectively. The proportion of the smoke subject to plume rise was -0.75 percent, which means 75 percent of the smoke is being dispersed gradually as it rises to the mixing height, and 25 percent is dispersed at ground level.

The VSMOKE model produces three types of outputs that estimate: a) The ability of the atmosphere to disperse smoke, b) Downwind concentrations of particulate matter and carbon monoxide, and c) Visibility conditions downwind of the fire.

The Dispersion Index (DI) is an estimate of the ability of the atmosphere to disperse smoke to acceptably low average concentrations downwind of one or more fires. This value could represent an area of approximately 1,000 square miles under uniform weather conditions. Typically, the DI value should be greater than 30 when igniting a large number of acres within an area. The calculated DI value was 38, which predicts the atmosphere has a fair to good capacity to disperse smoke.

High concentrations of particulate matter, especially fine particles (PM2.5), and carbon monoxide can have a negative impact on people's health. The Environmental Protection Agency (EPA) has developed a color coding system called the Air Quality Index (AQI) to help people understand what concentrations of air pollution may impact their health. When the AQI value is color code orange then people who are sensitive to air pollutants, or have other health problems, may experience health effects. This means they are likely to be affected at lower levels than the general public. Sensitive groups of people include the elderly, children, and people with either lung disease or heart disease. The general public is not likely to be affected when the AQI is code orange. Everyone may begin to experience health effects when AQI values are color coded as red. People who are sensitive to air pollutants may experience more serious health effects when concentrations reach code red levels. This analysis shows the air quality at downwind distances less than 1,056 feet from the edge of the fire may have a 1-hour particulate matter concentrations predicted to be code red or worse, while distances less than 0.39 miles are predicted to be code orange or worse.

Smoke can also have an impact on how far and how clearly we can see on a highway or in viewing scenery. The fine particles in the smoke are known to be able to scatter and absorb light, which can reduce visibility conditions. The visibility estimates from VSMOKE are valid only when the relative humidity is less than 70 percent. Also, the visibility estimates assume the smoke is passing in front of a person who is looking through the plume of smoke. The visibility thresholds used for this modeling analysis were to maintain a contrast ratio of greater than 0.05 and a visibility distance of 0.25 miles. Typically, mitigation measures are implemented if the visibility is below 0.25 miles.

The VSMOKE-GIS model provided estimates for four AQI values downwind of the proposed prescribed fire. The VSMOKE-GIS analysis had daytime dispersion characteristics to disperse the pollutants from the fire and this is the same as the VSMOKE analysis. The downwind spacing interval was set at 0.025 kilometers, and the model ceased making downwind estimates at 30 miles from the edge of the fire. The stability class used for the VSMOKE-GIS analysis was slightly unstable, and this is the same as the calculated stability from VSMOKE. The VSMOKE-GIS results predict the AQI index of code orange or red are unlikely to impact any smoke sensitive targets (schools, hospitals, health care facilities, or airports) and the highest smoke concentrations are most likely to remain on National Forest System lands.

In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. There are no other known foreseeable actions in the activity areas that could adversely affect air quality.

Stand 1-20

There would be no direct, indirect, or cumulative smoke effects for Alternatives B and C with stand 1-20 as only Alternative D proposes to burn this stand. The Pisgah RD anticipates burning about 500 acres spring 2006 in the South Mills River area (Otter Hole Prescribed Burn), but the effects of that burn with the Baldwin Gap burn are not expected to be major since the two areas are over 13 miles from each other and most of the effects are expected to be dissipated enough prior to potential accumulation.

The smoke dispersion modeling analysis (using VSMOKE and/or VSMOKE-GIS) for this project was performed for 6 acres to be burned on 10/15/2006 between 4:00 and 5:00 pm. This time period was chosen since this would be the period with the maximum amount fine particulates (PM2.5) and carbon monoxide released from the prescribed fire. A total of 39 acres would have a prescribed fire treatment between 10:00 am and 6:00 pm with a fire rate spread of about 3 to 6 acres per hour.

This time period has daytime dispersion characteristics to disperse the pollutants from the fire. The emission rate of PM2.5 (fine particles) this hour was 14 grams/second and carbon monoxide was 176 grams/second. The heat release rate was 7438.455 megawatts. Both emission rates and the heat release rates were calculated using the FEPS model assuming broadcast burning of slash fuels. The estimated background concentration of fine particles and carbon monoxide of the air carried with the winds into the fire are 20 micrograms/cubic meter and 4 parts per million, respectively. The proportion of the smoke subject to plume rise was -0.75 percent, which means 75 percent of the smoke is being dispersed gradually as it rises to the mixing height, and 25 percent is dispersed at ground level.

The DI analysis disclosed above for stand 1-4 would be the same for stand 1-20. This analysis shows the air quality at downwind distances less than 1,056 feet from the edge of the fire in stand 1-20 may have a 1-hour particulate matter concentrations predicted to be code red or worse, while distances less than 0.39 miles are predicted to be code orange or worse.

Smoke can also have an impact on how far and how clearly we can see on a highway or in viewing scenery. The fine particles in the smoke are known to be able to scatter and absorb light, which can reduce visibility conditions. The visibility estimates from VSMOKE are valid only when the relative humidity is less than 70 percent. Also, the visibility estimates assume the smoke is passing in front of a person who is looking through the plume of smoke. The visibility thresholds used for this modeling analysis were to maintain a contrast ratio of greater than 0.05 and a visibility distance of 0.25 miles. Typically, mitigation measures are implemented if the visibility is below 0.25 miles.

The VSMOKE-GIS model analysis disclosed above for stand 1-4 is expected to be the same for stand 1-20.

In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. There are no other known foreseeable actions in the activity areas that could adversely affect air quality.

3.9 Management Indicator Species

Introduction

An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. The assessment provides a checkpoint of project level activities, the anticipated change in habitat used by MIS, and the likely contribution to Forest-wide trends. Additional information on MIS, as well as other species, is located in the EA and the wildlife, aquatics, and botanical resource reports located in the project record.

Process

The Forest-wide list of MIS was considered as it relates to this project analysis area. Only those MIS that occur or have habitat within the project analysis area 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.

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

1) **Tables 3-16** and **3-17:** These tables display the biological communities, special habitats, associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is the Final Supplement to the Final Environmental Impact Statement (FSFEIS), Vol. I, Tables III-8 and III-9.
2) **Tables 3-18** and **3-19:** These tables compare the effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and special habitat considered in the project-level analysis. Following these tables is a discussion of the cumulative effects for the selected species and habitats.
3) **Table 3-20:** This table displays by MIS the Forest-wide population trend along with the associated biological community or special habitat. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests. This table is used in conjunction with the information presented in Tables G-3 and G-4 to explain how the project's effects to habitats affect Forest-wide population cumulative trends for the species considered.

Table 3-16: Biological Communities, Associated MIS (per the Final Supplement to the Final Environmental Impact Statement Volume I, Table III-8), and why Species were Chosen or Eliminated from Analysis

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Fraser fir forests	Fraser fir, golden-crowned kinglet, Carolina northern flying squirrel	No/1
Red spruce/fraser fir forests	Golden crowned kinglet, Carolina northern flying squirrel, solitary vireo	No/1
Grassy and heath balds	Mountain oat-grass, Catawba rhododendron	No/1
Northern hardwood forests	Carolina northern flying squirrel, twisted stalk, solitary vireo	No/1
Carolina hemlock bluff forests	Golden-crowned kinglet, Carolina hemlock	No/1
Cove forests	Ginseng, black cherry, buckeye, basswood, solitary vireo	Yes

Biological Community	MIS	Analyzed Further/ Evaluation Criteria
Oak and oak/hickory forests	Red oak, white oak, hickories	Yes
White pine forests	White pine (natural community only)	No/1
Yellow pine mid-successional communities	Pine warbler (low elevational shortleaf/Virginia pine)	No/2
Xeric yellow pine forests	Pine warbler (pine/oak/heath low elevation habitats) pitch pine, table mountain pine, turkey beard, mid-successional)	No/2
Forested seep wetlands	Golden saxifrage, umbrella leaf, mountain lettuce	No/1
Bogs	*Sphagnum spp.*	No/1
Mountain ponds and ephemeral pools	Spotted salamander (vernal pools)	No/1
Barrens and glades	Prairie dropseed, slender wheatgrass	No/1
Shaded rock outcrops and cliffs	Green salamander (granitic gneiss rock outcrops with crevices and mesic conditions), Jordan's salamander, alumroots, saxifrages	No/2
Open rock outcrops and cliffs	Raven, peregrine falcon, Biltmore sedge, wretched sedge, mountain oat-grass	No/2
Caves	Bats (all cave-using species)	No/2
Alluvial forests	Two-lined salamander (mid-late successional stages), raccoon (all forest types), mink	Yes
Coldwater streams	Brook, brown, and rainbow trout; sculpin, blacknose dace	Yes
Coolwater streams	Smallmouth bass, white sucker, Moxostoma spp., index of biotic integrity	No/1
Warmwater streams	Index of biotic integrity, smallmouth bass, freshwater mussels, spotfin chub	No/1
Reservoirs	Index of biotic integrity, largemouth bass, bluegill	No/2
Invasive exotic plant species	Japanese honeysuckle, Japanese grass, Chinese privet, periwinkle	Yes

1 Biological Community and its represented species are not known to occur within the Baldwin Gap area; 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 is imbedded in the Baldwin Gap area, but would not be affected by management activities because the biological community would not be entered by the proposed activities. 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.

Table 3-17: Special Habitats, Associated MIS (per Final Supplement to the Final Environmental Impact Statement Volume I, Table III-9), and why Species Chosen or Eliminated from Analysis

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
Old forest communities (100+ years old)	Black bear (dens, low levels of disturbance), bats (roosting and foraging habitats in mature forests), pileated woodpecker (cavities, foraging habitat), lung lichens (*Lobaria*)	Yes
Early successional (0-10 years old)	White-tailed deer (all communities and elevations), eastern wild turkey (all communities), ruffed grouse (early and mid-successional all communities) rabbits, rufous-sided (eastern) towhee, bobcat, field sparrow (brushy, riparian thickets)	Yes
Early successional (11-20)	Rufous-sided (eastern) towhee, ruffed grouse (early and mid-successional all communities)	No/1
Soft mast-producing	Wild grape (*vitus spp.)*, cedar waxwing (all communities soft	Yes

Special Habitat	MIS	Analyzed Further/ Evaluation Criteria
species	mast)	
Hard mast-producing species (>40 yrs)	Black bear, wild turkey, gray squirrel, white-tailed deer	Yes
Mixed pine/hardwood forest types (successional stage and hard mast)	Black bear, eastern wild turkey, gray squirrel, white-tailed deer	Yes
Permanent grass/forb openings	Eastern wild turkey, eastern meadowlark, rabbit	Yes
Contiguous areas with low disturbance (<1 mile open travelway/4 square miles	Black bear (all communities)	Yes
Contiguous areas with moderate disturbance levels (<1 mile open travelway/2 square miles)	Eastern wild turkey (all communities)	Yes
Den trees (>36" dbh)	Black bear (large dens)	Yes
Snags and dens (>22" dbh)	Pileated woodpecker, raccoon (moderate sized dens)	Yes
Small snags and dens	Gray squirrel, white-breasted nuthatch, yellow-bellied sapsucker (breeding populations)	Yes
Downed woody debris – all sizes (foraging and cover habitats)	Black bear (all communities), pileated woodpecker, ruffed grouse (down logs for drumming), Jordan's salamanders	Yes
Large contiguous forest areas	Ovenbird (in breeding range, moderately productive sites), northern parula warbler (in breeding range, requires cover and riparian habitats) veery, solitary (blue-headed) vireo	Yes

1 Special Habitat and its represented species are not known to occur within the Baldwin Gap area; therefore, this special habitat 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 habitat.

2 Special habitat is imbedded in only a small portion of the analysis area and would be excluded by project management activities. This biological community would not be affected by any of the alternatives or effects are discountably small. 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.

Table 3-18: Biological Communities, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Biological Community	Forest-wide Estimate	Estimated Changes			
		Alternative A	Alternative B	Alternative C	Alternative D
Oak and oak/hickory forests	High El. Oak: 40,600 ac. Mesic Oak/H: 283,340 ac. Dry Mesic Oak/H: 21,800 ac. Chestnut Oak/H: 8,600 ac. Upland hwd (other): 6,900 ac.	None affected	45 acres harvested	32 acres harvested	79 acres harvested
Cove Forests	Rich=107,500 ac. Acidic=174,600 ac. Cove (other)=2,800 ac.	None affected	66 acres harvested,	49 acres harvested,	77 acres harvested,
Alluvial Forest	21,000 ac Alluvial Forest 55,000 ac other flood-prone areas	None affected	<2 acres	<2 acres	<2 acres
Coldwater Streams	2,000 miles	None affected	Up to 12 culverts replaced	Up to 12 culverts replaced	Up to 12 culverts replaced
Invasive Exotic Plant Species	2,684 miles of road construction <25 years	No change	0.25 miles of new road and 1 mile of temporary road constructed	No change	0.25 miles of new road and 1 mile of temporary road constructed

[1] See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends

Table 3-19: Special Habitats, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Special Habitat	Forest wide Estimate	Estimated Changes			
		Alternative A	Alternative B	Alternative C	Alternative D
Old forest communities (100+ years old)	171,000 ac.	No change.	144 acres would be harvested or thinned.	91 acres would be harvested or thinned.	134 acres would be harvested or thinned.
Early successional (0-10 years old)	26,800 ac (yr 2000) 2,040 ac (5 yr avg) downward trend	No change	32 acres exist. Increase 111 acres	32 acres exist. Increase 81 acres	32 acres exist. Increase 152 acres
Soft mast producing species	13,144 ac early seral (yr 2000), highest potential on 5,650 ac downward trend	No Change	Slight increase in soft mast species habitat	Slight increase in soft mast species habitat	Slight increase in soft mast species habitat
Hard mast producing species (>40 years old)	681,000 acres, increasing trend	No Change	96 acres would be regenerated	66 acres would be regenerated	109 acres would be regenerated

Special Habitat	Forest wide Estimate	Estimated Changes			
		Alternative A	Alternative B	Alternative C	Alternative D
Mixed pine/hardwood forest types (successional stage and hard mast)	52,521 ac Increasing trend	No change.	15 acres would be regenerated.	15 acres would be regenerated.	15 acres would be regenerated.
Contiguous areas with low disturbance (<1 mile open travelway/4 square miles)	160,832 ac.	No change.	No change. All roads constructed in project would be maintained as closed.	No change. All roads constructed in project would be maintained as closed.	No change. All roads constructed in project would be maintained as closed.
Contiguous areas with moderate disturbance (<1 mile open travelway/2 square miles)	576,240 ac.	No change.	No change. All roads constructed in project would be maintained as closed.	No change. All roads constructed in project would be maintained as closed.	No change. All roads constructed in project would be maintained as closed.
Large contiguous forest areas	38 Patches (302,000 ac)	No change.	No change. The project does not occur in a forest interior bird patch.	No change. The project does not occur in a forest interior bird patch.	No change. The project does not occur in a forest interior bird patch.
Permanent grass/forb openings	3,000 acres	No Change	1.4 acre increase	0 ac increase	7.4 acre increase
Den trees (>36" dbh)	Varies across forests. Increasing trend.	No change.	No change. Dens and snags of this size are protected according to LRMP standards.	No change. Dens and snags of this size are protected according to LRMP standards.	No change. Dens and snags of this size are protected according to LRMP standards.
Snags and dens (>22" dbh)	Varies across forests. Increasing trend.	No change.	No change. Dens and snags of this size are protected according to LRMP standards.	No change. Dens and snags of this size are protected according to LRMP standards.	No change. Dens and snags of this size are protected according to LRMP standards.
Small snags and dens	Ave. at 80 year Cove=4/acre Upland=3/acre Pine=2/acre	No Change	Small number lost/damaged during harvest operations on 364 acres.	Small number lost/damaged during harvest operations on 232 acres.	Small number lost/damaged during harvest operations on 330 acres.
Downed woody debris, all sizes (foraging and cover habitats)	High Accumulation Small wood: 18,000 Large wood: 386,000 Low Accumulation (approx: 600,000)	No Change	Increase Small wood and Large wood on 111 ac high acc. areas	Increase Small wood and Large wood on 81 ac high acc. areas	Increase Small wood and Large wood on 152 ac high acc. areas

[1] See section "Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS" below for additional analysis by alternative and on population trends

Table 3-20: MIS, Estimated Population Trend, and Biological Community or Special Habitat Indicated by the Species

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
Black Bear	Increase	Old Forest Communities	Hard mast-producing species	Mixed Pine/hardwood forest types	Contiguous areas with low disturbance	Den trees (>36" dbh)	Downed woody debris- all sizes
White Tailed Deer	Static to decreasing	Early-successional (0-10)	Hard mast-producing species	Mixed pine/hardwood forest types			
Raccoon	Increase	Alluvial Forests	Snags and dens (>22 dbh)				
Rabbit	Decrease	Early successional (0-10)	Permanent grass/forb openings				
Gray Squirrel	Static	Hard mast-producing species	Mixed pine/hardwood forest types	Small snags and dens			
Bobcat	Static	Early successional (0-10)					
Mink	Static	Alluvial Forests					
Bats	Varies by species	Caves	Old Forest Communities				
Pileated Woodpecker	Increase	Old Forest Communities	Snags and dens (>22 dbh)	Downed woody debris – all sizes			
Veery	Static	Large Contiguous Forest Areas					
Solitary (Blue headed) Vireo	Increase	Red Spruce/Fraser fir Forests	Northern Hardwood Forests	Cove Forests	Large Contiguous forests		
Northern Parula Warbler	Static	Large Contiguous Forest Areas					
Ovenbird	Decrease	Large					

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
		Contiguous Forest Areas					
Yellow-Bellied Sapsucker	Decrease	Small snags and dens					
Rufous-Sided (Eastern) Towhee	Decrease	Early-successional (0-10)	Early successional (11-20)				
White-breasted Nuthatch	Increase	Small snags and dens					
Cedar Waxwing	Static	Soft mast-producing species					
Pine Warbler	Static	Yellow pine mid-successional forests					
Field Sparrow	Decrease	Early successional (0-10)					
Eastern Wild Turkey	Northern mtns = increase; Southern mtns = decrease	Hard mast-producing species	Mixed pine/hardwood forest types	Contiguous areas with moderate disturbance	Permanent grass/forb openings		
Ruffed Grouse	Static	Early successional (0-10)	Early successional (11-20)	Downed woody debris			
Eastern Meadowlark	Absent	Permanent grass/forb openings					
Jordan's Salamander	Static	Shaded rock outcrops and cliffs					
Blue Ridge two-lined salamander	Static	Alluvial Forests					

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
Brook, Brown and Rainbow Trout, sculpin	Static	Coldwater streams					
Largemouth Bass, Bluegill	Static	Reservoirs					
Blacknose Dace	Static	Coldwater streams					
Freshwater mussels	Varies by species	Warmwater streams					
Red Oak	Static	Oak and oak/hickory forests					
White Oak	Static	Oak and oak/hickory forests					
Buckeye	Static	Cove forests					
Basswood	Static	Cove forests					
Black Cherry	Increase	Cove Forests					
Hickory (All Species)	Static	Oak and oak/hickory forests					
White Pine	Increase	White Pine Forests					
Pitch and Table Mountain Pine	Decrease	Xeric yellow pine Forests					
Fraser Fir	Decrease	Fraser Fir Forests					
Carolina Hemlock	Increase	Carolina hemlock bluff forests					
Ginseng	Decrease	Cove Forests					
Catawba Rhododendron	Increase	Grassy and heath glades					
Wild Grape	Decrease	Soft mast-					

		Biological Community or Special Habitat					
Species	**Estimated Population Trend**	**1**	**2**	**3**	**4**	**5**	**6**
		producing species					
Turkey Beard	Decrease	Xeric yellow pine forests					
Mountain Lettuce	Static	Forested seep wetlands					
Golden Saxifrage	Static	Forested seep wetlands					
Slender Wheatgrass	Increase	Barrens and glades					
Prairie dropseed	Increase	Barrens and glades					
Alum root	Increase	Shaded rock outcrops and cliffs					
Saxifraga Spp.	Increase	Shaded rock outcrops and cliffs					
Wretched sedge	Decrease	Open rock outcrops and cliffs					
Lung lichen (*Lobaria*)	Increase	Old Forest Communities					
Aquatic Invertebrates	Static	Coldwater streams	Coolwater streams	Warmwater streams	Reservoirs		

Evaluating the Effect of Project-level Activities on Forest-wide Population Trends for MIS

Summary of Cumulative Effects to MIS by Alternative

Cumulatively, past and present activities (including wildfire history), combined with any of the action alternatives (Alternatives B, C, or D) would not greatly affect any MIS wildlife species across the analysis area, nor contribute to any change in Forest populations. Local populations of several species would benefit by the proposed vegetative manipulation over the next planning period of ten years.

There are no known changes in the private land use pattern over the next planning period. Therefore the existing use of residents and recreation use and forested land creating a mosaic of high disturbance areas and low disturbance is expected to continue. The cumulative private land use pattern would not cause any change to the impacts of MIS that occur on the Forest in the Baldwin Gap area.

Oak Hickory Forest Biological Community

Any action alternative selected (Alternative B: 45 acres, Alternative C: 32 acres, or Alternative D: 79 acres), would temporarily convert acres of Oak Hickory Forest to an earlier successional stage of Oak Hickory Forest by harvest. Regardless of the selected action alternative, it would affect <0.001% of the 640,840 acres of Oak Hickory Forest within the Forests. The proposed action would have very little impact on the Oak Hickory Forest in the Nantahala/Pisgah Forests because the proposed action is <0.001% of the total amount of Oak Hickory Forest within the Nantahala/Pisgah Forests and the proposed action does not convert communities. Red oak, white oak and hickory species were selected as MIS species for this community. The action is not expected to greatly influence the Forest-wide trends of Oak-Hickory Forests.

White Oak and Red Oak: The overall Forest trend in both of these species has been downward due to fire suppression and succession. However, local increase can occur within areas of silviculture treatments that favor oak regeneration. The action proposals should positively favor oak regeneration because of harvest and post-harvest treatments (Ted Oprean, per. com.). However, the cumulative positive impact on these treated acres would not be great enough (45, 32, or 79 harvested acres of the 40,500 Forest acres, or <0.20%) to influence the AA or Forest-wide downward trend (see MIS report sections 4.44, 4.45 for detailed Forest habitat and trend discussion). The proposal is not expected to greatly influence Forest wide trends or population numbers of red oak, white oak, and hickory species. Locally (within harvest units) red oak, white oak, and hickory species are expected to have a temporary decrease of larger mature individuals and an increase in seedlings. This would become less apparent as succession continues.

Hickory: The overall Forest-wide trend in both oak and hickory has been downward in the last few decades but appears to be stable from pre-settlement data. This mid century increase is due to the increase in hickories after the loss of the chestnut and past logging practices (see MIS report section 4.49 for detailed Forest habitat and trend discussion). The proposed regeneration of 45, 32, or 79 acres of Oak-Hickory would not have a great influence (positive or negative) of the local population of hickories because hickories would be favored as leave trees, where present. The proposed prescribed fire may decrease small individuals of hickories, but would not affect

mature trees. The overall, net cumulative effect of the proposal upon hickory species is near zero and the current downward Forest-wide trend would remain static.

Cove Forests Biological Community

Depending upon the action alternative selected this proposal would temporarily convert 66 acres (Alternative B), 49 acres (Alternative C), or 77 acres (Alternative D) of Cove Forest to an earlier succession stage of (Rich) Cove Forest by harvest. The action alternatives would affect no more than 0.07% of the 107,500 acres of rich cove forest within the Nantahala/Pisgah Forests. Cumulatively, the action alternatives would have an insignificant impact on the Cove Forests in the Nantahala/Pisgah Forests because they propose to harvest <0.1% of the total amount of cove forests within the two Forests, and they would not convert communities.

Ginseng, Black Cherry, Buckeye, and Basswood: The population trend for tree species associated with cove forests is upward because 1) the conversion of cove hardwood sites to white pine on the Nantahala and Pisgah (N&P) National Forests has been and would continue to decline, and 2) the N&P Land and Resource Management Plan (LRMP) provides for a variety of suitable conditions to be maintained across the N&P through natural processes and active forest management practices (MIS Report section 4.46, 4.47, 4.48) and this mix of conditions is beneficial to cove hardwood populations. This project would have no measurable impact on Forest-wide population trends for MIS associated with cove forests because 1) the extent of forest management activities in the action alternatives is only a fraction of the total estimated extent of coves (<0.1% of the total 107,500 acres) on the N&P, and 2) the proposed activities would follow all standards and guides in the LRMP and would not result in conversion of any stands to white pine. This project would also have no measurable impact on the following factors that influence specific population trends for cove MIS on the N&P: black cherry: 1) the Forest-wide use of pre-harvest silvicultural treatment would continue to promote advance growth species such as black cherry, and 2) ozone, a gas that is detrimental to black cherry, is expected to decline in the near future with increased nitrogen oxide controls on automobiles and power plants (from MIS report). Yellow buckeye: individual trees are retained during most timber harvest activities because of their low commercial value or because they have exfoliating bark that provide habitat for the Indiana bat (section 3.3, MIS report). Basswood is expected to increase in number as stand age across the N&P increases resulting in improved light conditions for this shade tolerant species. The Forest-wide population trend for ginseng is downward based on 1) historical accounts, i.e. harvest levels in the 1800s indicate a much greater population size than is currently present on the N&P, 2) permanent plots re-measured from 1979 to 2000 on the N&P, 3) decline in North Carolina harvest amounts within the counties with USFS lands, and 4) absence of ginseng on 24% of random plots inventoried in 2002 where species should occur. This project may temporarily improve light and moisture conditions for ginseng, decrease larger mature individuals and may provide more protection to sites through road closures; however, this would have no measurable effect (direct or cumulative) on the population trend.

Solitary (Blue-headed) vireo: The current estimated population trend of the solitary vireo is increasing. The solitary vireo represents red spruce/Fraser fir forests, northern hardwood forests, cove forests, and large contiguous forests. Red spruce/Fraser fir and northern hardwood forests do not occur in the analysis area, so these biological communities would not be affected. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of cove forests, nor would it affect large contiguous forests or change its trend, the project would not change the increasing population trend of the solitary vireo.

Alluvial Forests Biological Community

Raccoon: The current estimated population trend of the raccoon is upward. Raccoon represents alluvial forests and snags and dens (>22" dbh). Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the upward population trend of the raccoon.

Mink: The current estimated population trend of mink is static. Mink is an alluvial forest-associated species whose populations tend to be limited by the availability of den sites (e.g., dens of other species such as the bank dens of beavers or muskrats) or food sources. Since alluvial forests are protected by standards in the LRMP, implementation of this project (i.e., any of the action alternatives) would not change the trend of this biological community, so the project would not change the static population trend of the mink.

Blue Ridge two-lined salamander: The current estimated population trend of the Blue Ridge two-lined salamander is static. Blue Ridge two-lined salamanders represent alluvial forests. Since alluvial forests are protected by standards in the LRMP, implementation of this project (i.e., any of the action alternatives) would not change the trend of this biological community, so the project would not change the static population trend of the Blue Ridge two-lined salamander.

Cold Water Biological Community

Blacknose dace & Sculpin: These two species are sensitive to subtle changes within water quality and inhabit coldwater streams across the Forests. Management activities most likely to impact coldwater habitat would be installation and replacement of culverts, and road construction and reconstruction activities. Therefore, the number of new culverts, replacement culverts, and miles of road construction typically serve as indicators for analysis of the effects of each alternative. The stream crossings that are being replaced within the Baldwin Gap area are located in streams with no fish habitat (unnamed tributaries to Baldwin Field Branch and Bill Moore Creek). Since crossings are not within blacknose dace or sculpin habitat, there would be no impacts to the aquatic coldwater habitat for any blacknose dace or sculpin. These two species are mobile species that are able to move upstream or downstream during disturbances. There would be no changes to population trends or viability across the Forest from the implementation of any action alternatives of the Baldwin Gap Project.

There would be approximately 12 stream crossings replaced with the proposed alternative. This would involve directly impacting approximately 22 linear feet of stream channel per crossing. It should be noted that the existing structures that are in place (culverts) are undersized and causing stream bank erosion. Replacing these culverts with larger ones which have been properly sized for the stream channel would improve habitat and prevent further erosion.

Invasive Exotic Plant Species Biological Community

Potential habitat for exotic invasive species can increase with an increase in disturbance. While disturbance from tree removal and creation of wildlife fields can offer some increased habitat for exotic invasive plants, and new road is the prime habitat for many exotic invasive plants, it is less clear that temporary road construction is habitat for exotic invasive plants. Therefore, a good measure of habitat for comparison potential changes of exotic invasive plants is the creation of miles of new roads (Nantahala/ Pisgah Forests MIS Report, section 4.58).

Forest-wide, 2,684 miles of road construction has occurred within the Pisgah/Nantahala National Forest within the last 25 years or on average 107.3 miles per year. Alternative B and D would

contribute 1 mile of temporary road construction and 0.25 miles of system road construction or increase exotic plant species habitat by <1% of the yearly average. On the other hand, Alternative A and C would contribute no new road construction or increase exotic plant species habitat. All action alternatives would not greatly contribute to an undesirable the Forest-wide trend in exotic plant species habitat. Alternative A or C would not increase exotic plant species habitat (see discussion in selection concerning individual invasive exotic plant species in botanical report, project record).

Japanese Honeysuckle, Chinese Privet & Japanese Grass: Japanese Honeysuckle, Chinese Privet & Japanese Grass were selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. These species occur in disturbed habitats. Japanese Honeysuckle, Chinese Privet & Japanese Grass is well established in roadsides, wildlife fields and bottomland areas near large streams such as Baldwin Branch within the Baldwin Gap area. Alternatives B and D would only slightly increase populations of either of these species because their populations are so well established within the watershed and the amount of permanent open habitat needed for the establishment of these species is small (1 mile of temporary road and 0.25 mile of new road). This would not cumulatively influence the local (Baldwin Branch) or Forest trend.

Periwinkle: Periwinkle was selected as an MIS species to represent exotic invasive species habitat. The Forest trend for these species is positive. This species occurs in disturbed habitats. This species is not known to occur within the Analysis area. Therefore, there are no known effects (positive or negative) to this species.

Old Forest Communities Special Habitat (100+ years old)

Currently, there is approximately 1,890 acres of forests that are 100+ years of age within the analysis area. In Alternative B, 144 acres (7.6% of the analysis area) is proposed for harvest or thinning; 91 acres (4.8% of the analysis area) is proposed for harvest or thinning in Alternative C; and 134 acres (7.1% of the analysis area) is proposed for harvest or thinning in Alternative D. The 144 acres from Alternative B only represents 0.08% of the total old forest community across the Nantahala and Pisgah National Forests. There are 1,675 acres of mature forest that would become part of the old forest community in the analysis area within the next 10 years. This aging of the forest would more than offset the reduction of the old forest community in the analysis area by, at most, 144 acres in Alternative B.

Black Bear: The current estimated population trend for the black bear is increasing across the Nantahala and Pisgah National Forests. The black bear represents old forest communities, hard mast producing species, mixed pine/hardwood forest types, contiguous areas with low disturbance, large den trees (>36”), and downed woody debris of all sizes. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the upward population trend of the black bear. However, Alternatives B and C propose to build connector trails to create loop opportunities for mountain bikers and horse-back riders. This action would increase the amount of human disturbance in the area, thus possibly reducing or displacing the local population of black bear.

Pileated Woodpecker: The current estimated population trend of the pileated woodpecker is upward. Pileated woodpeckers represent old forest communities, snags and dens (>22” dbh), and downed woody debris of all sizes. Since implementation of this project (i.e., any of the action

alternatives) would not change the trend of any of these special habitats, the project would not change the increasing population trend of the pileated woodpecker.

Bats: The current estimated population trend for bats varies by species. Bats represent caves and old forest communities. Since no caves exist in the Baldwin Gap area and implementation of this project (i.e., any of the action alternatives) would not change the trend of old forest communities, the project would not change the population trend of bats.

Lung Lichen: There is an upward trend in the amount of old forests on the Nantahala and Pisgah National Forests. As this species is more likely in older forests, their populations are expected to be in an upward population trend and this project would not measurably change this trend.

Early Successional Special Habitat (0-10 years old)

Currently, there is approximately 30 acres of early successional habitat within the analysis area, none of which occur in the Baldwin Gap area. In Alternative B, 111 acres would be created; in Alternative C, 81 acres would be created; and in Alternative D, 152 acres would be created. The trend of this habitat is downward, since not as much forests are being regenerated. Although the harvest of 152 acres (the most created from Alternative D) is a fraction of a percentage of the total early successional habitat, and this would not change the downward trend, it would help contribute to the total number of acres in 0-10 year old age class.

Rufous-sided (Eastern) Towhee: The current estimated population trend of the rufous-sided towhee is downward. Rufous-sided towhees represent early successional habitat, both 0-10 and 11-20 year old forests. Since implementation of this project (i.e., any of the action alternatives) would not affect any 11-20 year old habitat (none exists in the Baldwin Gap area) and would not change the trend of 0-10 year old habitat, the project would not change the decreasing population trend of the rufous-sided towhee. However, since Alternative D creates more-early successional habitat than the other action alternatives and does not build connector trails, thus not increasing the amount of human disturbance in the area, this alternative may actually help to increase the local population of rufous-sided towhee within the Baldwin Gap area.

Field Sparrow: The current estimated population trend for the field sparrow is decreasing across the Nantahala and Pisgah National Forests. Field sparrow represents early successional (0-10 years old) habitat. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of this special habitat, the project would not change the decreasing population trend of the field sparrow. However, since Alternative D creates more early-successional habitat than the other action alternatives and does not build connector trails, thus not increasing the amount of human disturbance in the area, this alternative may actually help to increase the local population of field sparrow within the Baldwin Gap area.

Ruffed Grouse: The current estimated population trend for ruffed grouse is static across the Nantahala and Pisgah National Forests. Ruffed grouse represents early successional habitat (both 0-10 and 11-20 year old), and downed woody debris. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the static population trend of ruffed grouse. However, since Alternative D creates more early-successional habitat than the other action alternatives and does not build connector trails, thus not increasing the amount of human disturbance in the area, this alternative may actually help to increase the local population of ruffed grouse within the Baldwin Gap area.

Rabbits: The current estimated population trend of the rabbit is downward. Rabbit represents early successional (0-10 years old) habitat and permanent grass/forb openings. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the downward population trend of the rabbit. However, since Alternative D creates more early-successional habitat and permanent grass/forb habitat than the other action alternatives, this alternative may actually help to increase the local population of rabbit within the Baldwin Gap area.

Bobcat: The current estimated population trend of the bobcat is static. Bobcat represents early successional (0-10 years old) habitat. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of this special habitat, the project would not change the static population trend of the bobcat. However, since Alternative D creates more early-successional habitat and permanent grass/forb habitat than the other action alternatives, and Alternative D does not increase the amount of human disturbance by not building connector trails, this alternative may actually help to increase the local population of rabbit and turkey within the Baldwin Gap area. Since rabbit and turkey are the bobcat's primary prey, Alternative D may help to increase the local population of bobcat in the Baldwin Gap area as a result of the increase in prey.

Eastern Wild Turkey: The current estimated population trend for the eastern wild turkey is decreasing in the southern mountains. Eastern wild turkey represents hard mast producing species, mixed pine/hardwood forest types, contiguous areas with moderate disturbance, and permanent grass/forb openings. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the decreasing population trend of the eastern wild turkey. However, since Alternative D creates more early successional habitat than the other action alternatives and does not build connector trails, thus not increasing the amount of human disturbance in the area, this alternative may actually help to increase the local population of wild turkey within the Baldwin Gap area.

White-tailed Deer: The current estimated population trend for the white-tailed deer is static to decreasing across the Nantahala and Pisgah National Forests. Deer represent early successional (0-10 years old) habitat, hard mast producing species, and mixed pine/hardwood forest types. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the static to decreasing population trend of the white-tailed deer. However, since Alternative D creates more early-successional habitat than the other action alternatives and does not build connector trails, thus not increasing the amount of human disturbance in the area, this alternative may actually help to increase the local population of deer within the Baldwin Gap area.

Soft Mast-Producing Species Special Habitat

Soft mast producing species are scattered throughout the analysis area. The trend for soft mast across the Nantahala and Pisgah National Forests is one of decline since fewer acres are being harvested each year. Many soft mast species within the Baldwin Gap area would be maintained during timber stand improvement treatments, and as a result of harvest and thinning, soft mast (such as blackberries) would increase as areas are opened up and light penetrates the forest floor. This slight increase in soft mast would not, however, change the downward trend of soft mast across the forest.

Cedar Waxwing: The current estimated population trend of the cedar waxwing is static. Cedar waxwings represent soft mast producing species. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of this special habitat, the project would not change the static population trend of the cedar waxwing.

Wild Grape: Three wild grape (*Vitus* species) were found within the AAs. *Vitus asestivalis* is by far the most common species. Both action alternatives would generate a potential of 81, 111, or 152 acres of regeneration or soft mast habitat. However, grape species would be targeted during post-harvest timber stand treatment, resulting in very little net increase in habitat for grape species within regeneration units. Therefore, all alternatives would result in little increase in grape species habitat. Any alternative selected would not greatly influence the Forest-wide downward trend for grape species.

Hard Mast-producing Species Special Habitat (>40 years of age)

Hard mast is on the increase as younger forests mature into fruit-bearing age. There is approximately 3,575 acres of hard mast-producing species in the analysis area; however, 2,826 acres (79%) of the analysis area is 80+ years old. The prime mast producing age for hardwoods is generally 40-80 years of age. Older trees would continue to produce acorns, but usually at a diminished capacity. As a hardwood stand ages, it is better to regenerate (remove the older trees) while there is still some reproductive capability than to wait until the stand is so old that natural regeneration would not be successful. Alternative B would regenerate 96 acres, Alternative C would regenerate 66 acres, and Alternative D would regenerate 109 acres. Although up to 109 acres of hard mast production would be lost during the next 20+ years (as with Alternative D), most of the stands being harvested are greater than 80 years old, beyond the prime mast producing age. Harvesting the stands now for regeneration would be a prudent effort in order to assure that natural regeneration of hard mast producing species would occur in the analysis area. Also, currently there are 663 acres of hard mast producing species that are less than 40 years old. As these stands age, this would more than offset the loss of hard mast production from the stands being harvested at this time.

Gray Squirrel: The current estimated population trend of the gray squirrel is static. Gray squirrel represents hard mast producing species, mixed pine/hardwood forest types, and small snags and dens. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of any of these special habitats, the project would not change the static population trend of the gray squirrel.

Black Bear: Please see discussion about black bear in the old forest communities section above.

Eastern Wild Turkey: Please see discussion about the eastern wild turkey in the early successional (0-10) section above.

White-tailed Deer: Please see discussion about the white-tailed deer in the early successional (0-10) section above

Mixed Pine/Hardwood Forest Types (successional stage and hard mast)

There are approximately 250 acres of mixed pine/hardwood forest types within the analysis area. Only one stand (Stand 20) is considered a mixed pine/hardwood forest type that would be treated. Fifteen acres are planned for regeneration harvest (through uneven-aged management), and a majority of the remainder of the stand would be thinned. The current trend of mixed pine/hardwood across the Nantahala and Pisgah National Forests is on the increase. Although 15

acres would be regenerated, this would not change the continued increasing trend of these forest types.

Gray Squirrel: Please see discussion about gray squirrel in the hard mast species section above.

Black Bear: Please see discussion about black bear in the old forest communities section above.

Eastern Wild Turkey: Please see discussion about the eastern wild turkey in the early successional (0-10) section above.

White-tailed Deer: Please see discussion about the white-tailed deer in the early successional (0-10) section above.

Permanent Grass/Forb Opening Special Habitat

There approximately 3,000 acres of permanent grass/forb openings across the Forests. According to the LRMP for the Nantahala/Pisgah National Forests, 3% of permanent grass/forb in MAs 1 and 3 and 0.5% in the other MAs are desired to provide a diversity of habitat for those species that require grass/forb. For the analysis area, there is a desired 124 acres of permanent grass/forb habitat based on the MAs that occur in the analysis area. In Compartment 1, which is in MA 3B, there is a desired 41 acres. Currently, there are approximately 20 acres of permanent grass/forb in the analysis area, none of which occurs in Compartment 1 (the Baldwin Gap area). Alternative B proposed to create 1.6 acres by seeding temporary roads; Alternative C proposes to create no permanent grass/forb habitat; and Alternative D proposed to create 7.4 acres by seeding temporary roads and creating wildlife openings. Although none of the alternatives would come close to reaching the desired amount of grass/forb, Alternative D comes closest.

Eastern Meadowlark: The current estimated population trend of the eastern meadowlark is absent from the Forests. Although the eastern meadowlark was chosen in the LRMP to represent permanent grass/forb openings, the eastern meadowlark tends to be found more in larger openings, such as agricultural fields that may be adjacent to the Forest. Eastern meadowlark does occur in the Baldwin Gap area, but it inhabits the large fields on private property near the forest. It does not use the very small openings and roads that are maintained as permanent grass/forb openings in the area. Since implementation of this project (i.e., any of the action alternatives) would not affect the large permanent grass/forb openings on private land, the project would not change the population trend of the eastern meadowlark.

Eastern Wild Turkey: Please see discussion about the eastern wild turkey in the early successional (0-10) section above.

Rabbit: Please see discussion about the rabbit in the early successional (0-10) section above.

Contiguous Areas with Low Disturbance Special Habitat (<1 mile open travelway/4 square miles)

All three action alternatives include road construction or reconstruction. Alternative B would construct 0.25 miles of system road and 1 mile of temporary road, and reconstruct 8 miles of system road; Alternative C would reconstruct 4.7 miles of system road; and Alternative C would construct 0.25 miles of system road and 1 mile of temporary road, and reconstruct 8 miles of system road. Although up to 9.25 miles of road would be constructed or reconstructed (as with Alternatives B and D), all these roads would be maintained as closed; therefore, this would not change the open road density for this area.

Northern Parula Warbler: The current estimated population trend of the northern Parula warbler is static. The northern Parula represents large contiguous forests. Since implementation of this

project (i.e., any of the action alternatives) would not affect this special habitat nor change its trend, the project would not change the static population trend of the northern Parula warbler.

Ovenbird: The current estimated population trend of the ovenbird is downward. The ovenbird represents large contiguous forests. Since implementation of this project (i.e., any of the action alternatives) would not affect this special habitat nor change its trend, the project would not change the decreasing population trend of the ovenbird.

Black Bear: Please see discussion about black bear in the old forest communities section above.

Contiguous Areas with Moderate Disturbance (<1 mile open travelway/s square miles)

Please see discussion for Contiguous Areas with Low Disturbance.

Eastern Wild Turkey: Please see discussion about the eastern wild turkey in the early successional (0-10) section above.

Den Trees Special Habitat (>36" dbh)

As the forest ages, larger trees can provide potential den trees of this size. These large trees are scattered across the analysis area. According to the LRMP, there is a standard to protect dens and snags of this size during harvest activities (unless human safety becomes an issue). Therefore, the large den trees that currently exist in the Baldwin Gap area would be protected, and the trend of increasing large dens would not change across the Forests as a result of implementation of this project (i.e., any of the action alternatives).

Black Bear: Please see discussion about black bear in the old forest communities section above.

Snags and Dens Special Habitat

As a result of recent storms and pest infestations, numerous snags and dens of this size have been created. These trees are scattered across the analysis area, and many were found within the Baldwin Gap area during surveys. Although harvest activities may remove some of these trees, there are plenty across the Baldwin Gap area and analysis area to maintain this habitat. The trend of increasing snags and dens of this size would not change across the Forests as a result of implementation of this project (i.e., any of the action alternatives).

Yellow-bellied Sapsucker: The current estimated population trend of the yellow-bellied sapsucker is downward. Yellow-bellied sapsuckers represent small snags and dens. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of this special habitat, the project would not change the decreasing population trend of the yellow-bellied sapsucker.

White-breasted Nuthatch: The current estimated population trend of the white-breasted nuthatch is upward. White-breasted nuthatches represent small snags and dens. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of this special habitat, the project would not change the increasing population trend of the white-breasted nuthatch.

Pileated Woodpecker: Please see discussion about pileated woodpecker in the old forest communities section above.

Raccoon: Please see discussion about raccoon in the alluvial forests section above.

Gray Squirrel: Please see discussion about gray squirrel in the hard mast section above.

Downed Woody Debris Special Habitat (foraging and cover habitats)

As a result of recent storms and pest infestations and with the age of the forests (mostly 80+ years old), there is much downed woody material within the Baldwin Gap area and analysis area. Harvest activities usually create more downed wood, so there would be no shortage of this special habitat across the analysis area or in the Baldwin Gap area. Implementation of this project (i.e., any of the action alternatives) would only add to the increasing trend of this habitat across the Forests.

Jordan's Salamander: The current estimated population trend for the Jordan's salamander is static across the Forests. This salamander represents shaded rock outcrops and cliffs and downed woody debris of all sizes. Shaded rock outcrops are considered a biological community that is protected by standards in the LRMP. Downed woody debris is very abundant within the Baldwin Gap area. Since implementation of this project (i.e., any of the action alternatives) would not change the trend of downed woody debris, the project would not change the static population trend of Jordan's salamander. However, Alternative D would harvest more acres, thus creating more downed woody debris than the other action alternatives. Although there may be a perceived initial decline in the salamander population following harvest, this alternative may actually help to increase the local population of Jordan's salamander in the long term within the Baldwin Gap area by creating more cover objects under which the salamander can hide once shade returns to the harvested stands.

Pileated Woodpecker: Please see discussion about pileated woodpecker in the old forest communities section above.

Black Bear: Please see discussion about black bear in the old forest communities section above.

Ruffed Grouse: Please see discussion about ruffed grouse in the early successional habitat (0-10) section above.

Large Contiguous Forest Areas Special Habitat

There are currently 38 forest interior bird patches across the Nantahala and Pisgah National Forests. These patches represent areas of continuous forest canopy of 2,500+ acres with minimal edge. Optimal conditions for forest interior species are provided by minimizing canopy openings and edge effects over a large area. The analysis area is located in an area considered to be a mix of habitats. Habitat quality for forest interior species varies due to the amount and location of larger canopy openings or edge. Since the activities occurring in the Baldwin Gap area would not affect a forest interior patch, there would be no change in the number of patches (or their sizes) across the Nantahala and Pisgah National Forests as a result of this project.

Veery: The current estimated population trend of the veery is static. The veery represents large contiguous forests. Since implementation of this project (i.e., any of the action alternatives) would not affect this special habitat nor change its trend, the project would not change the static population trend of the veery.

Ovenbird: The current estimated population trend of the ovenbird is downward. The ovenbird represents large contiguous forests. Since implementation of this project (i.e., any of the action alternatives) would not affect this special habitat nor change its trend, the project would not change the decreasing population trend of the ovenbird.

Northern Parula Warbler: The current estimated population trend of the northern Parula warbler is static. The northern Parula represents large contiguous forests. Since implementation of this

project (i.e., any of the action alternatives) would not affect this special habitat nor change its trend, the project would not change the static population trend of the northern Parula warbler.

Solitary Vireo: Please see discussion about solitary vireo in the cove forests section above.

Summary of Cumulative Effects to MIS by Alternative

Cumulatively, past and present activities (including wildfire history), combined with any of the action alternatives (Alternatives B, C, or D) would not greatly affect any MIS across the analysis area, nor contribute to any change in Forest populations. Local populations of several species would benefit by the proposed vegetative manipulation over the next planning period of ten years.

There are no known changes in the private land use pattern over the next planning period. Therefore, existing use of residents and recreation use as well as forested land that creates a mosaic of high disturbance areas and low disturbance areas is expected to continue. The cumulative private land use pattern would not cause any change in MIS population trends across the Forests.

During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project would permanently convert from that of forested habitat to residential communities. This is evidenced by the Biltmore Lake Estates and the 19 acre development north of Wise Knob. This conversion would cause further fragmentation of an already heavily fragmented area. The existing use of residents and recreation use and forested land creating a mosaic of high disturbance areas and low disturbance is expected to continue. The cumulative private land pattern would not cause any cause any change to the impacts of MIS that occur on the Forest in the Baldwin Gap area.

3.10 Threatened, Endangered, and Sensitive Species

Introduction

This section discloses the determination of effects the proposal may have on threatened and endangered (T&E) and Regional Forester's sensitive (S) wildlife, fish, and botanical species—see Appendix A, Biological Evaluation (BE) for complete disclosure of surveys, habitat, species, and effects analyses. There would be no effect to TES species under Alternative A as no actions are proposed—current conditions would be maintained.

Determination of Effects

Threatened and Endangered Species

Implementation of an action alternative would have beneficial effects on *Puma concolor couguar*, should it occur within the Baldwin Gap area (Appendix A, Table A-8). Project implementation would enhance and increase habitat for the cougar's prey, the white-tailed deer, thus benefitting this large cat.

There are no federally-listed aquatic species or their associated habitat occurring or potentially occurring within the Baldwin Gap area based on surveys. Therefore, the action alternatives would have no effect on any federally listed aquatic species or their habitat. There is no risk to population viability of federally-listed aquatic species as a result of implementation of an action alternative.

There are no federally-listed botanical species or their associated habitat occurring or potentially occurring within the Baldwin Gap area based on surveys. Therefore, the action alternatives would have no effect on any federally listed botanical species or their habitat. There is no risk to population viability of federally-listed botanical species as a result of implementation of an action alternative.

Sensitive Species

Implementation of an action alternative may impact individual *Corynorhinus rafinesquii* and *Myotis lebeii lebeii*, but would not cause a trend toward federal listing or a loss of viability. The project has been designed to comply with Forest Plan standards which protect riparian habitat, snags, and rock outcrops.

Implementation of an action alternative may impact individual *Callophyrs irus* and *Speyeria diana*, but would not cause a trend toward federal listing or a loss of viability. Although some habitat would be lost for *Speyeria diana* in the short-term, habitat would be created for both species in the long-term.

Implementation of an action alternative would not impact *Nesticus silvanus* and *Scudderia septentrionalis*. This project would not change the southern mountains nor convert the forests in the Baldwin Gap area.

Implementation of an action alternative would not affect any aquatic sensitive species since none occur within the aquatic biological AA based on surveys.

Implementation of an action alternative would affect individual *Trillium rugelii*, but is not likely to result in a trend towards federal listing or loss of population viability of this plant since riparian buffers are planned in harvest units that would protect populations.

3.11 Other Areas of Concern

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, and D – Direct, Indirect, and Cumulative Effects

There would be no measurable direct, indirect, or cumulative effects from any of these alternatives because none of them 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. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap area and another larger development about two miles north of the Baldwin Gap area. The potential cumulative effects of the proposal in relation to these two developments are expected to be minimal and immeasurable. 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 – PREPARERS AND PUBLIC INVOLVEMENT

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT:

Scott Ashcraft – Zone Archaeologist
Chris Brown - Forester Trainee
Erik Crews – Forest Landscape Architect
Dave Danley – Zone Botanist
Brady Dodd – Forest Hydrologist
Mae Lee Hafer – Forest Wildlife Biologist
Michael Hutchins – IDT Leader
Ted Oprean – Project Leader, Silviculturist
Lorie Stroup – Zone Fisheries Biologist

4.1.2 Other Forest Service Personnel Providing Input:

John Blanton – Forest Silviculturist
Randy Burgess – Pisgah District Ranger
Michelle Cram – Plant Pathologist, Forest Health Unit, USDA Forest Service
Chris Kelly – Zone Wildlife Biologist (resigned 12/2004)
Bill Jackson – Forest Air Quality Specialist
Kriste Little – GIS Specialist
Henry McNab – Research Forester, Bent Creek Experimental Forest

4.2 Federal, State, and Local Agencies Providing Input

Brian Cole – USDI Fish and Wildlife Service
Dave McHenry – North Carolina Wildlife Resources Commission
Greg Smith – North Carolina Forest Service

4.3 Others Providing Input*

Dr. Richard Bury
Ed Erwin
Leonard Harwood
Claudia Nix
Lisa Searsey
Gary Woodall
Randall Denham
Dafney Fox
Steve Henson
Ben Prater
Rick Swilling
Rachel Doughty
Bob Gale
Margaret Hurt
Terry Rice
Julie White

* Two petitions against the proposal were signed at scoping and during the 30-day notice and comment period by 21 and 145 individuals respectively

APPENDIX A – BIOLOGICAL EVALUATION

APPENDIX A – BIOLOGICAL EVALUATION

BALDWIN GAP PROJECT

Buncombe County, North Carolina
Pisgah Ranger District

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 (TE) and Regional Forester's sensitive (S) species so that the Forest Service is within compliance of environmental laws such as the Endangered Species Act.

The proposed activities and possible extent of those activities are listed in the environmental assessment (EA). The potential effects of this proposal on TES species are evaluated. Potential direct and indirect impacts to TES species were analyzed in the areas where ground disturbance is proposed. This area of disturbance is called the "activity areas" or "project area". This BE draws its conclusions from the wildlife, botanical, and aquatics resource reports. These reports were written specifically for this timber sale. Conclusions and opinions reached within this BE are drawn from these reports. These reports are an integral part of this BE and should be consulted where further detail is needed.

The activity area is on the Pisgah Ranger District, Pisgah National Forest, Buncombe County, North Carolina. Each discipline (wildlife, botanical, and aquatic) may have a defined biological analysis area (AA) that is germane to that discipline.

Project Location & Description

The wildlife biological AA includes 6,674 acres of National Forest System (NFS) land in Compartments 1 - 6. The Baldwin Gap area for wildlife and the botanical biological AA is Compartment 1, which is 1,370 acres. The aquatic biological AA is within Land and Resources Management Plan (LRMP) watershed number 27 which includes Bill Moore Creek and Baldwin Field Branch. The activity area for wildlife, botany and aquatics is where actions are occurring on the ground. These biological analysis areas lie in the upper reaches of the French Broad River drainage. The area is bounded on the southwest, west, and north by private land and on the east and southeast by the North Boundary Road (FSR 485) and Bent Creek Experimental Forest. See Attachment 2 for definitions of the analysis areas.

Proposed Action

The purpose and need (objectives) for the proposed actions would be met through harvesting and related activities and meet Forest Plan direction and standards for vegetation management, wildlife management, recreation, hydrology, and visual resources and provide a more sustainable, healthy ecosystem. There are three action alternatives for the Baldwin Gap proposal. A detailed description of the proposed action (Alternative B) is located in Chapter 1

and all other alternatives are fully described in Chapter 2 of the EA. Table A-1 summarizes the alternatives.

Table A-1: Summary of Alternatives

PROPOSED ACTIONS	Alt. A	Alt. B	Alt. C	Alt. D
Total Commercial Harvest (ac)	0 ac	357 ac	232 ac	330 ac
Two-age Harvest	0 ac	96 ac	66 ac	137 ac
Skyline	0 ac	43 ac	0 ac	71 ac
Skidder	0 ac	53 ac	66 ac	66 ac
Group Selection	0 ac	15 ac	15 ac	15 ac
Sanitation Thinning	0 ac	246 ac	151 ac	178 ac
Total Roading (mi)	0 mi	9.25 mi	4.7 mi	9.25 mi
Construct system road	0 mi	0.25 mi	0.0 mi	0.25 mi
Reconstruct system road	0 mi	8.00 mi	4.7 mi	8.00 mi
Construct temporary road	0 mi	1.00 mi	0.0 mi	1.00 mi
Silvicultural Treatments (ac)	0 ac	623 ac	559 ac	473 ac
Timber Stand Improvement	0 ac	358 ac	358 ac	358 ac
Pre-harvest Oak Shelterwood	0 ac	265 ac	201 ac	115 ac
Control Invasives	0 ac	380 ac	344 ac	402 ac
Old Growth Designation	0 ac	88 ac	88 ac	88 ac
Total Wildlife Habitat Improvement	0 ac	30.6 ac	29.0 ac	72.4 ac
Permanent grass/forb	0 ac	1.6 ac	0.0 ac	7.4 ac
Prescribed burn	0 ac	29.0 ac	29.0 ac	65.0 ac
Total Trail Designation	0 mi	6.5 mi	6.5 mi	0.0 mi
Construct connector trails	0 mi	0.4 mi	0.4 mi	0.0 mi
Designate multi-use trails	0 mi	6.1 mi	6.1 mi	0.0 mi

Existing Condition

Wildlife

Presently, there are 32 acres of early succession (0-10 year age class) in the analysis area, none of which occurs in the Baldwin Gap area. Up to approximately 646 of the suitable acres should be in the 0-10 year age class per decade dispersed across the analysis area. This would provide hard and soft mast production, insect production, sustained hard mast, structural diversity, viability and provision for early successional habitat. There are approximately 20 acres in permanent grass forb openings located in the wildlife biological AA, all occurring in Compartments 2-6. For the analysis area, there is a desired 124 acres of permanent grass/forb habitat based on the MAs that occur in the AA. In Compartment 1, which is in MA 3B, there is a desired 41 acres (3% of 1,370 acres) primarily for eastern wild turkey.

Approximately 80% of the wildlife biological AA is in hard mast producing forest types with 24% of those acres being of prime mast producing age (40-80 years old). Approximately 10% of the Baldwin Gap area is in pine and pine/hardwood forest types (Table A-2).

Table A-2: Forest Types by Age Class and Acres in the Wildlife Biological Analysis Area

Forest Type	0-10 years	11-40 years	41-80 years	81-100 years	101+ years	Total
3 White Pine	0	123	0	0	0	123
8 Hemlock-Hardwood	0	0	113	0	0	113
9 White Pine-Cove Hardwood	0	0	37	0	0	37
12 Shortleaf Pine-Oak	0	0	0	77	0	77
15 Pitch Pine-Oak	0	0	0	0	80	80
32 Shortleaf Pine	0	142	0	10	0	152
38 Pitch Pine	0	0	0	35	47	82
41 Cove Hardwoods-White Pine-Hemlock	0	35	39	58	0	132
42 Upland Hardwoods-White Pine	0	0	0	38	0	38
45 Chestnut Oak-Scarlet Oak-Yellow Pine	0	0	27	0	0	27
50 Yellow Poplar	0	7	109	184	32	332
52 Chestnut Oak	0	0	261	653	646	1560
53 White Oak-Northern Red Oak-Hickory	10	133	80	203	353	779
55 Northern Red Oak	0	0	0	157	0	157
56 Yellow Poplar-White Oak-Northern Red Oak	22	463	527	972	507	2491
60 Chestnut Oak-Scarlet Oak	0	0	82	14	84	180
99 Brush Species	0	0	177	0	137	314
Total	**32**	**903**	**1,452**	**2,401**	**1,886**	**6,674**

Several snags or hollow trees exist within the Baldwin Gap area. Hollow trees serve as potential roost sites for eastern small-footed bats and Rafinesque's big-eared bats. Several rock outcrops exist in the Baldwin Gap area that is potential habitat for the small-footed bat. Per Dave Danley, Forest Service Botanist, he found wild indigo (*Baptisia tinctoria*), which may serve as a host plant for the frosted elfin. Also, *Viola sp.* were found within the Baldwin Gap area, which serves as the host plant for the Diana fritillary, which is found in rich woods and adjacent edges and openings.

Aquatics

The aquatic biological analysis area and Baldwin Gap area lie within LRMP watershed 27. This analysis includes activity area waters of Baldwin Field Branch and its tributaries, Bill Moore Creek and its tributaries, and Wise Branch.

Table A-3: Forest Plan Watershed 27 (Bill Moore Creek)

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Areas	Miles in Analysis Area	DEM Classification*
Baldwin Field Branch	01- 4, 23	0.87	1.2	C
UT 1	01- 20	0.15	0.23	C
UT 2	01- 20	0.23	0.27	C
UT 3	01- 20	0.30	0.38	C
UT 4	01- 20	0.19	0.30	C
UT 5	01- 04	0.19	0.23	C
UT 6	01- 27	0.038	0.21	C
UT 7	01- 27	0.19	0.49	C

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Areas	Miles in Analysis Area	DEM Classification*
UT 8	01- 23	0.38	0.38	C
UT 9	01- 23	0.17	0.17	C
UT10	01- 23, 31	0.23	0.34	C
Bill Moore Creek	01	0.15	2.61	C
UT 1	01- 40	0.04	0.95	C
UT 2	01- 18		0.53	C
UT 3	01- 18	0.04	0.72	C
UT 4	01- 35	0.19	0.76	C
UT 5	01- 47, 45	0.30	0.42	C
UT 6	01- 16	0.38	0.61	C
Wise Branch	01		0.23	C

*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.

Fish habitat exists within the analysis and activity areas of Baldwin Field Branch and the analysis area of Bill Moore Creek. There is limited habitat for fish species within the other Baldwin Gap area waters, due to small stream size and restricted flow regimes. Baldwin Gap area waters provide habitat for macroinvertebrates.

Botanical

The botanical biological AA can be characterized by low elevation Mountain region bordering Piedmont type communities. The AA has several small northwest trending drainages. All these flow into Bill Moore Creek to the north. The only named tributary is Baldwin Fields Branch. A succession of southwest to northeast trending, interlinking ridges are found between drains. The highest points of these ridges are about 3,000-3,700 feet (Wolf Knob, Stradley Mountain, Scott Mt., Hickory Top, etc.). The drainage flows downward to about 2,100 feet to the north. The analysis area exhibits many typical plant communities of the mid elevation southern Appalachian mountains. Most of these communities show signs of heavy past disturbances such as farming, clearing and/or logging (Ashcraft, USFS Archeologist). Nearly all of the communities are impacted by exotic invasive species particularly bittersweet, *Celastrus orbiculatas*.

A few common community types are characteristic within the AA and include: 1) Rich Cove Forest, 2) Chestnut Oak Forest, and 3) Montane Oak-Hickory Forest. The Acidic Cove Forest occurs to a much lesser extent. A Montane Alluvial Forest, and Rocky Shore and Bar communities are associated with the low elevation areas directly adjacent to major streams, but are best developed along Baldwin Fields Branch. Small habitat areas such as small rock outcrops (particularly in Wolf Knob) and forested seeps and streams can be imbedded within these communities. Natural communities often grade together and definite boundaries are usually difficult to see. However, there is often a pattern to these communities on the landscape. Within the AA, the Acidic Cove Forest and Alluvial Forest type often occupy areas near streams. Lower cove slopes and southern aspects are dominated by the Chestnut Oak Forest. Montane Oak-Hickory Forest and Rich Cove Forest Communities are found on northern and east-facing ridges and slopes. The Montane Oak-Hickory Forest, Montane Alluvial Forest, and Rich Cove Forest communities have the most diverse herbaceous component of the communities found within the analysis area. The AA has a rich herbaceous diversity. All of the communities are

very common community types within the Southern Appalachian (see Schafale and Weakley for a detailed description and discussion of these communities). The primary natural communities affected by this proposal are the Chestnut Oak Forest, Rich Cove Forest, and the Montane Oak-Hickory Forest. A brief description of these communities and common plants species most associated with the community found during the surveys, are also given in the Botanical Analysis located in the project record.

Method of Evaluation and Surveys

Potentially affected TES (2001) 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.

This analysis has been prepared based on the best available information at the present time.

Project Surveys

Wildlife habitat and TES species surveys were conducted in June 2004 by Chris Kelly, former Forest Service wildlife biologist; in March 2005 by Laura Edwards, Forest Service wildlife biologist detailer; and in June 2005 by Mae Lee Hafer, Forest Service wildlife biologist.

The proposed units were surveyed by David M. Danley, Forest Botanist on Aug. 7, 8, 13, 26 2004, April 12, and May 4, 10, 16, 19, 22, 2005. All proposed units were visited at least once during this time.

Lorie Stroup, USFS Fisheries Biologists and Kerri Lyda and Jamie Summer, USFS Fisheries Technicians conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas in the Fall of 2004 (August and October) and the Spring of 2005 (March, April, and May). The surveys consisted of examining streams within the aquatic activity areas, noting habitat quality, quantity, and suitability for TES aquatic species, as well as existing impacts and their source. Baldwin Gap and Bill Moore Creek were surveyed for fish using a backpack electrofishing machine.

Historical Surveys

Wildlife

Prior to summer 2004, there was no historical wildlife survey information in Compartment 1.

Aquatics

Existing data for aquatic resources within the aquatic biological 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 sparingly (mostly as a historical reference). Project-specific surveys are conducted to obtain reliable data where none exists.

Baldwin Field Branch was included in the 1992-1995 Brook Trout Surveys conducted by the USFS and the NCWRC. Odonate surveys were conducted by the USFS under contract with Virginia Commonwealth University on the Pisgah and Nantahala National Forests. Three sites were taken in the vicinity of the Baldwin Gap Project in 2003.

Botanical

Prior to fall 2004, there was no historical botanical survey information in the Baldwin Gap botanical biological analysis area (Compartment 1).

Species Evaluation

Species evaluated further may be found in Tables A-4 thru A-6. Species not evaluated further are listed in Attachment A, along with the reason for elimination from further consideration.

Wildlife

Currently, there are ten TE species and 38 S species on the Regional Forester's sensitive species (August 7, 2001) list for the Nantahala and Pisgah National Forests. These 48 species were originally considered for evaluation of this project. Twenty five of these 48 species do not occur in Buncombe County according to the North Carolina Natural Heritage Program and the U.S. Fish and Wildlife Service (Attachment 1). There would be no direct, indirect, or cumulative effects to these 25 species if the project was implemented because these species do not occur in Buncombe County.

Four TE and 19 S species are listed as known to occur, have occurred in the past but have not been found in recent years, or likely to occur in Buncombe County. Of these 23 species, only 7 (one E and 6 S) species or their associated habitats may occur within the Baldwin Gap area based on surveys. These species are the *Puma concolor couguar* (E), *Corynorhinus rafinesquii* (S), *Myotis lebeii lebeii* (S), *Callophyrs irus* (S), *Speyeria Diana* (S), *Nesticus silvanus* (S), and *Scudderia septentrionalis* (S) (Table A-4) and will be analyzed further in this document.

Table A-4: Known and Potential TES Wildlife Species in Buncombe County Evaluated for this Proposal

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered Species			
Puma concolor couguar	Mammal	Extensive forests, remote areas	May occur in activity areas
August 7, 2001 Regional Forester's Wildlife Sensitive Species			
Corynorhinus	Mammal	Roosts in caves, mines, and hollow	May occur in activity areas

Species	Type	Natural Community or Habitat	Occurrence
rafinesquii		trees usually near water	
Myotis leibii leibii	Mammal	Roosts in hollow trees, rock outcrops, bridges (warmer months); caves and mines (winter)	May occur in activity areas
Callophyrs irus	Butterfly	Open woods and borders, usually in dry situations; host plant-lupines, (*Lupinus*) and wild indigos (*Baptisia*)	May occur in activity areas
Speyeria diana	Butterfly	Rich woods and adjacent edges and openings; host plants violet (*Viola*)	May occur in activity areas
Nesticus silvanus	Arachnid	Apparently endemic to southern mountains of NC	May occur in activity areas
Scudderia septentrionalis	Katydid	Forests	May occur in activity areas

Aquatic

Two TE and two S aquatic species have been listed by NCWRC, USFWS, or NCNHP as occurring or potentially occurring in Buncombe County. These species are included in Attachment 2, which contains occurrence information for TES aquatic species on the Pisgah National Forest.

Based on recent surveys (<5 years old), these four species do not occur within the aquatic biological AA or the Baldwin Gap area. There will be no direct, indirect, or cumulative effects to these four species since they do not occur within aquatic biological AA. Therefore, these species will not be analyzed further in this document (Table A-5).

Table A-5: Known and Potential TES Aquatic Species in Buncombe County Evaluated for this Proposal

Species	Type	Habitat	Occurrence
Federally Threatened and Endangered Species			
Cyprinella monacha	Fish	Sand, gravel, rubble, boulder and bedrock substrates in the Little Tennessee River Drainage	Eliminated based on analysis area surveys
Alasmidonta raveneliana	Mollusk	Relatively shallow medium-sized creeks and rivers with cool, well-oxygenated, and moderate to fast-flowing water	Eliminated based on analysis area surveys
August 7, 2001 Regional Forester's Sensitive Aquatic Species			

Species	Type	Habitat	Occurrence
Percina burtoni	Fish	Medium-sized to large creeks and small to medium rivers with warm, usually clear water, and moderate gradient	Eliminated based on activity area surveys conducted by the USFS and NCWRC.
Percina macrocephala	Fish	Relatively deep, gently flowing pools of large creeks to medium rivers	Eliminated based on activity area surveys conducted by the USFS and NCWRC.

Botanical

Five TE and 41 S botanical species have been listed by the USFWS or NCNHP as occurring or potentially occurring in Buncombe County. These species are included in Attachment 2, which contains occurrence information for TES botanical species on the Pisgah National Forest.

No TE plant species nor their habitat occur in the botanical biological AA based on surveys. There would be no direct, indirect, or cumulative effects to these 5 species if the project was implemented because these species do not occur in Buncombe County.

Seventeen S plant species may occur (see Attachment 2 for definition) within the botanical biological analysis area, but they are not known to occur within the activity area based on surveys (Table A-6). There would be no direct, indirect, or cumulative effects to these 17 species if the project was implemented because these species do not occur in the activity area.

One S plant species, *Trillium rugelii*, is known to occur within the activity area. This species will be analyzed further in this document.

Table A-6: Known and Potential TES Plant Species in the Baldwin Gap Botanical Analysis Area

Species	Type	Natural Community or Habitat	Occurrence[1]
Federally Threatened or Endangered Plant Species			
None	N/A	N/A	N/A
August 7, 2001 Regional Forester's Sensitive Plant Species			
Aconitum reclinatum	Vascular Plant	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest	May occur in analysis area, not known to occur in activity area.
Berberbis canadensis	Vascular Plant	Rich Cove Forest, Mafic Glade	May occur in analysis area, not known to occur in activity area.
Botrychium jenmanii	Vascular Plant	Rich Cove Forest	May occur in analysis area, not known to occur in activity area.
Buckleya distchophylla	Vascular Plant	Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff	May occur in analysis area, not known to occur in activity area.
Coreopsis latifolia	Vascular Plant	Rich Cove Forest, Northern Hardwood Forest	May occur in analysis area, not known to occur in activity area.
Euphorbia purpurea	Vascular Plant	Northern Hardwood Forest, Rich Cove Forest, Mesic Oak Hickory	May occur in analysis area, not known to occur in activity area.
Hasteola suaveolens	Vascular Plant	Montane Alluvial Forest	May occur in analysis area, not known to occur in activity area.
Hexistylis	Vascular Plant	Acidic Cove Forest	May occur in analysis area, not

Species	Type	Natural Community or Habitat	Occurrence[1]
contracta			known to occur in activity area.
Hexastylis rhombiformis	Vascular Plant	Acidic Cove Forest.	May occur in analysis area, not known to occur in activity area.
Helianthus glaucophyllus	Vascular Plant	Anthropogenic, roadsides; Rich Cove Forests	May occur in analysis area, not known to occur in activity area.
Heuchera longiflora var. aceroides	Vascular Plant	Rock outcrop in Rich Cove Forest	May occur in analysis area, not known to occur in activity area.
Hydothyria venosa	Lichen	On rock in streams	May occur in analysis area, not known to occur in activity area.
Juglans cinerea	Vascular Plant	Rich Cove Forest.	May occur in analysis area, not known to occur in activity area.
Lysimiachia fraseri	Vascular Plant	Rich Cove Forest, Acidic Cove Forest, roadsides	May occur in analysis area, not known to occur in activity area.
Monotropsis oderata	Vascular Plant	Chestnut Oak Forest	May occur in analysis area, not known to occur in activity area.
Nardia lescurii	Liverwort	Acidic Cove Forest.	May occur in analysis area, not known to occur in activity area.
Rudbeckia triloba var. pinnatiloba	Vascular Plant	Rich Cove Forest, Montane Mafic Cliff, mafic rock	May occur in analysis area, not known to occur in activity area.
Trillium rugelii	Vascular Plant	Rich Cove Forest, low elevation	Known to occur in activity area. (Stands: 1-4, 1-18, 1-20, 1-23, 1-34, & 1-35)

[1]See Attachment 2 for definitions of the various types of likelihood of occurrence.

Direct, Indirect, and Cumulative Effects to T&E Species and Habitat

Wildlife

Eastern Cougar

Implementation of any of the action alternatives may provide beneficial effects for *Puma concolor couguar*, should it occur in the Baldwin Gap area. The eastern cougar is found in forests, particularly in remote areas. Its habitat is essentially that of its prey, the white-tailed deer. Although the reduced populations of cougars in the east have made it difficult to determine its preferred habitats, evidence suggests that cougars share the same basic habitat types with white-tailed deer. These habitats are primarily open areas in oak stands and grassy areas with an abundance of edge.

The biological AA for wildlife contains about 5,364 acres of mixed hardwoods and hardwood/pine stands that have an oak component. About 1,016 of those acres are in prime mast producing age (40-80 years old), and there are about 32 acres in 0-10 year old stands and about 631 acres in the 11-20 year old trees. The Baldwin Gap Forest Plan AA is 6,674 acres in size. This is only 27% of a typical small home range size of about 24,320 acres for the eastern cougar. If compartments 7 and 128 are also added to the biological AA for wildlife, there will be a total of about 17,050 acres of NFS land, which is about 70% of a small home range size for the cougar.

The biological AA for wildlife (plus Compartments 7 and 128) is not remote. It is located on the outskirts of the city of Asheville, North Carolina, and this area contains many miles of trails and roads, and is bounded on the south by the Blue Ridge Parkway. The Bent Creek area (Compartment 128) contains the Lake Powhatan Campground, Bent Creek Experimental Forest, the N.C. Arboretum, and is very heavily used by recreationists. The north side of the area is bounded by private land, with some of the private land being converted to residential communities.

No cougars were found during surveys of the Baldwin Gap project, and the likelihood that a cougar exists within the Baldwin Gap area is very slim. The last recorded siting of a cougar in Buncombe County is 29 years old. Implementation of any of the action alternatives may provide beneficial effects to the cougar's habitat by creating early successional habitat and regenerating hardwoods (particularly oak) for its prey, the white-tailed deer. Those actions that create or enhance grass/forb habitat or early successional habitat will improve habitat for the white-tailed deer. This, in turn, improves habitat for the cougar.

Part of the Mt. Pisgah Timber Sale (in Compartment 5) was implemented within the past 10 years, creating 32 acres of early successional (0-10 years old) habitat. The remainder of the Mt. Pisgah Timber Sale (Compartments 5 and 6) and the Beaverdam Timber Sale (Compartments 2, 3, and 4) created 903 acres of early successional (11-20 years old) habitat. These timber sales improved habitat for the cougar by enhancing habitat for its prey, the white-tailed deer. There have been no projects within Compartment 1 within the past 20 years in the Baldwin Gap area. Also, there are no ongoing activities, and there will be no foreseeable future projects in the area beyond those actions included in the Baldwin Gap project proposal.

During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. This permanent conversion will further fragment an area that is already fragmented. Also, the pattern of existing use of the local residents for recreation on NFS land will continue to create a mosaic of high disturbance and low disturbance areas. Although private land may create early successional habitat used by white-tailed deer, the presence of humans may exclude use of the area by cougars, which prefer more remote areas. Table A-7 summarizes the effects to the eastern cougar by alternative.

Table A-7: Summary of Effects to *Puma concolor couguar* by Alternative

PROPOSED ACTIONS	Alt. A	Alt. B	Alt. C	Alt. D
Harvest (ac)	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Sanitation Thinning	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Roading (mi)	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Silvicultural Treatments (ac)	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Control Invasives	No effect	No effect	No effect	No effect
Old Growth Designation	No effect	No effect	No effect	No effect
Wildlife Habitat Improvement	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Prescribed Burning	No effect	Beneficial effect	Beneficial effect	Beneficial effect
Trail Construction and Designation	No effect	Insignificant effect	Insignificant effect	No effect

Aquatic
There will be no direct, indirect, or cumulative effects on any aquatic TE species since none occur within the Baldwin Gap area based on analysis and Baldwin Gap area surveys that were conducted by the USFS, NCWRC, NCHP and DWQ.

Botanical
There will be no direct, indirect, or cumulative effects on any botanical TE species or their associated habitat since none occur within the activity area based on surveys.

Direct, Indirect, and Cumulative Effects to Sensitive Species and Habitat

Wildlife
Rafinesque's Big-eared Bat and Eastern Small-footed Bat
Corynorhinus rafinesquii roosts in old buildings or hollow trees, usually near water. *Myotis lebeii lebeii* may roost in hollow trees or rock outcrops during the summer. Several rock outcrops occur and snags are not in short supply across the wildlife biological analysis area as a result of recent storms and pest infestations. If these bats are roosting in trees during logging operations, the bats could be disturbed or die as a result of trees being cut or knocked down. Removal of snags or hollow trees due to logging could indirectly affect these bats by eliminating roost trees.

The Baldwin Gap project proposes to harvest from 232-364 acres (dependent on which alternative is implemented). This only represents 3-5% of the wildlife biological AA. No rock outcrops would be destroyed or altered as a result of implementing any of the action alternatives, and rock outcrops that are suitable (contain crevices suitable for bats) would be protected with a buffer. Also, there is a LRMP standard to maintain large snags and cavity trees within the Baldwin Gap area during harvest activities (LRMP, page III-23), and no activities will occur within 30 feet of riparian areas (LRMP, page III-187) where many snags occur. The project has been designed to fully comply with these standards.

The likelihood that a Rafinesque's big-eared bat exists within the Baldwin Gap area is very slim. The last recorded siting of a Rafinesque's big-eared bat in Buncombe County is 111 years old. Small-footed bats were last observed in county in 1999, so there is a greater likelihood that this bat could exist within the wildlife biological analysis area. Implementation of any of the action alternatives may affect possible roost trees, but more snags will be created as the forest ages and other natural events (i.e., storms, insects and disease) occur. All rock outcrops that could house eastern small-footed bats will be protected. Individual bats may be impacted, but this will not lead to a loss of viability.

Past timber sales in the wildlife biological AA include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, bats could be disturbed or killed from the falling of trees that they are roosting in, or possible roost trees would be removed from use.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological analysis area on National Forest lands. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. This permanent conversion will further fragment an area that is already fragmented. Also, removal of trees that may be suitable roost trees could impact these bats.

Cumulatively, the past projects, current proposal, and activities on private land could impact local populations of bats that roost in trees. Viability across the forest for these two bat species would be unaffected because the total cumulative effect of past actions, proposed actions and activities on private land would occur in a localized area. The likelihood the Rafinsque's big-eared bat occurring in the Baldwin Gap area is very slim. The project is also designed to protect rock outcrops and some snags within the Baldwin Gap area. Snags will continue to be recruited through natural means, thus mitigating any loss of habitat.

Frosted Elfin and Diana Fritillary

Callophyrs irus is found in open woods and borders, usually in dry situations. Its host plant is wild indigo (*Baptisia spp.*), which occurs in the Baldwin Gap area. Females lay eggs on the flower buds, and the caterpillars feed on the flowers and seedpods. In late summer, the caterpillars build a shelter on the ground by tying leaves together with silk, and they overwinter in the pupal stage. In very early spring, the new adults emerge and fly.

Speyeria diana is found in rich woods and adjacent edges and openings, and its host plant is violet (*Viola spp.*), which occurs in the Baldwin Gap area. Males patrol for females in deep woods. Females walk along the ground laying single eggs on dead twigs and leaves near violets. The caterpillars hatch and overwinter without feeding. In the spring they feed on leaves and flowers of violets.

Neither of these butterflies were found during surveys in the Baldwin Gap area. Any activities that may directly crush plants with egg masses or caterpillars of the frosted elfin and Diana fritillary could be directly affected. Also, Diana fritillary eggs or overwintering caterpillars could be destroyed with any ground-disturbing activity. The harvesting and thinning proposed (232-364 acres) in the action alternatives would open the forest and create drier conditions as sunlight is allowed to reach the forest floor. This may improve habitat (increase wild indigo) for the frosted elfin by opening up the forest and creating drier conditions. However, wild violets grow best in shady, moist soil. So, these same activities may adversely affect the Diana fritillary by decreasing the growing potential for violets. Creation of roads through the Baldwin Gap area, especially through coves, may improve habitat for the Diana fritillary since roads provide edge through the forested landscape. The action alternatives will construct/reconstruct 4.7 to 9.25 miles of road (dependent on alternative) in the Baldwin Gap area. This will increase potential Diana fritillary habitat by 6.8 to 13.5 acres.

Past timber sales in the wildlife biological analysis area include Mt. Pisgah, Beaverdam, Billy Moore, and Baldwin Fields Timber Sales. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, some activities could have crushed plants with eggs or caterpillars, or overwintering caterpillars or eggs on the ground could

have been run over. Opening up the forest through timber harvest may have increased habitat for frosted elfin but decreased habitat for Diana fritillary. However, constructing road may have increased habitat for the Diana fritillary.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological analysis area on National Forest lands. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. Activities on private land could directly impact the frosted elfin and Diana fritillary in a similar manner to activities on National Forest lands. However, it is doubtful that habitat will be improved for these butterflies by the development of manicured lawns.

Cumulatively, the past projects, current proposal, and activities on private land could directly impact local populations of frosted elfin and Diana fritillary during implementation. However, activities on National Forest lands could help improve habitat in the long term by creating more open, drier forest conditions for the frosted elfin. Viability across the forest for this butterfly would be unaffected because the total cumulative effect of past actions, proposed actions and activities on private land would occur in a localized area. Although timber activities may decrease habitat for the Diana fritillary, the construction/reconstruction of roads would increase habitat and mitigate any loss of violets in activity areas.

A Cave Spider

Nesticus silvanus is apparently endemic to southern mountains of North Carolina. There are 6,674 acres in the wildlife biological analysis area in the southern mountains. Implementation of any of the action alternatives does not change the amount of southern mountains in the analysis area. Past projects, the proposed action, and actions on private lands will not impact this spider, so no cumulative impacts will occur.

Northern Bush Katydid

Scudderia septentrionalis occurs in forests. This katydid occurs in a variety of habitats, including a residential neighborhoods. Males tend to sing from the treetops, and females may be found on smaller trees, especially when feeding. Additionally, western North Carolina is on the southern edge of the species' geographical range, therefore populations may be more fragmented here. Where this katydid has been found, populations are small and appear to be stable.

The Baldwin Gap project proposes to harvest and thin 232-364 acres of forest, which is only 3-5% of the wildlife biological AA. Direct effects to the katydid are crushing from the felling of trees and other associated activities. Since this species is highly mobile, the potential for directly killing a katydid is very slim. Harvesting and thinning will not convert the forest, but only change the successional stage of the forest. Although older trees, which serve as singing posts for the males, may be cut, younger trees will grow back, thus providing more feeding habitat.

The effects of past timber sales in the wildlife biological AA had basically the same effects as described above for the proposed actions. Specifically, some activities could have crushed katydids. But, the likelihood of this occurring was very slim since these katydids are highly

mobile. Also, since past projects did not convert the forests, the forest in Baldwin Gap remains in tact.

There are no ongoing or reasonably foreseeable actions occurring in the wildlife biological analysis area on National Forest lands. During the next planning period, some of the private property in the general vicinity of the Baldwin Gap project will permanently convert from that of forested habitat to residential communities. Activities on private land could directly impact the frosted elfin and Diana fritillary in a similar manner to activities on National Forest lands. Since the northern bush katydid has been found in a residential neighborhood, activities on private land will also provide habitat.

Aquatic

There would be no direct, indirect, or cumulative effects on any aquatic sensitive species since none occur within the Baldwin Gap area based on Baldwin Gap area surveys that were conducted by the USFS and NCWRC.

Botanical

The only Regional Forester's sensitive plant species found during surveys of the Baldwin Gap area was *Trillium rugelii*. This proposal would have little effect on the total numbers of *Trillium rugelii* individuals across the Forest, but may directly and indirectly affect some individuals. This proposal would have no effect upon the Forest viability of *Trillium rugelii.*

It primarily has been located within the foothills portion of the mountains and the Piedmont of North Carolina (Radford et. al.1968). Few have been recorded within the Forest. Within the Nantahala and Pisgah National Forest seven other populations are currently known. As such, it is important to maintain the viability of this species across the Forest. Generally this species occurs under a full canopy cover, such as found in a rich cove forest. It has been observed in 40-80 year old forest communities within the Pisgah and Nantahala National Forest.

The known local population (Compartment 1) consists of hundreds, or perhaps thousands, (estimated) of individuals of *Trillium rugelii*. The population is scattered in the Rich Cove Forest Communities north of Stradley Mountain and the Alluvial Forest Community adjacent to Baldwin Fields Branch. *Trillium rugelii* occurs within the activity area within stands 1-4, 1-18, 1-20, 1-23, 1-34, and 1-35. The population is most plentiful near streams (as per the Forest Plan, these areas would be excluded from most activities). It also occurs within non-activity areas. This proposal may impact individuals of *Trillium rugelii* by mechanical damage as a result of heavy equipment and logging activities such as skidding logs. The indirect negative effects of modifying the habitat may also affect *Trillium rugelii*. Some of the expected indirect effects of timber removal would initially produce an increase in light, temperature, reduced humidity, and decreased soil surface moisture.

The known local population of *Trillium rugelii* in Compartment 1 is expected to remain viable after the proposed activity is completed because: 1) *Trillium rugelii* is a perennial plant with a bulb that can reproduce after some disturbance. It is very unlikely that all individuals or a major portion of the population would be negatively affected by the proposed activity, and 2) about half of the known population of *Trillium rugelii* would not be affected by the proposal because it is

not within activity areas or is within stream buffers excluded from activity. Thus, it is expected that the local population of *Trillium rugelii* would remain viable. Furthermore, the habitat for *Trillium rugelii* is not expected to be permanently altered by this proposal, and *Trillium rugelii* is expected to recover in the proposed activity areas. The project has been designed to exclude heavy equipment or timber falling within the 100 foot riparian stream buffers.

The past actions that would have impacted *Trillium rugelii* include the Billy Moore Cove Timber Sale (1970), Stradley Mountain Timber Sale (1981), and Baldwin Fields Timber Sale (1975). Timber removal within rich cove forest communities (*Trillium rugelii* habitat) would have directly impacted individuals of *Trillium rugelii* by mechanical injury and indirectly modifying habitat. It has been noted that, on other Forest populations, *Trillium rugelii* most often occurs within 40-80 year old stands. This suggests that habitat recovery from a timber removal event may take 40+ years. The effects of past actions were basically the same as the effects described above for the proposed actions. Specifically, the effects would have included mechanical damage as a result of heavy equipment and logging activities such as skidding logs, or modifying the habitat by timber removal which would initially increase light and temperature, reduce humidity, and decrease soil surface moisture. The past timber removal within the botanical biological AA occurred between 24 and 35 years ago. A couple of stands previously harvested (Compartment 1, Stands 3 and 30) have small but extant populations of *Trillium rugelii*. Thus, populations within the botanical biological AA may still be in recovery from these past actions. There are no additional foreseeable or ongoing actions in the botanical biological AA. Therefore, the cumulative impacts are those of the proposed action and the past harvesting where populations have partially recovered.

Viability across the forest for *Trillium rugelii* would be unaffected because the total cumulative effect of the proposed action is limited to this project's direct and indirect effects which would occur in localized rich cove communities.

Mitigation Measures (Project Design Features)

Wildlife, Aquatic, and Botanical

No mitigation measures (project design features) are required for this project.

Determination of Effect

Threatened and Endangered Species

Implementation of the proposed project will have beneficial effects on *Puma concolor couguar*, should it occur within the Baldwin Gap area (Table A-8). Project implementation will enhance and increase habitat for the cougar's prey, the white-tailed deer, thus benefitting this large cat. Formal consultation with the U.S. Fish and Wildlife Service is not required.

Table A-8: Determination of Effect to *Puma concolor couguar* by Alternative

Proposed Actions	Alt. A	Alt. B	Alt. C	Alt. D
Harvest (ac)	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Sanitation Thinning	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect

Proposed Actions	Alt. A	Alt. B	Alt. C	Alt. D
Roading (mi)	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Silvicultural Treatments (ac)	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Control Invasives	No effect	No effect	No effect	No effect
Old Growth Designation	No effect	No effect	No effect	No effect
Wildlife Habitat Improvement	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Prescribed Burning	No effect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Trail Construction and Designation	No effect	Not likely to adversely affect	Not likely to adversely affect	No effect

There are no federally-listed aquatic species or their associated habitat occurring or potentially occurring within the Baldwin Gap area based on surveys. Therefore, this project will have no effect on any federally listed aquatic species or their habitat. There is no risk to population viability of federally-listed aquatic species as a result of implementation this project.

There are no federally-listed botanical species or their associated habitat occurring or potentially occurring within the Baldwin Gap area based on surveys. Therefore, this project will have no effect on any federally listed botanical species or their habitat. There is no risk to population viability of federally-listed botanical species as a result of implementation this project.

Sensitive Species

Implementation of the proposed project may impact individual *Corynorhinus rafinesquii* and *Myotis lebeii lebeii*, but will not cause a trend toward federal listing or a loss of viability. The project has been designed to comply with Forest Plan standards which protect riparian habitat, snags, and rock outcrops.

Implementation of the proposed project may impact individual *Callophyrs irus* and *Speyeria diana*, but will not cause a trend toward federal listing or a loss of viability. Although some habitat will be lost for *Speyeria diana* in the short-term, habitat will be created for both species in the long-term.

Implementation of the proposed project will not impact *Nesticus silvanus* and *Scudderia septentrionalis*. This project will not change the southern mountains nor convert the forests in the Baldwin Gap area.

Implementation of the proposed project will not affect any aquatic sensitive species since none occur within the aquatic biological AA based on surveys.

Implementation of the proposed project will affect individual *Trillium rugelii*, but is not likely to result in a trend towards federal listing or loss of population viability of this plant since riparian buffers are planned in harvest units that will protect populations.

Table A-9: Effects to Sensitive Species by Alternative

Species	Alternative A	Alternative B	Alternative C	Alternative D
Corynorhinus rafinesquii	No impact	May impact individuals	May impact individuals	May impact individuals
Myotis lebeii lebeii	No impact	May impact individuals	May impact individuals	May impact individuals
Callophyrs irus	No impact	May impact individuals	May impact individuals	May impact individuals
Speyeria diana	No impact	May impact individuals	May impact individuals	May impact individuals
Nesticus silvanus	No impact	No impact	No impact	No impact
Scudderia septentrionalis	No impact	No impact	No impact	No impact
Trillium rugelii	No impact	May impact individuals	May impact individuals	May impact individuals

List of Preparers

Prepared by: */s/ Lorie L. Stroup* *September 15, 2005*

Lorie L Stroup – lstroup@fs.fed.us
Lorie Stroup, Aquatic Resources Analysis and Biological Evaluation
USFS Fisheries Biologist, Pisgah National Forest

Dave Danley, Botanical Analysis
USFS Botanist, Pisgah National Forest

Mae Lee Hafer, Wildlife Analysis
Forest Wildlife Biologist, National Forests in North Carolina

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Attachment 1 Species Lists for Buncombe County

Wildlife

2001 Nantahala/Pisgah National Forests Federally Listed and Regionally Sensitive Terrestrial Wildlife List				
Group	**Species**	**Brief Habitat Description**	**Counties[1]**	**Analyzed Further/ Evaluation Criteria[2]**
Federally Threatened and Endangered Species				
Mammal	*Canis rufus* Red Wolf (Endangered)	Swamps, pocosins, extensive forests	Beaufort, Dare, Hyde, Tyrrell, Washington	No/1
Mammal	*Corynorhinus townsendii virginianus* Virginia Big-eared Bat (Endangered)	Roosts in caves (and rarely mines), especially in limestone areas	Avery, Watauga, Yancey	No/1
Mammal	*Puma concolor couguar* Eastern Cougar (Endangered)	Extensive forests, remote areas	Brunswick, Buncombe, Carteret, Haywood, Montgomery, Onslow, Swain, Yancey	Yes
Mammal	*Glaucomys sabrinus coloratus* Carolina Northern Flying Squirrel (Endangered)	High elevation forests, mainly spruce/fir	Avery, Buncombe, Graham, Haywood, Jackson, McDowell, Mitchell, Swain, Transylvania, Watauga, Yancey	No/2
Mammal	*Myotis grisescens* Gray Bat (Endangered)	Roosts in caves; forages mainly over open water	Buncombe, Haywood	No/2
Mammal	*Myotis sodalis* Indiana Bat (Endangered)	Roosts in hollow trees or under loose bark (warmer months); in caves (winter)	Graham, Jackson, Mitchell, Rutherford, Swain, Cherokee, Clay, Macon	No/1
Bird	*Haliaeetus leucocephalus* Bald Eagle (Threatened)	Mature forests near large bodies of water (for nesting); lakes and sounds [nesting sites; regular non-breeding sites]	Alexander, Anson, Beaufort, Bertie, Bladen, Brunswick, Burke, Camden, Catawba, Chatham, Chowan, Columbus, Craven, Currituck, Dare, Davidson, Durham, Gaston, Granville, Gulfort, Halifax, Harnett, Haywood, Hyde, Johnston, Lenoir, Martin, Mecklenburg, Montgomery, Nash, Northampton, Onslow, Orange, Pamlico, Pasquotank, Pitt, Richmond, Rowan, Stanly, Tyrrell, Vance, Wake, Warren, Washington, Wilson	No/1
Reptile	*Clemmys muhlenbergi* Bog Turtle (Threatened S/A)	Bogs, wet pastures, wet thickets	Alexander, Alleghany, Ashe, Avery, Buncombe, Burke, Cherokee, Clay, Forsyth, Gaston, Graham, Henderson, Iredell, Macon, McDowell, Mitchell, Surry, Transylvania, Watauga, Wilkes, Yancey	No/2
Insect	*Microhexura montivaga* Spruce-fir Moss Spider (Endangered)	In moss of spruce-fir forests (endemic to North Carolina and adjacent Tennessee)	Avery, Caldwell, Mitchell, Swain, Yancey	No/1
Mollusk	*Mesodon clarki Nantahala* Noonday Globe (Threatened)	Nantahala Gorge (endemic to this site)	Swain	No/1
August 7, 2001 Regional Forester's Sensitive Species				
Mammal	*Corynorhinus rafinesquii* Rafinesque's big-eared bat	Roosts in caves, mines, and hollow trees usually near water	Alexander, Buncombe, Burke, Cherokee, Graham, Macon, Madison, Swain, Transylvania	Yes
Mammal	*Microtus chrotorrhinus carolinensis* Southern rock vole	Rocky areas at high elevations, forests or fields	Avery, Haywood, Jackson, Macon, Swain, Yancey	No/1
Mammal	*Myotis leibii* Eastern small-footed bat	Roosts in hollow trees, rock outcrops, bridges (warmer	Alleghany, Avery, Buncombe, Graham, Henderson, Macon,	Yes

2001 Nantahala/Pisgah National Forests Federally Listed and Regionally Sensitive Terrestrial Wildlife List				
Group	**Species**	**Brief Habitat Description**	**Counties[1]**	**Analyzed Further/ Evaluation Criteria[2]**
		months); caves and mines (winter)	Rutherford, Swain, Wilkes, Yancey	
Mammal	*Sorex palustris puntculatus* Southern water shrew	Stream banks in montane forests	Avery, Buncombe, Clay, Haywood, Macon, Swain, Watauga	No/2
Bird	*Falco peregrinus* Peregrine Falcon	Cliffs (for nesting); coastal ponds and mudflats (for foraging in winter) [nesting evidence; regular wintering sites]	Avery, Brunswick, Buncombe, Burke, Carteret, Dare, Haywood, Hyde, Jackson, Madison, Rutherford, Stokes, Surry, Transylvania, Wilkes, Yancey	No/2
Bird	*Lanius ludovicia migrans* Migrant loggerhead shrike	Fields and pastures [breeding season only]	None indicated	No/2
Bird	*Thryomanes bewickii altus* Appalachian Bewick's wren	Woodland borders or openings, farmlands or brushy fields, at high elevations [breeding season only]	Ashe, Avery, Buncombe, Haywood, Jackson, Macon, Transylvania	No/2
Amphibian	*Desmognathus Santeetlah* Santeetlah dusky salamander	Stream headwaters and seepage areas; southwestern mountains	Graham, Jackson, Swain	No/1
Amphibian	*Eurycea junaluska* Junaluska salamander	Forests near seeps and streams, mainly in Cheoah River	Cherokee, Clay, Graham	No/1
Amphibian	*Plethodon aureolus* Tellico salamander	Forests in the Unicoi Mountains	Cherokee, Graham	No/1
Amphibian	*Plethodon teyahalee* Southern Appalachian salamander	High elevation, wooded slopes and forests; prefers hardwood forests and logs over pines and hemlocks	None indicated	No/2
Amphibian	*Plethodon welleri* Weller's salamander	High elevation forests in northern mountains, mainly in spruce-fir, and to a lesser degree in northern hardwood forests	Avery, Mitchell, Watauga, Yancey	No/2
Insect	*Callophrys irus* Frosted elfin	Open woods and borders, usually in dry situations; host plant-lupines, (*Lupinus*) and wild indigos (*Baptisia*)	Brunswick, Buncombe, Cherokee, Craven, Cumberland, Franklin, Gates, Jones, Moore, Pender, Polk, Richmond, Scotland	Yes
Insect	*Cicindela ancocisconensis* A tiger beetle	Shaded gravel and sandbanks on mountain brooks and small rivers with large boulders	None indicated	No/2
Insect	*Euchlaena milnei* Milne's Euchlaena	Associated with river bluffs	None indicated	No/1
Insect	*Hypochilus coylei* A cave spider	Rock outcrops (apparently endemic to southern mountains of NC)	Buncombe, Henderson, Polk, Rutherford	No/2
Insect	*Hypochilus sheari* A lampshade spider	Rock outcrops (apparently endemic to Buncombe, McDowell, and Yancey counties, NC)	Buncombe, McDowell, Yancey	No/2
Insect	*Melanoplus divergens* Divergent Melanoplus	Glades and balds, 1800-4717 feet	None indicated	No/2
Insect	*Melanoplus serrulatus* Serrulate Melanoplus	Valleys and lower slopes, Nantahala Mountains	None indicated	No/1
Insect	*Nesticus cooperi* Lost Nantahala Cave spider	Caves and along Nantahala River (apparently endemic to Swain County, NC)	Macon, Swain	No/1
Insect	*Nesticus crosbyi* A cave spider	Spruce-fir forests (apparently endemic to Mount Mitchell)	Buncombe, Yancey	No/2
Insect	*Nesticus mimus* A cave spider	Rocky areas; known from Grandfather Mtn. and Table Rock	Avery, Burke	No/1
Insect	*Nesticus sheari* A cave spider	On the ground in moist or rich forests (apparently endemic to Graham County, NC)	Graham	No/1
Insect	*Nesticus silvanus* A cave spider	Apparently endemic to southern mountains of NC	None indicated	Yes

2001 Nantahala/Pisgah National Forests Federally Listed and Regionally Sensitive Terrestrial Wildlife List				
Group	**Species**	**Brief Habitat Description**	**Counties[1]**	**Analyzed Further/ Evaluation Criteria[2]**
Insect	*Scudderia septentrionalis* Northern Bush Katydid	Forests	None indicated	Yes
Insect	*Semiothisa fraserata* Fraser Fir Angle	Spruce/fir forests	None indicated	No/2
Insect	*Speyeria Diana* Diana fritillary	Rich woods and adjacent edges and openings; host plants violet (*Viola*)	None indicated	Yes
Insect	*Speyeria idalia* Regal fritillary	Wet or dry meadows, bogs, open hilltops; host plants-violets (*Viola*)	Alleghany, Ashe, Avery, Wilkes	No/1
Insect	*Trechus carolinae* A ground beetle	Black Mountains (endemic to NC)	Yancey	No/1
Insect	*Trechus luculentus unicoi* A ground beetle	Apparently the mountains of Graham County	Graham	No/1
Insect	*Trechus mitchellensis* A ground beetle	Black Mountains (endemic to NC)	Buncombe, McDowell, Yancey	No/2
Insect	*Trechus rosenbergi* A ground beetle	Plott Balsam and Great Balsam Mountains (endemic to NC)	Haywood, Jackson	No/1
Insect	*Trechus satanicus* A ground beetle	Vicinity of Devil's Courthouse and Graveyard Fields (endemic to NC)	Haywood, Transylvania	No/1
Insect	*Trimerotropis saxatilis* Rock-loving grasshopper	Lichen-covered rock outcrops	Transylvania	No/1
Mollusk	*Helicodiscus triodes* Talus coil	Madison County	Madison	No/1
Mollusk	*Pallifera hemphilli* Black mantleslug	High elevation forest, mainly spruce-fir	Avery, Jackson, Mitchell, Swain, Yancey	No/1
Mollusk	*Paravitrea placentula* Glossy supercoil	Madison, Mitchell, Swain Counties	Madison, Mitchell, Swain	No/1
Mollusk	*Ventridens coelaxis* Bidentate dome	Northern mountains	Alleghany, Avery, Madison, Watauga	No/1

[1]The counties listed are those in which the species is known to occur, has occurred in the past but has not been found in recent years, or is likely to occur according to the North Carolina Natural Heritage Program and the U.S. Fish and Wildlife Service.

[2]Evaluation Criteria:
1. Not known to occur in the County (according to the North Carolina Natural Heritage Program and U.S. Fish and Wildlife Service). Given that the species or its associated habitat does not occur in the County, there will be no negative effect/impact to the species due to implementation of the project.
2. The species is known to occur or to have occurred within the County (based on records and surveys), but not within the Baldwin Gap area. Given that the species or its associated habitat does not occur within the Baldwin Gap area based on surveys, there will be no negative effect/impact to the species due to implementation of the project.

Aquatics

Rare Species List - Buncombe County (List Updated 6/2005)

Common Name	Scientific Name	Type	Likelihood of Occurrence
Threatened, Endangered, or Proposed Species			
Appalachian elktoe	*Alasmidonta raveneliana*	mussel	Does Not Occur (1)
Spotfin chub	*Cyprinella monacha*	fish	Does Not Occur (1)
Sensitive Species (based on 2002 Regional Forester's list)			
blotchside darter	*Percina burtoni*	fish	Does Not Occur (1)
longhead darter	*Percina macrocephala*	fish	Does Not Occur (1)

Common Name	Scientific Name	Type	Likelihood of Occurrence
EVALUATION CRITERIA: 1 = Recent survey data within or downstream the aquatic analysis area (<5 yrs old) 2 = Historical survey data within or downstream the aquatic analysis area (>5 yrs old) 3 = Vicinity records (within or downstream the analysis area, not necessarily within Baldwin Gap area) 4 = Suitable habitat present, but no vicinity records 5 = No suitable habitat present or vicinity records within analysis area, but species may be present in county 6 = Extirpated species listed for river system			

Botanical

Buncombe County

Species	Form	Natural Communities, Habitat	Status/ Occurrence
Aconitum reclinatum	Vascular plant	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest	Sensitive/4
Berberis canadensis	Vascular plant	Rich Cove Forest, Glade, mafic rock	Sensitive/3
Botrychium jenmanii	Vascular plant	Rich Cove Forest	Sensitive/3
Buckleya distichophylla	Vascular plant	Hemlock Hardwood Forest, Acidic Cove Forest, Montane Acidic Cliff, Mesic Oak-Hickory	Sensitive/3
Calamagrostis cainii	Vascular plant	High Elevation Rocky Summit	Sensitive/4
Carex biltmoreana	Vascular plant	High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff	Sensitive/4
Carex misera	Vascular plant	High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome	Sensitive/4
Cleistes bifaria	Vascular plant	Pine-Oak/Heath Forest, Pine-Oak Woodland	Sensitive/4
Coreopsis latifolia	Vascular plant	Rich Cove Forest, Northern Hardwood Forest	Sensitive/3
Diplophyllum obtusatum	Liverwort	Spruce-Fir Forest	Sensitive/4
Euphorbia purpurea	Vascular plant	Northern Hardwood Forest, Rich Cove Forest, Mesic oak-hickory	Sensitive/3
Fissidens appalachensis	Moss	streams at high elevations	Sensitive/4
Frullania oakesiana	Liverwort	Spruce-Fir Forest	Sensitive/4
Geum radiatum	Vascular plant	High Elevation Rocky Summit	Endangered/4
Gymnoderma lineare	Lichen	High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove in Gorge	Endangered/4
Hasteola suaveolens	Vascular plant	Montane Alluvial Forest	Sensitive/4
Helianthus glaucophyllus	Vascular plant	Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside	Sensitive/3
Heuchera longiflora var. aceroides	Vascular plant	rock outcrops in Rich Cove Forest, mafic rock	Sensitive/3
Hexastylis contracta	Vascular	Acidic Cove Forest	Sensitive/3

Species	Form	Natural Communities, Habitat	Status/ Occurrence
	plant		
Hexastylis rhombiformis	Vascular plant	Acidic Cove Forest, Hemlock Hardwood Forest, Montane Alluvial Forest	Sensitive/3
Hydrothyria venosa	Lichen	Stream	Sensitive/3
Hypericum graveolens	Vascular plant	High Elevation Seep, Wet Meadow	Sensitive/4
Hypericum mitchellianum	Vascular plant	High Elevation Seep, Wet Meadow	Sensitive/4
Hypotrachyna virginica	Lichen	High Elevation Forest	Sensitive/4
Juglans cinerea	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest	Sensitive/3
Liatris turgida	Vascular plant	High Elevation Granitic Dome, Montane Oak Woodland	Sensitive/4
Lilium grayi	Vascular plant	Northern Hardwood Forest, High Elevation Seep, Grassy Bald, Wet Meadow	Sensitive/4
Lysimachia fraseri	Vascular plant	Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside	Sensitive/3
Monotropsis odorata	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest	Sensitive/3
Nardia lescurii	Liverwort	Acidic Cove Forest, near streams	Sensitive/3
Packera millefolia	Vascular plant	Montane Acidic Cliff, Montane Cedar-Hardwood Woodland, High Elevation Granitic Dome	Sensitive/4
Penstemon smallii	Vascular plant	rock outcrops, woodlands	Sensitive/4
Polytrichum appalachianum	Moss	Rocky Summits, mid to high elevation	Sensitive/4
Prenanthes roanensis	Vascular plant	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest	Sensitive/4
Rhododendron vaseyi	Vascular plant	Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside	Sensitive/4
Robinia viscosa var. viscosa	Vascular plant	High Elevation Granitic Dome, woodlands	Sensitive/4
Rudbeckia triloba var. pinnatiloba	Vascular plant	Rich Cove Forest, Montane Mafic Cliff, mafic rock	Sensitive/3
Sagittaria fasciculata	Vascular plant	Southern Appalachian Bog, Streamside, Swamp Forest-Bog Complex	Endangered/4
Sarracenia jonesii	Vascular plant	Southern Appalachian Bog	Endangered/4
Saxifraga caroliniana	Vascular plant	Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit	Sensitive/4
Silene ovata	Vascular plant	Rich Cove Forest, Mesic Oak-Hickory, Roadside, mafic rock	Sensitive/4
Spiraea virginiana	Vascular plant	Riverside scour zone	Threatened/4
Thermopsis fraxinifolia	Vascular plant	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath	Sensitive/3
Trillium rugelii	Vascular	Rich Cove Forest, low elevation	Sensitive/1

Species	Form	Natural Communities, Habitat	Status/ Occurrence
	plant		
Tsuga caroliniana	Vascular plant	Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit	Sensitive/3
Xanthoparmelia monticola	Lichen	High Elevation Rocky Summit	Sensitive/4

1= Found in activity area
2= Found within botanical analysis area but not activity area
3= Possibly found within botanical analysis area (based on broad habitat concepts)
4= No known occurrences or habitat known within botanical analysis area, (not further analyzed)

Attachment 2: Definitions

Definitions for the Biological Analysis Areas by Resource

- Wildlife biological analysis area – Compartments 1-6
- Aquatic biological analysis area – Activity area waters of Baldwin Field Branch and its tributaries, Bill Moore Creek and its tributaries, and Wise Branch.
- Botanical biological analysis area – Compartment 1

Definitions for the Various Types of Likelihood of Occurrence

- Known to occur – those species of which there is documentation that the species exists within a specified area, or it was found in the area during surveys.
- Likely to occur – those species of 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.
- May occur – 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.
- Not likely to occur – suitable habitat for a species may exist in a specified area, but there is other information known about the area and/or the species to determine that it is not likely to occur. These species are not included in the analysis.
- Does not occur – exhaustive surveys (existing and USFS) have not found the species in the project and/or analysis areas. These species are not included in the analysis.

Attachment 3: Amendment to the Baldwin Gap Project

Buncombe County, North Carolina
Pisgah Ranger District

Introduction

The purpose of this amendment to the biological evaluation (BE) for the Baldwin Gap Project is to provide information regarding the preferred alternative, Alternative B Modified, to the decision maker with relevant biological information as to the possible effects this proposal may have to federally threatened, endangered (TE) and Regional Forester's sensitive (S) species so that the Forest Service is within compliance of environmental laws such as the Endangered Species Act.

Project Location & Description

Refer to the BE for the Baldwin Gap Project for a project location and description.

Preferred Alternative – Alternative B Modified

The changes in Alternative B include changing Stand 27 from a sanitation thin to a two-age regeneration harvest, dropping Stand 40 from any treatment, dropping the 0.25 mile of road construction that accesses Stand 40, creating about 7 acres of wildlife fields and linear wildlife openings, and adding 7 extra acres of bittersweet control in the wildlife fields/linear wildlife openings.

Stand 27 was analyzed as a two-age harvest unit in Alternatives C and D. The approximately 7 acres of permanent grass/forb creation from wildlife fields and linear wildlife openings and the extra approximately 7 acres of bittersweet control in the permanent grass/forb were analyzed in Alternative D. The effects of these actions on TES will remain the same as are discussed in the BE for the Baldwin Gap Project. Dropping Stand 40 and the road construction accessing that stand are lesser actions, so the effects to TES will be less on the species analyzed than are indicated in the BE.

Existing Condition

Refer to the BE for a discussion of the existing condition for wildlife, botany and aquatics.

Method of Evaluation and Surveys

Refer to the BE for a discussion of the methods of evaluation and surveys, including any project surveys and historical surveys.

Species Evaluation

Species evaluated further are found in Table Amend A-1. Refer to the BE for a more detailed discussion of the step-down process for evaluation of TES species for the Baldwin Gap project.

Table Amend A-1: Known and Potential TES Species in Buncombe County Evaluated for this Proposal

Species	Type	Natural Community or Habitat	Occurrence
Federally Threatened or Endangered Species			
Puma concolor couguar	Mammal	Extensive forests, remote areas	May occur in project area
August 7, 2001 Regional Forester's Wildlife Sensitive Species			
Corynorhinus rafinesquii	Mammal	Roosts in caves, mines, and hollow trees usually near water	May occur in project area
Myotis leibii leibii	Mammal	Roosts in hollow trees, rock outcrops, bridges (warmer months); caves and mines (winter)	May occur in project area
Callophyrs irus	Butterfly	Open woods and borders, usually in dry situations; host plant-lupines, (*Lupinus*) and wild indigos (*Baptisia*)	May occur in project area
Speyeria diana	Butterfly	Rich woods and adjacent edges and openings; host plants violet (*Viola*)	May occur in project area
Nesticus silvanus	Arachnid	Apparently endemic to southern mountains of NC	May occur in project area
Scudderia septentrionalis	Katydid	Forests	May occur in project area
Trillium rugelii	Vascular Plant	Rich Cove Forest, low elevation	Known to occur in activity area. (Stands: 1-4, 1-18, 1-20, 1-23, 1-34, & 1-35)

Direct, Indirect, and Cumulative Effects to T&E Species and Habitat

Refer to the BE for the Baldwin Gap Project for a discussion of the direct, indirect and cumulative effects to TES species. The effects will remain the same or less as those discussed since the modification included changes to treatments that were already analyzed in other alternatives, or treatments were dropped.

Mitigation Measures

No mitigation measures are required for this project.

Determination of Effect

The determination of effect for the TES species analyzed in Alternative B Modified has not changed for those species analyzed in the Baldwin Gap Project. Table Amend A-2 summarizes the determination of effect of all alternatives on TES, including Alternative B Modified.

Table Amend A-2: Determination of Effect to TES Species by Alternative

Species	Alt. A	Alt. B	Alt. B Modified	Alt. C	Alt. D
Puma concolor couguar	No impact	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect	Not likely to adversely affect
Corynorhinus rafinesquii	No impact	May impact individuals	May impact individuals	May impact individuals	May impact individuals
Myotis lebeii lebeii	No impact	May impact individuals	May impact individuals	May impact individuals	May impact individuals
Callophyrs irus	No impact	May impact individuals	May impact individuals	May impact individuals	May impact individuals
Speyeria diana	No impact	May impact individuals	May impact individuals	May impact individuals	May impact individuals
Nesticus silvanus	No impact	No impact	No impact	No impact	No impact
Scudderia septentrionalis	No impact	No impact	No impact	No impact	No impact
Tillium rugelii	No impact	May impact individuals	May impact individuals	May impact individuals	May impact individuals

List of Preparers

Prepared by: /s/ Mae Lee A. Hafer September 19, 2005
Mae Lee A. Hafer – mhafer@fs.fed.us
Forest Wildlife Biologist, National Forests in North Carolina

References and Data Sources

Refer to the BE for the Baldwin Gap Project for a list of references and data sources.

APPENDIX B – AGE CLASS DISTRIBUTION

APPENDIX B – AGE CLASS DISTRIBUTION

The Baldwin Gap Forest Management Project is located in Pisgah District Analysis Area 01 (6,674 acres), Compartment 01 (1,370 acres). Analysis Areas 01 contains Management Areas 3B, timber emphasis, MA 4C scenery and older forest habitat emphasis and MA 18 embedded within the other management areas consists of aquatic and riparian ecosystems.

Management Area 3B, suitable for timber production (Forest Plan, page III-71) dominates the Pisgah District Analysis Area 01 (54%0) and Compartment 01 (94%). Inventory data shows that the age-class distribution is unbalanced for MA 3B in the Analysis Area and Compartment 01.

This analysis is to determine the minimum and maximum harvest levels for the Baldwin Gap area according to the Forest Plan. All 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 with 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 4, 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 01 Pisgah Ranger District and for the Baldwin Gap Forest Management project in Compartment 01. 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 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 MA's 1B, 2A, 3B, 4A and 4D multiply the number of acres in each MA by the maximum percent allowed.

1B & 3B ~ 3,629 acres x 15% = 544 acres

2A ~ 0 acres x 10% = 0 acres

4A & 4D ~ 1,018 acres x 10% = 102 acres

4,647 646 acres

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

Table B-1: Analysis Area Calculations 0-10 Year Age-Class

		0-10 Year Age-Class[1]			Harvest Goals	
Analysis Area	Suitable Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
01	4,647	181	646	32	149	614

1 – minimum and maximum 0-10 allowed cannot 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-2: Management Area Calculations 0-10 Year Age-Class Pisgah District Analysis Area 01 (Compartments 01, 02, 03, 04, 05 and 06)

		0-10 Year Age-Class			Harvest Goals	
Mgmt. Area	Forested Acres	Min. Desired[1]	Max. Allowed[1]	Existing 0-10 Yr.	Min.	Max.
3B	3,629	181	544	32	149	512
4A, 4D	1,018	-	102	0	-	102
2C, 4C, 13	2,027	-	-	-	-	-
Total	**6,674**	**181**	**646**	**32**	**149**	**614**

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 MA 1B, 2A, 3B, 4A, or 4D, the amount of 0-10 year age-class allowed in each compartment is calculated by determining which of the MA's 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-3: Pisgah District Analysis Area 01 Compartment 01, 0-10 Year Age-Class

		0-10 Year Age-Class			Harvest Goals	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
3B	1,370	68	205	0	68	205
Total	**1,370**	**68**	**205**	**0**	**68**	**205**

Note: Only Management Area 3B contains suitable acres in this compartment

Comparison of Alternatives for Early Successional Habitat

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)

This analysis would compare the action and no-action alternatives to see which alternatives would 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.

Table B-4 shows the acres of proposed regeneration by alternative with respective % by geographic scale. All alternatives but the No-Action Alternative meets the minimum % of 0-10

age class by Compartment. Further analysis is needed to determine if the percent of 0-10 shown here meets Forest Plan Amendment 5 direction for the Management and Analysis Areas.

Table B-4: Percent of 0-10 age-class distribution by Alternative of Proposed Timber Harvest- Base Year 2006

Alternative	Acres of Proposed Harvest AA 01 Compartment 01	Percent 0- 10 Compartment Scale	Percent 0-10 Management Area 3B Scale	Percent 0-10 Analysis Area Scale
A	0	0	0.9	0.7
B	111	8.1	3.9	3.1
C	81	5.9	3.1	2.4
D	152	11.1	5.1	4.0

The comparison of alternatives in Table 5 show that only Alternative D meets Forest Plan Amendment 5 Direction and Standards for regulating the 0-10 age class distribution at the 3 geographic scales. Alternatives B and C only meet 1 geographic scale (Compartment Level) and Alternative A does not meet any of the 3 geographic scales.

Table B-5: Comparison of Alternatives by Age-Class Distribution – Base year 2006

Alternative	Acres Harvest	Acres Existing 0-10	Total Acres 0-10	Meets Forest Plan Direction for 68 Acres Minimum @ Compartment Area	Meets Forest Plan Direction for 149 Acres Minimum @ Management Area	Meets Forest Plan Direction for 149 Acres Minimum @ Analysis Area
A	0	0	0	NO	NO	NO
B	111	0	111	YES	NO	NO
C	81	0	81	YES	NO	NO
D	152	0	152	YES	YES	YES

In addition to meeting Forest Plan Standards for 0-10 age class distribution spatially at 3 geographic scales, the project must also meet the 0-10 age class distribution over a time frame. The time frame for Management Area 3B is 10 years.

The following tables display the effects of each alternative on the 0-10 age-class distributions in Analysis Area 01 over a 10 year period.

Table B-6: Alternative A – 0-10 Age-Class Distribution Over 10 year Period in Analysis Area 01

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Acreage	32	10	0	0	0	0	0	0	0	0	0	0
% Analysis Area	0.7%	0.2%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
0-10 for Analysis Area is:	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under
Compartment 1	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 2	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 3	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 4	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%

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Compartment 5	20	10	0	0	0	0	0	0	0	0	0	0
% Compartment	1.5%	0.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 6	12	0	0	0	0	0	0	0	0	0	0	0
% Compartment	1.3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table B-7: Alternative B - 0-10 Age-Class Distribution Over 10 Year Period in Analysis Area 01

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Acreage	128	121	111	111	111	111	111	111	111	111	111	0
% Analysis Area	2.8%	2.6%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2,4%	2.4%	2.4%	0%
0-10 for Analysis Area is:	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under
Compartment 1	96	111	111	111	111	111	111	111	111	111	111	0
% Compartment:	7.0%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	0%
Compartment 2	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 3	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 4	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 5	20	10	0	0	0	0	0	0	0	0	0	0
% Compartment	1.5%	0.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 6	12	0	0	0	0	0	0	0	0	0	0	0
% Compartment	1.3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table B-8: Alternative C - 0-10 Age-Class Distribution Over a 10 Year Period in Analysis Area 01

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Acreage	98	91	81	81	81	81	81	81	81	81	81	0
% Analysis Area	2.1%	2.0%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	2.4%	2.4%	0%
0-10 for Analysis Area is:	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under	Under
Compartment 1	66	81	81	81	81	81	81	81	81	81	81	0
% Compartment:	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	5.9%	0%
Compartment 2	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 3	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 4	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 5	20	10	0	0	0	0	0	0	0	0	0	0
% Compartment	1.5%	0.8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 6	12	0	0	0	0	0	0	0	0	0	0	0
% Compartment	1.3%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Table B-9: Alternative D - 0-10 Age-Class Distribution Over a 10 Year Period in Analysis Area 01

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total Acreage	169	162	152	152	152	152	152	152	152	152	152	0
% Analysis Area	3.6%	3.5%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	0%
0-10 Analysis Area 01 is:	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets	Meets
Compartment 1	137	152	152	152	152	152	152	152	152	152	152	0
% Compartment	10.0%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	11.1%	0%
Compartment 2	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 3	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 4	0	0	0	0	0	0	0	0	0	0	0	0

Future	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
%Compartment	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 5 % Compartment	20 1.5%	10 0.8%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 6 % Compartment	12 1.3%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

In Alternative A, the No Action alternative, early successional habitat would not be present within Analysis Area 01 after 2007. All the action alternatives would maintain early successional habitat for 10 years ending in 2017 if no other regeneration takes place within Analysis Area 01. Of the 3 action alternatives only Alternative D (152 acres) meets Forest Plan Direction to provide and maintain a minimum of 149 acres in the 0-10 age-class in order to assure a regular and sustained flow of habitats for diversity and viability of plant and animal populations through space and time.

APPENDIX C – OLD GROWTH ANALYSIS

APPENDIX C – OLD GROWTH 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 administrative watershed affected by this project is 01. The requirements for this project are as follows: (1) Check for large old growth patches in Pisgah Analysis Area 01; (2) select a small patch for Compartment 01; and (3) field check stands in the initial inventory of old growth that would be directly affected by this project.

The purpose of the **large patches** is to serve as permanent reservoirs of biological diversity and to provide preferred habitats for forest interior birds across the landscape.

Large Patch: There are no large old growth patches within Pisgah District Analysis Area 01,

Initial Inventory of Old Growth and Small Patch Designation

There are several patches of **initial inventory** old growth identified by the Forest Plan in Analysis Area 01, but none were identified in Compartment 01. See Table C-1

Table C-1: Inventory of Initial Old Growth Stands Analysis Area 01

Compartments	Initial Old Growth Identified Stands
01	None
02	None
03	None
04	01, 09
05	02, 04, 05, 07 & 11
06	05, 07 & 08

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. There are currently no small old growth patches in Pisgah District Analysis Area 01.

The following stands would be designated as small patches for long- term old growth retention to meet Forest Plan standards for old growth.

Table C-2: Small Old Growth Patches Designated in Analysis Area 01 Compartment 01

Comp.	Minimum Acres	Selected Acres	Stand No.	Age in 2005	Initial Inv.?	Community Type
01	69	**88 total** (stand 13 ~56 ac, stand 14 ~32 ac)	13 & 14	Stand 13 – 105 Stand 14 – 105	No	Mixed mesophytic forest

APPENDIX D – APPROPRIATENESS OF HARVEST

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

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 Baldwin Gap Area. Thinning and sanitation cutting may also occur, but they are intermediate treatments and would 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 board 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 they can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one would 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 would 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 would 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 would 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 would 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 would 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	Vol./ac (CCF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
01-15	12	15.5	Medium	Y	No	Good	Visual
01-16	10	15.1	High	Y	No	Good	Visual
01-18	13	21.2	Very High	Y	No	Good	Visual/Water
01-20	15	13.5	Low	N	Yes	Good	Water/Heritage
01-23	27	15.8	High	Y	No	Good	Visual/Water/Heritage
01-27	19	23.0	High	Y	No	Good	Visual/Water
01-34	31	19.1	Very High	Y	No	Good	Visual
01-44	28	15.9	High	Y	No	Good	Visual
01-45	12	18.9	Very High	Y	No	Good	Visual/Water

1/ Timber Quality:	Very High	= Northern Red Oak, White Oak, Black Cherry
	High	= Large White Pine, Yellow-poplar
	Medium	= Small Diameter Sawtimber, Mixed Oak
	Low	= Small Roundwood, Scarlet Oak, Yellow Pine
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 would 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

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	Forest Type	Age	Method Of Logging	Selection (groups <1 ac) - Alternative	Shelterwood BA 30-50 - Alternative	Two-Age BA 15-20 - Alternative
01-15	12	Cove Hwd	89	Tractor			Yes B
01-16	10	Cove Hwd.	107	Tractor			Yes C, D
01-18	13	Cove Hwd.	81	Tractor			Yes B,C,D
01-20	15	SYP-Oak	94	Tractor	Yes B,C,D		
01-23	28	Cove Hwd.	113	Tractor			Yes B,C,D
01-27	19	Cove Hwd.	84	Tractor			Yes C,D
01-34	31	Cove Hwd.	102	Skyline			Yes B,D
01-44	28	Cove Hwd.	68	Skyline			Yes D
01-45	12	Cove Hwd.	103	Skyline			Yes B,D

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 would 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 areas between 0.2 and 1.0 acre each, distributed over a large area, with the intent over time to establish three or more distinct age-classes. Width of an individual opening would be 1.5 - 2 times the 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

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 Stateline Timber Sale and Associated Activities, 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. The financial efficiency analysis was updated since issuance of the July 2004, EA to better reflect estimated costs for the new road construction in Alternatives B and D.

Assumptions

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

1. Discount Rate is 4%.
2. Inflation rate is 0% throughout the analysis period (60 years plus).
3. Estimated timber revenues were pine and pole timber were calculated using the base prices from the Pisgah and Nantahala National Forests 1st Quarter Adjustment Sheet for Fiscal Year 2005 and the Base Period Prices for Hardwood by Species Work Sheet week of 07/01/2005 for hardwoods issued by the Forest Supervisor's Office in Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from budget figures for the 2004 National Forests in North Carolina. Sale preparation costs are approximately $9.60/CCF and timber harvest administration costs are approximately $4,000 per year of sale (generally sales run 1-3 years depending on size and complexity).
5. Reforestation and silvicultural treatment costs were taken from averages of actual contract costs on the Pisgah Ranger District plus an additional 25% to cover district preparation and administration costs.
6. Road construction is estimated at $35,000/mile and road reconstruction at $17,500/mile.
7. A 60-year long-term projection was used to simulate the time for high quality hardwood sawtimber and as per Forest Service Handbook 2409.18, Section 13.05, Long-Term Efficiency Analysis.

Financial Analysis Worksheets

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	$0
B	3,163	$199,896
C	2,362	$141,200
D	3,847	$246,418

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	3,163	$9.60	$30,365
Harvest Administration	Year	3	$4,000	$12,000
Site Preparation Natural– Herbicide & Handtools	Acres	111	$175	$19,425

Activity	Units	Number	Cost/Unit	Total Costs
Road Engineering and Design Construction	Miles	0.25	$35,000	$8,750
Road Engineering and Design Reconstruction	Miles	8.0	$17,500	$140,000
Temporary Road Construction	Miles	1.0	$10,000	$10,000
Total Costs				**$220,540**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$199,896	$220,540	$-20,644	0.91
60	0.04	$7,996	$8,822	$-826	0.91

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	2,362	$9.60	$22,675
Harvest Administration	Year	3	$4,000	$12,000
Site Preparation Natural – Herbicide & Handtools	Acres	81	$175	$14,175
Road Engineering and Design Construction	Miles	0.0	$35,000	$0
Road Engineering and Design Reconstruction	Miles	4.7	$17,500	$82,250
Temporary Road Construction	Miles	0.0	$10,000	$0
Total Costs				**$131,100**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$141,200	$131,100	$10,100	1.08
60	0.04	$5,648	$5,244	$404	1.08

Table E-6: Sale Cost Estimates – Alternative D

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	3,847	$9.60	$36,931
Harvest Administration	Year	3	$4,000	$12,000
Site Preparation Natural – Herbicide & Handtools	Acres	152	$175	$26,600
Road Engineering and Design Construction	Miles	0.0	$35,000	$0
Road Engineering and Design Reconstruction	Miles	8.0	$17,500	$140,000
Temporary Road Construction	Miles	1.0	$10,000	$10,000
Total Costs				**$225,531**

Table E-7: Benefit Cost Ratio – Alternative D

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$246,418	$225,531	$20,887	1.09
60	0.04	$9,857	$9,021	$836	1.09

APPENDIX F – PROJECT DESIGN FEATURES FOR PRESCRIBED FIRE AND PESTICIDE USE

APPENDIX F – PROJECT DESIGN FEATURES FOR PRESCRIBED FIRE AND PESTICIDE USE

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 l/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.

Pesticide Application Project Design Features

1. Pesticides 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 pesticide 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. A setback of 60 feet will be applied along the private boundary line of stands 1-5, 1-19, and 1-47 due to proximity of residences.
4. Areas are not prescribed burned for at least 30 days after pesticide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of pesticides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted pesticide projects, is a certified pesticide applicator. Contract inspectors are trained in pesticide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the pesticide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. Triclopyr is not ground-applied within 60 feet of known occupied gray, Virginia big-eared, or Indiana bat habitat. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. No pesticide 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
11. Application equipment, empty pesticide 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.
12. No pesticide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No pesticide 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 pesticides) may occur within these buffers only to prevent major environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
13. During transport, pesticides, 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.
14. Only the amount of pesticide needed for the day's use is brought to the site. At day's end, all leftover pesticide is returned to storage.
15. Pesticide 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.
16. During use, equipment to store, transport, mix, or apply pesticides is inspected daily for leaks.