United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Pisgah Ranger District | 1001 Pisgah Hwy
Pisgah Forest, NC 27868-7721
828-877-3265

**File Code:** 1950-1
**Date:** July 25, 2005

Dear Interested Members of the Public and Forest Users:

Enclosed is a copy of the Environmental Assessment (EA) for the Baldwin Gap Project on the Pisgah Ranger District, Pisgah National Forest. The project is located in Buncombe County and is also within the Bill Moore Creek drainage of the South Hominy Creek Sub-Watershed. Four alternatives have been developed and analyzed; Alternative A – No Action, Alternative B – Proposed Action, Alternatives C, and Alternative D. A decision will be made that selects one of these alternatives or a modification of one. While Alternative B has been identified as the Preferred Alternative, a final decision has not yet been made. I am seeking your input on this EA before I reach a decision.

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

In accordance with 36 CFR 215.6(2)(4), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizen-Times*. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-pisgah@fs.fed.us; regular mail to: Appalachian Ranger District, Attn: Michael Hutchins, P.O. Box 128, Burnsville, NC 28714; or faxed to 828-884-7527.

Please contact Michael Hutchins, Interdisciplinary Team Leader at 828-682-6146, or Ted Oprean, Project Leader at 828-877-3265 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

/s/ Randy Burgess
RANDALL BURGESS
District Ranger

Enclosure

United
States
Department
of
Agriculture

Forest
Service

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

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# SUMMARY

The Pisgah National Forest proposes to regenerate about 111 acres using the two-age (96 acres) and group selection (15 acres) harvest methods and sanitation thin about 246 acres; perform timber stand improvement on about 358 acres; perform pre-harvest oak shelterwood treatment on about 265 acres; prescribe burn about 29 acres; control non-native plants by herbicide treatment on about 377 acres; site prepare and release with herbicide and hand tools the acres harvested using the two-age method; construct about ¼ mile of new road, reconstruct about eight miles of existing road, and construct about one mile of temporary road (temporary road would be maintained as a linear wildlife field following harvest); use a fungicide in one stand to limit spread of annosus root rot; designate two stands (88 acres) as small patch old growth; develop two new trail connectors into hike/bike/horse trails following harvest activities as funding becomes available to connect with the North Boundary trail/road and the Baldwin Fields road; rehabilitate "user created" trails as funding becomes available; and stabilize about one mile of stream within the Baldwin Field Branch drainage and place large wood and rock in the stream. The project area is located within the 1,370 acre Compartment 1 and the 6,674 acre Analysis Area 1, is about five miles southwest of Asheville, North Carolina, and is within the Pisgah Ranger District, Pisgah National Forest, and Buncombe County.

This action is needed because: age-class distribution (early successional habitat) in stands within the project area is not balanced; previously harvested stands are being out-competed by vegetation; non-native exotic vegetation is established in the analysis area; grass/forb habitat is not established in the project area; and water quality and aquatic habitat is being impacted by sediment delivery due to unstable streams, unauthorized trail use, and unmaintained "woods" roads.

In addition to the proposed action (Alternative B), the Forest Service also evaluated the following alternatives:

- *Alternative A – No Action Alternative*
- *Alternative C – No road construction, reduced pesticides applied, 29 acres of prescribed burning, 81 acres of two-age (includes 20 acres of group selection), 151 acres of sanitation thinning, 358 acres of timber stand improvement (TSI), 344 acres of invasive control, 201 acres of pre-harvest oak shelterwood, 88 acres of small patch old growth designation, stream rehabilitation, and two connector trails developed*
- *Alternative D – Increase grass/forb habitat by 7 acres, no system road construction, 65 acres of prescribed burning, 152 acres of two-age harvest (includes 20 acres of group selection), 178 acres of sanitation thinning harvest, 358 acres of TSI, 115 acres of pre-harvest oak shelterwood, 402 acres of invasive control, 88 acres of small patch old growth designation, stream rehabilitation, and no connector trails developed*

Based upon the effects of the alternatives, the responsible official will decide to select the no-action alternative, an action alternative, or a modification of an action alternative.

# CHAPTER 1 – PURPOSE AND NEED

## 1.1 Document Structure

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

- *Chapter 1 – Purpose and Need:* This section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Chapter 2 – Alternatives:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. These alternatives were developed based on key issues raised by the public and other agencies. This discussion also includes possible mitigation measures. This section also provides a summary of the environmental consequences associated with each alternative.
- *Chapter 3 – Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by key issues. Within each section, the affected environment is described first, followed by the effects of the No-action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Chapter 4 – Preparers and Public Involvement:* This section provides a list of preparers and members of the public consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

### 1.1.1 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.

Relying on specialist reports and the project record helps implement the CEQ Regulations' provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), and that NEPA documents be analytic rather than encyclopedic and kept concise and no longer than absolutely necessary (40 CFR 1502.2). The objective is to furnish enough site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The project record is located at the Appalachian Ranger District Office in Burnsville, North Carolina.

## 1.2 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 Analysis Areas (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 proposal is within Management Areas (MA) 3B, 4C, and 18 as designated in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests, North Carolina (1994) (hereafter called the Forest Plan). 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).

## 1.3 Proposed Action

The Proposed Action (Alternative B) has been developed by the Forest Service to meet the Purpose and Need of this project. A more detailed discussion on the Proposed Action is located in Chapter 2, Section 2.2.2—a map is also located at the end of Chapter 2. The Proposed Action would:

- Regenerate about 111 acres using the two-age (96 acres) and group selection (15 acres) method, 246 acres using the sanitation thinning method, and 15 acres using the group selection method;
- Perform timber stand improvement on about 358 acres;
- Perform pre-harvest oak shelterwood treatment on about 265 acres;
- Prescribe burn about 29 acres;
- Control non-native plants by herbicide treatment on about 377 acres;
- Site prepare and release with herbicide and hand tools all two-age and group selection regenerated stands;
- Use a fungicide in one stand to limit spread of annosus root rot;
- Stabilize about one mile of stream within the Baldwin Field Branch drainage and place large wood and rock in the stream;
- 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 fields converted from temporary roads; 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 project area (about 6.5 miles total) unless the system roads are posted otherwise. There would be no other trails in the project 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 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%. 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 project area (Compartment 1 and Analysis Area 1) has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the project area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Baldwin Gap project 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 Analysis Area. The last appreciable entry in the AA was in 1992 over 13 years ago (approximately 83 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, 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 project 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 project 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 1-1: Quality Hardwood Sawtimber (Forest Plan, page 111-75)**

| 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 project 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 project 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 project 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 project 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 Framework

Based on the analysis disclosed in this EA, the Responsible Official will make a decision and document it in a Decision Notice and Finding of No Significant Impact. The Responsible Official can:

- Select an action alternative that has been considered in detail, or
- Select a modified action alternative, or
- Select the No-action Alternative.

## 1.6 Public Involvement

The proposal was listed in each Schedule of Proposed Actions since October 2002. The proposal was provided to the public and other agencies for comment during scoping from March 25, 2005 thru April 25, 2005—twelve individual comments were received during scoping—two additional comments (and a petition signed by 21 individuals against the proposal) were received two months later.

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

The Forest Service separated the issues into two groups: (key) significant and non-key (non-significant) issues. Each issue was analyzed with effects disclosed in Chapter 3.

### 1.7.1 Key Issue #1: Water Quality and Aquatic Habitat – *Constructing and reconstructing roads may adversely impact water quality and aquatic habitat*

**Indicators**

- ◊ Miles of road construction
- ◊ Miles of road reconstruction
- ◊ Mi/mi$^2$ road density

### 1.7.2 Key Issue #2: Wildlife and Trail Use – *The proposal may not create enough early successional habitat and grass/forb habitat. There are potential conflicts between trail users and hunters; and trail use and grass/forb habitat*

**Indicators**

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

### 1.7.3 Issue #3: Non-native Plants – *Non-native plants are established in the project area and there are various methods for control*

**Indicator**

- ◊ Acres of treatment

### 1.7.4 Issue #4: Pesticides – *Pesticide use (herbicide/fungicide) may adversely affect wildlife, water quality, and humans*

**Indicator**

- ◊ Acres of pesticide application

### 1.7.5 Issue #5: Soil Resources – *Constructing and reconstructing roads and logging related activities may impact soils*

**Indicators**

- ◊ Miles of road construction
- ◊ Miles of road reconstruction

- ◊ Acres of two-age harvest
- ◊ Acres of salvage thinning
- ◊ Acres of selection harvest

### 1.7.6 Issue #6: Cultural Resources – *Constructing and reconstructing roads and logging related activities may impact cultural resources*

**Indicators**

- ◊ Number of cultural resource sites in compartment
- ◊ Number of cultural resource sites impacted by logging and road construction activities

### 1.7.7 Issue #7: Scenery Resources – *Logging related activities may impact scenery resources*

**Indicators**

- ◊ Acres of modification visual quality objective (VQO)
- ◊ Acres of partial retention VQO
- ◊ Acres of retention VQO

### 1.7.8 Issue #8: Air Quality – *Prescribed fire may impact air quality in the watershed*

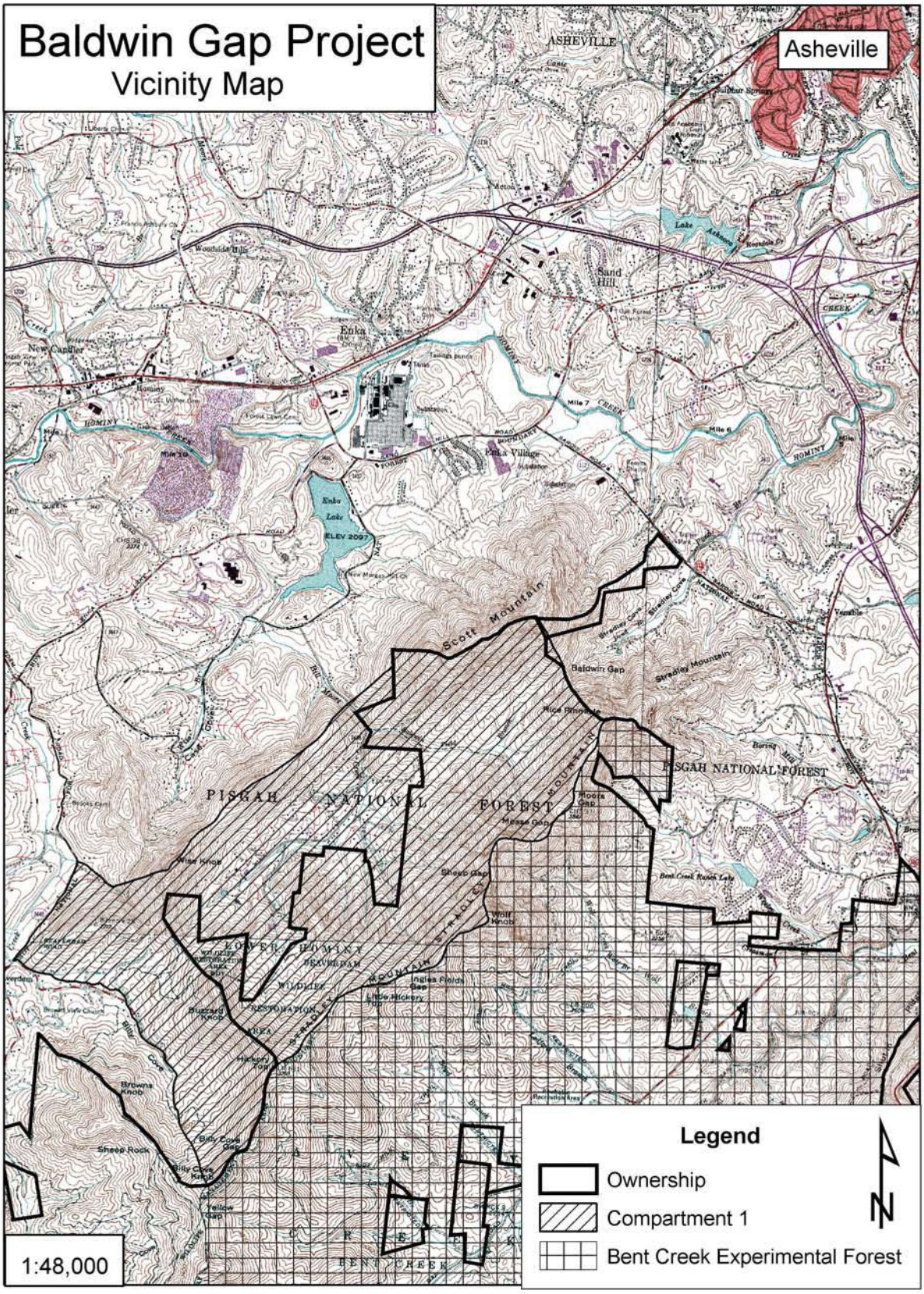
**Indicators**

- ◊ Acres of prescribed burning
- ◊ Particulate, carbon monoxide, visibility, and contrast ratio levels

### 1.7.9 Issue #9: Other Areas of Concern – *Harvest activities may adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local law or requirements imposed for the protection of the environment*

**Indicator**

- ◊ Presence of park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local law or requirements imposed for the protection of the environment


Baldwin Gap Project
Vicinity Map
Asheville
ASHEVILLE
Sand Hill
Enka
Enka Village
Enka Lake
ELEV 2097
New Candler
Scott Mountain
Baldwin Gap
Stradley Mountain
PISGAH NATIONAL FOREST
PISGAH NATIONAL FOREST
Moores Gap
Mesa Gap
Sheep Gap
Wolf Knob
Wise Knob
LOWER HOMINY
BEAVERDAM
WILDLIFE
RESTORATION
AREA
Buzzard Knob
Hickory Top
Browns Knob
Sheep Rock
Billy Cove Gap
Billy Cove Knob
Yellow Gap
Inglis Fields Gap
Little Hickory Top
Bent Creek Rugby Lake
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 proposal (Section 1.4, Chapter 1), and by the key issues responding to the proposal. An alternative 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 five alternatives. Following internal review, three alternatives were developed in detail and two were eliminated from detailed study.

## 2.2 Alternatives Considered in Detail

Four alternatives were developed by the IDT in response to the issues and concerns regarding the proposal and to meet NEPA regulations; Alternative A – No Action, Alternative B – Proposed Action, Alternative C, and Alternative D. The action alternatives fulfill the specific purpose and need for these actions. Mitigation measures for activities in each action alternative are also described in this chapter.

### 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. No management actions would take place at this time to improve the existing condition of the environment in the project area. There would be no regeneration, thinning or timber stand improvements, treatment of non-native plant species, designation of small or medium patches for old growth restoration, nor wildlife or aquatic habitat improvements made. This alternative serves as the environmental baseline for analysis of effects.

### 2.2.2 Alternative B – Proposed Action

This alternative was developed to improve 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. Specific activities and locations are displayed in the following table and in the Alternative B map located at the end of this chapter.

**Table 2-1: Summary of Alternative B – 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 |

| Stand | Acres | Treatment | Logging System |
|---|---|---|---|
| 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 | |
| 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 | |
| 1-25 | 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 | |

| Stand | Acres | Treatment | Logging System |
|---|---|---|---|
| 1-35 | 21 | Control invasives | n/a |
| 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, Alternative B 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 project area (about 6.5 miles total) unless the system roads are posted otherwise. There would be no other trails in the project 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.

### 2.2.3 Alternative C

Alternative C was developed to address public concerns regarding the method of treating oriental bittersweet, potential impacts to landowners caused by log trucks using the North Boundary Road (FSR 485), and potential impacts caused by road construction. Specific activities and locations are displayed in the following table and in the Alternative C map located at the end of this Chapter.

**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 |
| 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 | |

| Stand | Acres | Treatment | Logging System |
|---|---|---|---|
| 1-9 | 14 | Control invasives | n/a |
| 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 goats/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 project area (about 6.5 miles total) unless the system roads are posted otherwise. There would be no other trails in the project 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 public concerns with the amount of early successional habitat created, the percent of permanent grass and forb habitat developed, amount of prescribed fire proposed, 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.

**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 |
| 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 | |

| Stand | Acres | Treatment | Logging System |
|---|---|---|---|
| 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 | |
| 1-47 | 24 | Control invasives | |
| 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 project 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 project 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 Mitigation, Design Features, and Monitoring Common to Action Alternatives

Mitigation is defined as actions to avoid, reduce, eliminate, rectify or compensate for undesirable effects from proposed activities (40 CFR 1508.20). Mitigation measures are necessary for wildlife, terrestrial, and botanical resources (Appendix A), prescribed fire, and pesticide use (listed in Appendix F). The action alternatives share these mitigation measures, and unless noted otherwise in the decision document, they would become mandatory if the responsible official selects an action alternative.

Mitigation/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.
- ◊ 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 mitigation 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 project 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 table provides a comparison between the alternatives:

**Table 2-4: Comparison of Alternatives**

| Stand | Treatment Prescription | Logging System | Is Stand Proposed for Treatment? | | | |
|---|---|---|---|---|---|---|
| | | | Alt A | Alt B | Alt C | Alt D |
| **Regeneration Harvest** | | | | | | |
| 1-15 | Two-age | Tractor | No | Yes | No | No |
| 1-16 | Two-age | Tractor | No | No | Yes | Yes |
| 1-18 | Two-age | Tractor | No | Yes | Yes | Yes |
| 1-20[1] | Group selection | Tractor | No | Yes | Yes | Yes |
| 1-23 | Two-age | Tractor | No | Yes | Yes | Yes |
| 1-27 | Two-age | Tractor | No | No | Yes | Yes |
| 1-34 | Two-age | Skyline | No | Yes | No | Yes |
| 1-44 | Two-age | Skyline | No | No | No | Yes |
| 1-45 | Two-age | Skyline | No | Yes | No | Yes |
| **Total Acres of Two Age Harvest Proposed** | | | **0** | **111** | **81** | **152** |
| **Intermediate Harvest** | | | | | | |
| 1-4 | Sanitation Thin | Tractor | No | Yes | Yes | Yes |
| 1-15 | Sanitation Thin | Tractor | No | No | No | Yes |
| 1-16 | Sanitation Thin | Tractor | No | Yes | No | No |
| 1-20[1] | Sanitation Thin | Tractor | No | Yes | Yes | Yes |
| 1-25 | Sanitation Thin | Tractor | No | Yes | No | Yes |
| 1-27 | Sanitation Thin | Tractor | No | Yes | No | No |
| 1-31 | Sanitation Thin | Tractor | No | Yes | Yes | Yes |
| 1-35 | Sanitation Thin | Tractor/Skyline | No | No | Yes | Yes |

| Stand | Treatment Prescription | Logging System | Is Stand Proposed for Treatment? | | | |
|---|---|---|---|---|---|---|
| | | | Alt A | Alt B | Alt C | Alt D |
| 1-40 | Sanitation Thin | Tractor | No | Yes | No | No |
| 1-47 | Sanitation Thin | Tractor | No | Yes | Yes | Yes |
| **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** | | | | | | |
| 1-1 | Timber Stand Improvement (TSI) | n/a | No | Yes | Yes | Yes |
| 1-2 | TSI | n/a | No | Yes | Yes | Yes |
| 1-3 | TSI | n/a | No | Yes | Yes | Yes |
| 1-5 | TSI | n/a | No | Yes | Yes | Yes |
| 1-7 | TSI | n/a | No | Yes | Yes | Yes |
| 1-8 | TSI | n/a | No | Yes | Yes | Yes |
| 1-9 | TSI | n/a | No | Yes | Yes | Yes |
| 1-10 | TSI | n/a | No | Yes | Yes | Yes |
| 1-22 | TSI | n/a | No | Yes | Yes | Yes |
| 1-29 | TSI | n/a | No | Yes | Yes | Yes |
| **Total Acres of TSI Proposed** | | | **0** | **358** | **358** | **358** |
| **Oak Shelterwood** | | | | | | |
| 1-11 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | Yes |
| 1-15 | Pre-harvest Oak Shelterwood | n/a | No | No | Yes | No |
| 1-17 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | Yes |
| 1-25 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | No |
| 1-27 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | No |
| 1-35 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | Yes |
| 1-40 | Pre-harvest Oak Shelterwood | n/a | No | Yes | No | No |
| 1-44 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | No |
| 1-46 | Pre-harvest Oak Shelterwood | n/a | No | Yes | Yes | Yes |
| **Total Acres of Pre-harvest Oak Shelterwood Proposed** | | | **0** | **265** | **201** | **115** |
| **Invasives** | | | | | | |

| Stand | Treatment Prescription | Logging System | Is Stand Proposed for Treatment? | | | |
|---|---|---|---|---|---|---|
| | | | Alt A | Alt B | Alt C | Alt D |
| 1-4 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-6 | Control Invasives | n/a | No | No | Yes | No |
| 1-7 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-8 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-9 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-10 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-16 | Control Invasives | n/a | No | Yes | Yes | No |
| 1-17 | Control Invasives | n/a | No | Yes | Yes | No |
| 1-19 | Control Invasives | n/a | No | No | No | Yes |
| 1-22 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-25 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-27 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-28 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-30 | Control Invasives | n/a | No | No | No | Yes |
| 1-31 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-35 | Control Invasives | n/a | No | Yes | Yes | Yes |
| 1-40 | Control Invasives | n/a | No | Yes | No | No |
| 1-46 | Control Invasives | n/a | No | Yes | No | No |
| 1-47 | Control Invasives | n/a | No | Yes | Yes | No |
| Existing roads | Control invasives | n/a | No | Yes | Yes | Yes |
| **Total Acres of Invasives Controlled** | | | **0** | **380** | **344** | **402** |
| **Wildlife Habitat** | | | | | | |
| 1-15 | Linear Wildlife Opening | n/a | No | Yes | No | Yes |
| 1-19 | Wildlife Fields | n/a | No | No | No | Yes |
| 1-25 | Linear Wildlife Opening | n/a | No | Yes | No | No |
| 1-30 | Wildlife Fields | n/a | No | No | No | Yes |
| **Total Acres of Wildlife Habitat Developed** | | | **0** | **1.4** | **0** | **7.4** |
| **Prescribed Burning** | | | | | | |
| 1-4 | Prescribed Burning | n/a | No | Yes | Yes | Yes |
| 1-20 | Prescribed Burning | n/a | No | No | No | Yes |
| **Total Acres of Prescribed Burning** | | | **0** | **29** | **29** | **65** |

| Stand | Treatment Prescription | Logging System | Is Stand Proposed for Treatment? | | | |
|---|---|---|---|---|---|---|
| | | | Alt A | Alt B | Alt C | Alt D |
| **Bike/Horse Trails Designated** | | | | | | |
| **Miles of System Roads Available as Multi-use Non-motorized Trails in the Project 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.

# CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

This chapter forms the scientific and analytical basis for the comparison of alternatives as required by the National Environmental Policy Act (NEPA). Included in this chapter are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources relevant to the key issues. Direct and indirect effects occur at, or near the same time and place as a result of the action [40 CFR 1508.8 (a) and (b)]. They have been combined in this chapter, as it is difficult to completely separate between the two effects. Cumulative effects result "*…from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such action. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time"* (40 CFR 1508.7). Reports from different resource specialists supplied information for portions of the analysis in this chapter. The project area is the location of the proposal. The analysis area is the anticipated extent of effects by resource and is generally larger than the project area.

Effects analyses are disclosed by issue in this chapter. The issues associated with this proposed project were identified through a public participation process, which included input from Forest Service natural resource specialists, other government agencies, organizations, and individuals (see Section 1.7, Chapter 1). Analysis related to the two key issues will help form the decision to be made concerning this project.

## 3.1 Key Issue #1 – Water Quality and Aquatic Habitat _____

Issue Statement: *Constructing and reconstructing roads may adversely impact water quality and aquatic habitat*

Indicators:

- Miles of road construction
- Miles of road reconstruction
- Mi/mi$^2$ road density

### Hydrology Existing Condition

The analysis area is within the Bill Moore Creek drainage of the South Hominy Creek Sub-Watershed (6$^{th}$ level hydrologic unit). 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.

The road density in the Baldwin Field Branch drainage (a one square mile area) is relatively high at about 7.25 miles/mile$^2$ of existing system and "woods" roads. In the headwaters of the Bill Moore Creek drainage, on National Forest System lands only, there are 3.2 miles of road. Road density within the Bill Moore Creek drainage was not calculated due to the large amount of privately owned roads. 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 federally managed lands are predominantly stable due to well-vegetated surfaces, with the exception of several 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 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.

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 project area, 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 the project 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 project area 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 Project Area | 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 |
| 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 project areas of Baldwin Field Branch and the analysis area of Bill Moore Creek. There is limited habitat for fish species within the other project area waters, due to small stream size and restricted flow regimes. Project 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.

Project 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 unnamed tributary 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 project 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 project area 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 project 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 project area. 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 project area 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 Effects Analysis

Aquatic Habitat Effects Summary

The following table summarizes the effects analyses 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. | Existing habitat would improve with watershed enhancement and stream bank stability at crossings. Population trends continue. | Existing habitat would improve with watershed enhancement and stream bank stability at crossings. Population trends continue. |
| Effects on water quality | Slight risk of degradation from | Turbidity and sediment loading | Turbidity and sediment loading | Turbidity and sediment loading |

| Issue | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| (associated with the amount of soil disturbance) | undesignated connector trails. | may increase slightly during culvert installation and implementation of watershed project. Should diminish downstream and cease with site rehabilitation. | may increase slightly during culvert installation and implementation of watershed project. Should diminish downstream and cease with site rehabilitation. | may increase slightly during culvert installation and implementation of watershed project. Should diminish downstream and cease with site rehabilitation. Slight risk of degradation from undesignated connector trails. |
| 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. | May temporarily affect aquatic habitat Baldwin Branch and tributaries (during restoration) but would improve over time. | May temporarily affect aquatic habitat Baldwin Branch and tributaries (during restoration) but would improve over time. |
| 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. | Remain in present state except at stream crossings. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams. | Remain in present state except at stream crossings. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams. |
| 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. | No impact as no spraying would occur within 30 horizontal feet of streams. Goats would stay out of this 30 feet of riparian to protect native riparian vegetation. | No impact as no spraying would occur within 30 horizontal feet of streams. |
| Effects of prescribed burning | No impact | Burning activity within riparian areas would not be intense enough to destroy riparian vegetation | Burning activity within riparian areas would not be intense enough to destroy riparian vegetation | Burning activity within riparian areas would not be intense enough to destroy riparian vegetation |

## 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. The Forest Plan does not allow vegetation management within riparian zones for perennial streams unless it is specifically for the enhancement of riparian values (page III-181). This standard was designed to allow vegetation along streams to become old and decadent and to serve as a long-term source of LWD to stream channels. However, areas exist across the Forests where vegetation can be managed within designated riparian areas to facilitate LWD transport and to serve as a short-term source of habitat improvement.

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

Sedimentation of aquatic habitats within the project area 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 FS 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 FS5096. Also, improvements to water quality are expected by the elimination of undesignated connector trails into the Baldwin Gap area from North Boundary Road

### 3.1.2 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. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. 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 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, more 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 (Best Management Practices) and Forest Practices Guidelines listed in Section 3.1.3 below, and mitigation and design features listed in Section 2.4 above.

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

Access through stand 20 would require the reconstruction of an existing woods road. This reconstruction has the 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 to Baldwin Field Branch 2, 3, 4 and 5. Habitat within and downstream of these crossing sites would improve since the 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 project 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 project 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 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).

Alternative C

This alternative is the same in regards to impacts on aquatic resources because the stream crossings listed above would still exist with the proposal in Alternative B. Please see the discussion above for impacts to aquatic resources from access.

Alternative D

This alternative would be the same as Alternative B in regards to impacts to aquatic resources from access. Please see the discussion in Alternative B for impacts to aquatic resources from access.

### 3.1.3 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 would be implemented during harvest activities. Applications of Forest Plan standards are intended to meet performance standards of the state regulations. Visible sediment derived from timber harvesting, defined by state regulations, should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures would be implemented as specified by state regulations.

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 the Land and Resources Management Plan (LRMP) Vol. 1, *Under these conditions, no increase in water temperature is anticipated under any of the alternatives. Since riparian-area treatment is not expected under any alternatives, availability of woody debris would be positively influenced if there was no harvest anywhere within the riparian zone on each streambank* Vol. 1, IV-36.

Alternative C

Effects to aquatic resources would generally be similar to Alternatives B with C. 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 neither would have any adverse impacts to aquatic resources. No skidding would occur across these drains and trees would be directionally felled away from them, reducing the risk of sediment reaching analysis area streams.

Alternative D

Alternative D includes the same harvesting treatments as Alternative B with the addition of linear wildlife fields on access roads and 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 so are therefore 100 horizontal feet from the stream's edge. Therefore, the development of these wildlife fields within stands 30 and 19 would have no indirect or direct effects on the aquatic resources within Baldwin Field Branch or the tributaries. Effects discussed in Alternative B apply to Alternative D.

### 3.1.4 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 project 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 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. The scales of the trees and stream channels do not match, and 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" 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 the stream banks would most likely 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 construction, however the riparian areas associated with stream crossings would remain the same.

Alternative D

Effects to the 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 analysis area streams. The stream crossings associated with Alternative B are the same for Alternative D.

### 3.1.5 Effects of Other Activities

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 should be noted that the encroachment of oriental bittersweet throughout the riparian areas of the aquatic resources within the area would likely occur 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 streams within the Baldwin Gap Project, reducing potential for direct impacts to water quality (see also Section 3.4 below). No herbicide would be sprayed within the 30 foot designated riparian area of any intermittent streams within the project area. 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 prescribed burning—stand 04 in Alternatives B and C and stands 20 and 04 in Alternative D. No fire line 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 Baldwin Gap Project area. Late winter or early spring burns are typically of low intensity. Any burning activity within riparian areas would not be intense enough to

destroy riparian vegetation. IF fire lines are needed, they would be constructed with hand tools. If mineral soil is disturbed within riparian areas, it is possible that erosion could occur. Prescribed burn areas are inspected after implementation. Areas of erosion are identified and corrected during inspection to eliminate stream sediment sources. There would be no effect to aquatic resources from this activity.

#### 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 (LWD) within a stream is defined as woody debris greater than or equal to 10 centimeters in diameter (Meehan, 1991). LWD 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 to 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 the recontouring and obliteration of 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 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. The following table displays a summary of expected effects by alternative.

#### 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 is no “designated” trail connecting North Boundary Road to the Baldwin Field area. In the absence of such a connector, there have been various 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 negative impacts on populations of aquatic macroinvertebrates. Alternative D would not designate the connectors, but would rehabilitate user developed trails.

The implementation of Alternatives B or C would address the existing issue of user developed 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 sites would be closed to use and rehabilitated. The development of these designated connectors would reduce the amount of off site movement of soil and eliminate the direct impacts to individuals from use within the channel.

### 3.1.6 Aquatic Threatened, Endangered, and Sensitive 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 included in Attachment 2, which 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. Attachment 3 summarizes this process.

Because of the amount of suitable habitat available across North Carolina and the Southern Appalachian Mountains, a majority of the members of the sensitive and Forest concern 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 PETS within the project or analysis area of the Baldwin Gap Timber Project. During the project and analysis area specific surveys there were no Forest concern aquatic organisms found. However, 10 Forest concern species are included in this analysis due to their habitat preferences and the presence of this habitat within the project and analysis areas.

Activities within the Baldwin Gap Timber Project area would follow the riparian area guidelines along perennial and intermittent streams as stated in the Land and Resources Management Plan (LRMP) for the Nantahala and Pisgah National Forests and NC Best Management Practices. During specific project area surveys, none of the members of the Forest concern aquatic species were present however habitat did exist. Aquatic insects present during culvert installation may suffer mortality during disturbance at stream crossings. This disturbance may cause a temporary fluctuation in turbidity, but it is not expected to impact any of the area's aquatic resources.

**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 Proposed, Endangered, Threatened, or Sensitive or Forest Concern aquatic species.

**Alternative B**

There would be 13 crossings associated with the implementation of this project. Though no TES or Forest Concern aquatic species were found during project area surveys, habitat exists thus they were included in the analysis. 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 the proposed actions for Alternative B to any aquatic PETS or FC species.

**Alternative C**

Alternative C drops any new road construction and reduces the amount of reconstruction. There would be 12 crossings associated with the implementation of this alternative. Though no TES or Forest Concern aquatic species were found during project area surveys, habitat exists thus they were included in the analysis. 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 the proposed actions for Alternative C to any 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 Species** | | | | |
| None present | | | | |
| **2002 Region 8 Regional Forester's Sensitive Species List** | | | | |
| None present | | | | |
| **Forest Concern Species** | | | | |
| *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* | No Impact. | *May impact | *May impact | *May impact |

| Species | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| (Benfield's bearded small minnow mayfly) | Existing condition would continue. | individuals. | individuals. | 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 project area 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

### 3.1.7 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. There has been a tremendous amount of resource specialist involvement in the planning and design of this proposal, contributing to the reduction in possible adverse effects.

Past timber projects within compartment 1 date back from the 1970s to 1981. Other disturbances within the AA include several private residences, absence of riparian vegetation on Bill Moore Creek, 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 (analysis area) within the Bent Creek Experimental Forest and only hauling would occur within that watershed under Alternatives B and D.

Other impacts to the analysis area streams include illegal 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 analysis area waters is occurring as a result of these activities. USFS law enforcement officials are addressing the illegal ORV use on the National Forests 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 the obliteration of two undesignated trails which is expected to improve habitat within two intermittent channels which are carrying sediments into Baldwin Field Branch during storm events. There are no other known foreseeable actions in the project area.

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 project 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 analysis area 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 project and analysis areas during September of 2004 during an eight day period. These storms released up to 14 inches of rain within 48 hours each time. Many streams within the French Broad River drainage were heavily impacted by the storm events. Streams within the Baldwin Gap Project 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. 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.

### 3.1.8 Water Quality Effects Analysis

Introduction

Direct and indirect effects to stream channels would be 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 7$^{th}$ 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**

Since Alternative A would do nothing to actively change the current watershed condition, 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 no other known foreseeable actions in the project area.

### Alternative B – Proposed Action

#### Direct and Indirect Effects

Summary: Alternative B is not likely to increase sediment loading to stream channels due to 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 have a positive effect on water quality.

Alternative B would construct 0.25 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 analysis area has the potential to increase sediment inputs to streams, predominantly during the replacement of culverts. During the replacement of road crossings, mitigation measures 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 effected drainages since existing chronic sources of sediment would be notably reduced.

This alternative proposes to construct two connector trails for bicycle riders. 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 non-designated trails that appear to be contributing to water resource damage.

Alternative B proposes the decommissioning of 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 mitigation measures 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 1 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 project area and another larger development about two miles north of the Baldwin Gap project 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.

## 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 analysis area has the potential to increase sediment inputs to streams, predominantly during the replacement of culverts. During the replacement of road crossings, mitigation measures 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 effected drainages since existing chronic sources of sediment would be notably reduced.

This alternative proposes to construct two connector trails for bicycle riders. 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 non-designated trails that appear to be contributing to water resource damage.

This alternative proposes the decommissioning of 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 mitigation measures 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 1 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 project area and another larger development about two miles north of the Baldwin Gap project 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.

### Alternative D

#### Direct, Indirect, & Cumulative Effects

Since Alternative D proposes the same road and stream treatments as Alternative B, please see disclosures in Alternative B above for impacts to water quality as a result of the road network.

## 3.2 Key Issue #2 – Wildlife and Trail Use

Issue Statement: *The proposal may not create enough early successional habitat and grass/forb habitat. There are potential conflicts between trail users and hunters; and trail use and grass/forb habitat*

Indicators:

- Acres of early successional habitat created (two-age harvest)
- Percent of grass/forb developed
- Acres of prescribed burning
- Miles of new bike/horse trail designated

### Existing Condition

Ten federally listed, 33 Region 8 Regional Forester's sensitive species (August 7, 2001, list), and 57 forest concern (locally rare) wildlife species were originally considered from the Forest's species list (wildlife analysis, Attachment A, project record). All but 4 federally listed, 11 sensitive, and 13 forest concern species were dropped since these were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Buncombe County. All of these but three sensitive and five forest concern species were dropped

from the list for analysis as a result of the likelihood of occurrence evaluation based on habitat elements and filed records (see following table).

**Table 3-4: Likelihood of Occurrence of Rare Wildlife Species within the Analysis Area**

| Species | Status | Likelihood of Occurrence | Evaluation Criteria* |
|---|---|---|---|
| Eastern Small-footed Bat (*Myotis leibii leibii*) | Sensitive | May occur | 1, 4 |
| Frosted Elfin (*Callophyrs irus*) | Sensitive | May occur | 1, 4 |
| Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) | Sensitive | May occur | 1, 4 |
| Eastern Woodrat (*Neotoma floridana haematoreia*) | Forest Concern | May occur | 1, 4 |
| Yellow-bellied Sapsucker (*Shyrapicus varius appalachiensis*) | Forest Concern | May occur | 1, 4 |
| Dusky Azure (*Celastrina niger*) | Forest Concern | May occur | 1, 4 |
| Golden banded skipper (*Autochton cellus*) | Forest Concern | May occur | 1, 4 |
| Tawny crescent (*Phyciodes batesii maconensis*) | Forest Concern | May occur | 1, 4 |

1 = Recent survey data within project area (<5 year old)
2 = Historical survey data within project area (>5 years old)
3 = Vicinity records (NCWRC, NCNHP, USFWS)
4 = Suitable habitat exists within project area, but no records
5 = No suitable habitat exists within project area

Several snags or hollow trees exist within the project area. 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 project area, based on surveys conducted by Mae Lee Hafer, Forest Wildlife Biologist.

Several rock outcrops and small boulder fields exist in the project area that is 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 project 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.

There is currently unauthorized horse, bike, and all terrain vehicle use in the project area 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 regionally sensitive and forest concern wildlife species. Additional information and effects analysis on threatened and endangered wildlife

species is disclosed in Appendix A, Biological Evaluation and additional information and effects analysis on wildlife management indicator species (MIS) is disclosed in Appendix G, MIS.

### 3.2.1 Regionally Sensitive Species

Alternative A - No Action

The no action alternative would maintain the status quo for the project area. None of the current habitat would change; therefore, this alternative would have no impact on any regionally sensitive species.

Alternatives B, C, and D

Implementation of any of the action alternatives would have no impact on the small-footed bat. The small-footed bat may roost in hollow trees or rock outcrops during the summer. No rock outcrops would be destroyed as a result of implementing any of the action alternatives. Also, there is a LRMP standard to maintain large snags and cavity trees within the project area during harvest activities (Forest Plan, page III-23). Snags are not in short supply within the project area as a result of recent storms and pest infestations.

The action alternatives may actually improve habitat for the frosted elfin. The frosted elfin is found in open woods and borders, usually in dry situations. Its host plant is wild indigo (*Baptisia spp.*), which occurs in the project area. The harvesting and thinning proposed in the action alternatives would open the forest and create drier conditions as sunlight is allowed to reach the forest floor.

Implementation of any of the action alternatives would have no impact on the Rafinesque's big-eared bat. Rafinesque's big-eared bat roosts in old buildings or hollow trees, usually near water. There is a LRMP standard to maintain snags and cavity trees within the project area during harvest activities (Forest Plan, page III-23). Snags are not in short supply within the project area as a result of recent storms and pest infestations.

### 3.2.2 Forest Concern Species

Alternative A - No Action

The no action alternative would maintain the status quo for the project area. None of the current habitat would change; therefore, this alternative would have no impact on any forest concern species.

Alternatives B, C, and D

The eastern woodrat is associated with boulder fields in deciduous or mixed forests. Although there are suitable rocky habitat in the project area for this species, care would be taken to protect all boulder fields that provide suitable habitat for the eastern woodrat. This would be accomplished by maintaining a buffer around the boulder field; therefore, there would be no impact to this species should any of the action alternatives be implemented.

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 project area. Evidence of sapsucker foraging was found during surveys by Mae Lee Hafer, Forest Wildlife Biologist. Although the action alternatives would harvest mature trees, snags are protected according to LRMP standards

(Forest Plan, page III-23). The thinning proposed would open the forest, which may create more suitable habitat for the sapsucker.

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 project area. This plant could be affected by harvest and thinning activities should it be in the area where equipment is being used. Although no dusky azures were found during surveys of the project area, if they did occur, individuals might be impacted by management activities being implemented with any of the action alternatives.

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 project area in rich coves. Although the action alternatives will harvest trees in rich coves, riparian areas are protected according to LRMP standards. Although no golden-banded skippers were found during surveys of the project area, if they did occur, their habitat along streams would be protected. Thus, implementation of any of the action alternatives will not adversely impact the golden-banded skipper.

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 project area in the montane oak-hickory forest. This plant could be affected by harvest and thinning activities should it be in the area where equipment is being used (i.e., individual plants being crushed by equipment). Although no tawny crescent were found during surveys of the project area, if they did occur, individuals might be impacted indirectly in the short term (about 2 years) by management activities being implemented with any of the action alternatives as a result of the effects to *Aster undulates*. However, 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.

The following table summarizes information relating to the wildlife resource by alternative:

**Table 3-5: Summary of Actions Related to Wildlife by Alternative**

| Indicator | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Acres of early successional habitat created (two-age)[1] | 0 | 111 | 81 | 152 |
| Percent of grass/forb developed | 0 | 1.4 | 0 | 7.4 |
| Acres of prescribed burning | 0 | 29 | 29 | 65 |
| Miles of new bike/horse trail designated[2] | 0 | 6.5 | 6.5 | 0 |

1 Include 15 acres of group selection harvest
2 Includes about 0.4 miles of new trail construction (2 connectors)

### 3.2.3 Cumulative Effects

Alternative A

Since there are no direct or indirect effects with this alternative, there would be no cumulative effects.

Alternatives B, C, and D

There will be no cumulative impacts on the eastern small-footed bat, Rafinesque's big-eared bat, eastern woodrat, and golden-banded skipper since there are no direct or indirect impacts on these

species should any of the action alternatives be implemented. The frosted elfin and yellow-bellied sapsucker may have beneficial cumulative impacts since implementation of any of the action alternatives may actually improve their habitat in the project area. The dusky azure may have negative cumulative impacts since implementation of any of the action alternatives may impact its host plant, goat's beard. The tawny crescent may have negative cumulative impacts initially after implementation (about 2 years) of any of the action alternatives because of impacts to its host plant, *Aster undulates*. However, implementation may have beneficial cumulative impacts in the long-term by opening up the woods causing more favorable conditions for the aster and the tawny crescent.

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 subdivision being developed 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 change to the impacts of MIS that occur on the Forest in the project area. There are no other known foreseeable actions in the project area.

## 3.3 Issue #3 – Non-native Plants

Issue Statement: *Non-native plants are established in the project area and there are various methods for control*

Indicator:

◊ Acres of treatment

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 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 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* (bittersweet) within the 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 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 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 project area:

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

| Species | Regional Category[1] | Location in Project Area |
|---|---|---|
| *Lespedeza cuneata*<br>Sericea | 1 | All roadsides through out AA |
| *Paulownia tomentosa*<br>Princess tree | 1 | Infection limited to area near old road (stand 1-16) |
| *Lolium arundinaceum*<br>Tall fescue | 1 | Old roads |
| *Lonicera japonica*<br>Japanese honeysuckle | 1 | Alluvial Forest along Baldwin Fields Branch, woods roads, through out AA |
| *Microstegium vinineum*<br>Japanese stilt grass | 1 | Mostly in Alluvial Forests and coves. Very well established |
| *Celastrus orbiculatus*<br>Bittersweet | 1 | Mostly in Alluvial Forests and Rich Coves. Very well established in AA. |
| *Rosa multiflora*<br>Multi floral rose | 1 | Alluvial Forest along Baldwin Fields Branch, woods roads, through out AA |
| *Miscanthus sinensis*<br>Plume grass | 2 | Baldwin Fields Branch road |
| *Allium vineale*<br>Field garlic | 1 | Scattered small populations near old roads |
| *Coronilla varia*<br>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 threatened and endangered plant species is disclosed in he Biological Evaluation, Appendix A, and additional information and effects analysis on management indicator plant species (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 plants 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 project area.

### 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 Project Area 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 |
| *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 or control bittersweet within the AA or contribute to a major reduction in trend within the 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 of 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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

## 3.4 Issue #4 – Pesticides

Issue Statement: *Pesticide use (herbicide/fungicide) may adversely affect wildlife, water quality, and humans*

Indicator:

◊ Acres of pesticide application

Existing Condition

The Baldwin Gap project 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 project area.

### 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. Effects of the treatment would be limited to individual trees/plants and the immediate area near them. 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/index.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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

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 analysis area that could cause adverse cumulative effects.

## 3.5 Issue #5 – Soil Resources

Issue Statement: *Constructing and reconstructing roads and logging related activities may impact soils*

Indicators:

- Miles of road construction
- Miles of temporary road reconstruction
- Acres of regeneration harvest
- Acres of group selection
- Acres of intermediate harvest

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 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 |

| Map Unit Name | Soil Map Symbol | Avg. Slope Percent | Characteristics |
|---|---|---|---|
| | | | 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 project area.

### 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 |
| 788D,E | Trail Construction | 0.2 | 0.2 | 0 |

| Soil Map Unit Symbol | Proposed Activity | Alternative B (acres) | Alternative C (acres) | Alternative D (acres) |
|---|---|---|---|---|
| 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 project 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 project 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 project 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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

## 3.6 Issue #6 – Cultural Resources

Issue Statement: *Constructing and reconstructing roads and logging related activities may impact cultural resources*

Indicators:

- Number of cultural sites in compartment
- Number of cultural resource sites impacted by logging and road construction activities

Existing Condition

Within the project 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 project area.

### 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 mitigation measures listed in Section 2.4, Chapter 2. There are no expected ground disturbing actions proposed in the project area in the foreseeable future. In addition, there is a 19 acre subdivision being developed about one mile west of the Baldwin Gap project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

## 3.7 Issue #7 – Scenery Resources

Issue Statement: *Logging related activities may impact scenery resources*

Indicators:

- ◊ Acres of modification visual quality objective (VQO)
- ◊ Acres of partial retention VQO
- ◊ Acres of retention VQO

Existing Condition

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

### 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 mitigation, 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 | Mitigation* |
|---|---|---|---|---|---|---|---|
| 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 mitigation, 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 | Mitigation* |
|---|---|---|---|---|---|---|---|
| 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 mitigation, 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 | Mitigation* |
|---|---|---|---|---|---|---|---|
| 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 following scenery mitigation, 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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

## 3.8 Issue #8 – Air Quality

Issue Statement: *Prescribed fire may impact air quality in the watershed*

Indicators:

- Acres of prescribed burning
- Particulate, carbon monoxide, visibility, and contrast ratio levels

### 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 project area.

### 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)<br>38.06 (1-20) | 4.46 (1-4)<br>4.40 (1-20) | 21.69 (1-4)<br>21.48 (1-20) | 0.84 (1-4)<br>0.81 (1-20) | | | |
| Upper Extreme Level | | 360.94 (1-4)<br>353.10 (1-20) | 7.76 (1-4)<br>7.82 (1-20) | 21.69 (1-4)<br>21.48 (1-20) | 0.84 (1-4)<br>0.81 (1-20) | | | |
| Minimum Distance to be Assigned Green[c] by the EPA | | 4,118’ (1-4)<br>5,174’ (1-20) | 2,587’ (1-4)<br>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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

## 3.9 Issue #9 – Other Areas of Concern

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

Indicator:

- Presence of park lands, prime farmlands, wetlands, wild and scenic rivers, ecologically critical areas, or local law or requirements imposed for the protection of the environment

### 3.9.1 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.

### 3.9.2 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 project area and another larger development about two miles north of the Baldwin Gap project 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 project area.

# 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

## 4.3 Others Providing Input

Dr. Richard Bury
Ed Erwin
Tamatha Hallinger*
Johanna Herman*
Ronnie & Llewellyn Lawing*
Ben Prater
Gary Robinson*
Roy & Viola Walker*
Emily Wynes*
Randall Denham
Dafney Fox
Leonard Harwood
Margaret Hurt
Teresa Massey*
Terry Rice
Ed Stein*
Julie White
Rachel Doughty
Kurt Graulich*
Steve Henson
Paul Lane*
Claudia Nix
Dale Robinson*
Linda Strather*
Gary Woodall

* Signed a petition against the proposal

# 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 (T&E) and Regional Forester's Sensitive (S) species so that the Forest Service is within compliance of environmental laws such as the Endangered Species Act and the National Forest Management Act (NFMA). Meeting these laws will prevent possible adverse viability trends to these species. Forest Concern species (FC) are discussed and analyzed in the wildlife, botanical, and aquatics resource reports located in the project record.

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 area 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 resource analysis area (AA) that is germane to that discipline.

### Project Location & Description

The analysis area used for the wildlife analysis includes 6,674 acres of Forest Service land in Compartments 1 - 6. The project area for wildlife and botanical resources include Compartment 1, which is 1,370 acres—Compartment 1 is also the botanical AA. The aquatic analysis area is within Land and Resources Management Plan (LRMP) watershed number 27 which includes Bill Moore Creek and Baldwin Field Branch. The analysis area lies in the upper reaches of the French Broad River drainage. It 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.

The project area is entirely in MA 3B. Management Area 3B emphasizes managing for a sustainable supply of timber, with few open roads, and provides habitat needs for wildlife such as wild turkey, deer, a variety of small mammals and other species that would benefit from a managed forest with limited motorized access. Over half (54%) of the analysis area is in

Management Area 3B. MA 3B uses 80 year rotations for cove and upland hardwoods and 60 years for white and yellow pine. The remaining 46% are in other management areas.

Management opportunities have been identified through a comparison of existing and desired conditions which could move this landscape toward a desired future condition. The desired future condition for a given resource was determined by examination of the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (USDA March 1994 and here after referred to as the Forest Plan). 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, and visual resources and provide a more sustainable, healthy ecosystem. There are three action alternatives for the Baldwin Branch proposal. A detailed description of the proposed actions and alternatives is located in Chapter 2.

## Proposed Action

1. Regenerate forested stands by selection or two-age timber harvest.
2. Construct new, temporary, and/or reconstruction of road (s). Maintain existing roads.
3. Improve wildlife habitat.
4. Designate old growth.
5. Construct bike/hiking connector trails.
6. Stream channel stabilization on Baldwin Field Branch.
7. Control exotic and invasive plant species.

## 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 project 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 AA, none of which occurs in Compartment 1. 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 (3% of 1,370 acres) primarily for eastern wild turkey.

Approximately 80% of the analysis area 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 project area is in pine and pine/hardwood forest types (Table A-1).

**Table A-1: Forest Types by Age Class and Acres in the 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 |

| Forest Type | 0-10 years | 11-40 years | 41-80 years | 81-100 years | 101+ years | Total |
|---|---|---|---|---|---|---|
| 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 project area as a result of past storms and pest infestations. Hollow trees serve as potential roost sites for Rafinesque's big-eared bats. Several rock outcrops and small boulder fields exist in the project area that may provide potential roosting habitat for the small-footed bat. Dave Danley, Forest Service botanist, found wild indigo (*Baptisia tinctoria*) in the project area, which may serve as a host plant for the frosted elfin.

### Aquatics

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

**Table A-2: Forest Plan Watershed 27 (Bill Moore Creek)**

| Stream Name (UT denotes an unnamed tributary) | Compartment-Stand | Miles in Project Area | 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 |

| Stream Name (UT denotes an unnamed tributary) | Compartment-Stand | Miles in Project Area | Miles in Analysis Area | DEM Classification* |
|---|---|---|---|---|
| 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 project areas of Baldwin Field Branch and the analysis area of Bill Moore Creek. There is limited habitat for fish species within the other project area waters, due to small stream size and restricted flow regimes. Project area waters provide habitat for macroinvertebrates.

### Botanical

The Baldwin Gap botanical 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 T&E (2001), and S (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 surveys, snail surveys, and bird 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 project area, 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.

## Historical Surveys

### Wildlife

Prior to summer 2004, there was no historical wildlife survey information in the Baldwin Field Gap analysis area.

### Aquatics

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used 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 Field Gap analysis area.

## Species Evaluation

Species evaluated further may be found in Tables A-3 thru A-5. Species not evaluated further are listed in Attachment A, along with the reason for elimination from further consideration.

### Wildlife

Ten T & E, 33 Region 8 Regional Forester's sensitive species (August 7, 2001 list), and 57 forest concern (locally rare) wildlife species were originally considered from the Forest's species list (wildlife report, Attachment A, project record). All but four T & E, 11 sensitive, and 13 forest concern species were dropped since these were listed by the North Carolina Wildlife Resources Commission (NCWRC), North Carolina Natural Heritage Program (NCNHP), and the US Fish and Wildlife Service (USFWS) as occurring or probably occurring in Buncombe County (wildlife report, Attachment A, project record). All of these but three sensitive and five forest concern species (discussed in Attachment A of the wildlife report, project record) were dropped from the list for analysis as a result of the likelihood of occurrence evaluation based on habitat elements and field records (Table A-3).

**Table A-3: Likelihood of Occurrence of Rare Wildlife Species Within the Analysis Area in Buncombe County, North Carolina.**

| Species | Status | Liklihood of Occurrence | Evaluation Criteria* |
|---|---|---|---|
| Eastern Small-footed Bat (*Myotis leibii leibii*) | Sensitive | May occur | 1, 4 |
| Frosted Elfin (*Callophyrs irus*) | Sensitive | May occur | 1, 4 |
| Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) | Sensitive | May occur | 1, 4 |

* 1 = Recent survey data within project area (<5 year old)
2 = Historical survey data within project area (>5 years old)
3 = Vicinity records (NCWRC, NCNHP, USFWS)
4 = Suitable habitat exists within project area, but no records

5 = No suitable habitat exists within project area

### Aquatic

Twenty nine rare 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 (aquatic report, project record), which 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. Attachment 3 (Aquatic Report, project record) summarizes this process.

Because of the amount of suitable habitat available across North Carolina and the Southern Appalachian Mountains, a majority of the members of the sensitive 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. For a discussion of the forest concern species, please refer to the Aquatic Report, located in the project record.

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

| Species | Type | Habitat | Occurrence |
|---|---|---|---|
| **Federally Threatened and Endangered Species** | | | |
| *Cyprinella monacha* and *Alasmidonta raveneliana* were considered but eliminated based on analysis area surveys, USFS, NCWRC, NCHP and DWQ. | | | |
| **2002 Region 8 Regional Forester's Sensitive Species List** | | | |
| *Percina burtoni* and *Percina macrocephala* were considered but eliminated based on project area surveys conducted by the USFS and NCWRC. | | | |

### Botanical

A total of 327 common plant species were noted during field surveys. Attachment 2 of the botanical analysis located in the project record lists the 327 plant species found. Listed below are the TES species and their likelihood of occurrence within the Baldwin Gap project and analysis area.

**Table A-5: Potential & Known TES Plant Species in the Baldwin Gap Botanical Analysis Area**

| Species | Type | Natural Community or Habitat | Occurrence |
|---|---|---|---|
| **Federally Threatened or Endangered plant species (T&E)** | | | |
| None | N/A | N/A | N/A |
| **2002 Region 8 Regional Forester's Sensitive plant species (S)** | | | |
| *Aconitum reclinatum* | Vascular Plant | Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest | May occur in analysis area, not known to occur in project or activity area. |
| *Berberbis canadensis* | Vascular Plant | Rich Cove Forest, Mafic Glade | May occur in analysis area, not known to occur in project or activity area. |
| *Botrychium jenmanii* | Vascular Plant | Rich Cove Forest | May occur in analysis area, not known to occur in project or |

| Species | Type | Natural Community or Habitat | Occurrence |
|---|---|---|---|
| | | | 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 project or activity area. |
| *Coreopsis latifolia* | Vascular Plant | Rich Cove Forest, Northern Hardwood Forest | May occur in analysis area, not known to occur in project or 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 project or activity area. |
| *Hasteola suaveolens* | Vascular Plant | Montane Alluvial Forest | May occur in analysis area, not known to occur in project or activity area. |
| *Hexistylis contracta* | Vascular Plant | Acidic Cove Forest | May occur in analysis area, not known to occur in project or activity area. |
| *Hexastylis rhombiformis* | Vascular Plant | Acidic Cove Forest. | May occur in analysis area, not known to occur in project or activity area. |
| *Helianthus glaucophyllus* | Vascular Plant | Anthropogenic, roadsides; Rich Cove Forests | May occur in analysis area, not known to occur in project or activity area. |
| *Heuchera longiflora var. aceroides* | Vascular Plant | Rock outcrop in Rich Cove Forest | May occur in analysis area, not known to occur in project or activity area. |
| *Hydothyria venosa* | Lichen | On rock in streams | May occur in analysis area, not known to occur in project or activity area. |
| *Juglans cinerea* | Vascular Plant | Rich Cove Forest. | May occur in analysis area, not known to occur in project or activity area. |
| *Lysimiachia fraseri* | Vascular Plant | Rich Cove Forest, Acidic Cove Forest, roadsides | May occur in analysis area, not known to occur in project or activity area. |
| *Monotropsis oderata* | Vascular Plant | Chestnut Oak Forest | May occur in analysis area, not known to occur in project or activity area. |
| *Nardia lescurii* | Liverwort | Acidic Cove Forest. | May occur in analysis area, not known to occur in project or 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 project or 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) |

Definitions for the various types of likelihood of occurrence are as follows:

"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. For purposes of the AQUA, it should be assumed that the species does occur in a specified area until presence/absence of the species is verified.
"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 ours) have not found the species in the project and/or analysis areas. These species are not included in the analysis.

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

### Wildlife

There would be no direct, indirect, or cumulative effects on any wildlife T&E species since none occur within the project area based on known distribution and lack of suitable habitat within the project area (based on surveys).

### Aquatics

There would be no direct, indirect, or cumulative effects on any aquatic T&E species since none occur within the project area based on analysis and project area surveys that were conducted by the USFS, NCWRC, NCHP and DWQ.

### Botanical

There would be no direct, indirect, or cumulative effects on any botanical T&E species since none occur within the project area based on known distribution and lack of suitable habitat within the project area (based on surveys).

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

### Wildlife

The small-footed bat may roost in hollow trees or rock outcrops during the summer. No rock outcrops would be destroyed as a result of implementing any of the action alternatives, and those rock outcrops that are suitable for the eastern woodrat (a forest concern species) would be protected with a buffer. Also, there is a LRMP standard to maintain large snags and cavity trees within the project area during harvest activities (Forest Plan, page III-23). Snags are not in short supply within the project area as a result of recent storms and pest infestations. Implementation of any of the action alternatives would have no impact on the small-footed bat as a result of protection of snags and rock outcrops, and no shortage of snags in the project area.

The frosted elfin is found in open woods and borders, usually in dry situations. Its host plant is wild indigo (*Baptisia spp.*), which occurs in the project area. The harvesting and thinning proposed in the action alternatives would open the forest and create drier conditions as sunlight

is allowed to reach the forest floor. The action alternatives may improve habitat (wild indigo) for the frosted elfin by opening up the forest and creating drier conditions.

Rafinesque's big-eared bat roosts in old buildings or hollow trees, usually near water. There is a LRMP standard to maintain snags and cavity trees within the project area during harvest activities (Forest Plan, page III-23). Snags are not in short supply within the project area as a result of recent storms and pest infestations. Implementation of any of the action alternatives would have no impact on Rafinesque's big-eared bat since snags in riparian areas would be protected, and there is no shortage of snags in the project area.

There would be no cumulative impacts on the eastern small-footed bat and Rafinesque's big-eared bat since there are no direct or indirect impacts on these species should any of the action alternatives be implemented. The frosted elfin may have positive cumulative impacts since implementation of any of the action alternatives may actually improve their habitat in the project area.

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 small 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 change to the impacts of the rare species that may occur on the forest in the project area since this private land use pattern has been occurring for the past several years.

### Aquatic

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

### Botanical

None of the Regional Forester's sensitive plant species were found during surveys of the project area except *Trillium rugelii*. This proposal would have little effect on the total numbers of *Trillium rugelii* individuals throughout the Forest, but may directly affect some individuals. This proposal would have no effect upon the Forest viability of *Trillium rugelii.* This proposal has no known cumulative effects to *Trillium rugelii* as a result of this proposal and past, present and reasonably foreseeable projects.

*Trillium rugelii*, southern nodding trillium, is a member of the lily family that is separated from other *Trillium* species by the presence of flowers with broad recurved white or maroon petals and short stamens with lavender anther sacs that are abruptly declined below the leaves (Weakley 1997). It ranges from North Carolina and Tennessee south to South Carolina, Alabama and Georgia. Recently this species has been placed on the USFS regional rare species list given the limited number of occurrences throughout its range. The North Carolina Natural Heritage Program currently places this species on the watch list in watch category 1, which denotes

species that are rare within the state but, which appear to be relatively secure within the state (Amoroso & Weakley). This species was previously on the main rare species list for the state. 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 from 40 to 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 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, Baldwin Fields Branch, 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 lethally 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. No other mitigation, other than exclusion from heavy equipment or timber falling within the 100 foot riparian stream buffers, is recommended.

This proposal is not expected to have cumulative adverse effects on *Trillium rugelii* because a small portion of individuals may be impacted by the proposal, but the population in the project area would remain viable due to project design features. This species is a “watch list” species not actively tracked by the North Carolina biological data base (BCD) because the state believes the populations are stable enough not to warrant state listing. There are also seven known populations across the Forest. The Bluff Mountain Timber Sale (Appalachian RD, 1998) did affect some individuals of *Trillium rugelii*. The Bluff Mountain *Trillium rugelii* population numbers were an estimated 2,000 in April 2000. The Bluff Mountain Timber Sale did not adversely impact the local population viability of this species, nor should the Baldwin Gap Timber Sale.

## Mitigation Measures and Project Design Features

### Mitigation

1. Protect rock outcrops which are potential habitat for eastern small-footed bat. This may be achieved during lay out of the harvest units by having a wildlife biologist establish buffers around rock outcrops. Otherwise, none are recommended since some species would benefit from activities proposed in the action alternatives.

### Project Design Features

1. Retain snags at a rate of two snags per acre in harvest units where present, or reserve green trees for snag recruitment.
2. Riparian perennial stream buffers in planned harvest units are essential to protect populations of the regionally sensitive species *Trillium rugelii*.

## Determination of Effect

There would be no adverse direct, indirect, or cumulative effects to any Threatened & Endangered (T&E) plant, aquatic, or wildlife species populations or their habitat by any alternative considered as no T&E aquatic, botanical, or wildlife species are known to occur in the analysis area (AA) based on the known distribution of the species, lack of suitable habitat in the analysis area, and field surveys. There would be no adverse impact to Rafinesque's big-eared bat, and the frosted elfin may have a possible beneficial effect as a result of project implementation. There would be no adverse impact to the eastern small-footed bat or *Trillium rugelii* provided that mitigation and project design features are implemented. Implementation of the proposed project is not likely to result in a trend towards federal listing of any other sensitive species since there would be no adverse impact if project implementation is in compliance with the Endangered Species Act and Forest Service Manual 2670. Consultation with USDI Fish and Wildlife Service is not required.

### Wildlife

Implementation of the proposed project would have no adverse effect on any federally listed wildlife species since none occur within the project area based on the known distribution of the species, lack of suitable habitat in the analysis area, and field surveys. Also, implementation of the proposed project is not likely to result in a trend towards federal listing of the eastern small-footed bat, frosted elfin, Rafinesque's big-eared bat, or any other sensitive species since there will be no negative impacts and if project implementation is in compliance with the Endangered Species Act and Forest Service Manual 2670.

**Table A-6: Effects to Sensitive Wildlife Species by Alternative**

| Common Name | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| Eastern Small-footed Bat | No adverse impact | No adverse impact | No adverse impact | No adverse impact |
| Frosted Elfin | No adverse impact | Possible beneficial impact | Possible beneficial impact | Possible beneficial impact |
| Rafinesque's Big-eared Bat | No adverse impact | No adverse impact | No adverse impact | No adverse impact |

### Aquatic

No risk to population viability of any aquatic species including federally listed or sensitive species across the Forest would occur as a result of the Baldwin Gap Project. The project would have no effect on any federally listed species or their habitat based on the known distribution of the species, lack of suitable habitat in the analysis area, and field surveys. No impacts to the two listed sensitive species (*Percina burtoni* and *Percina macrocephala*) for Buncombe County would result from the implementation of any of the action alternatives since there are no sensitive species within the aquatic project or analysis areas.

**Table A-7: Determination of Effect of Each Alternative on the Evaluated TES Species**

| Species | Alternative A | Alternative B | Alternative C | Alternative D |
|---|---|---|---|---|
| **Federally Threatened and Endangered Species** | | | | |
| None present | Not Applicable (N/A) | N/A | N/A | N/A |
| **2002 Region 8 Regional Forester's Sensitive Species List** | | | | |
| None present | N/A | N/A | N/A | N/A |

### Botanical

Implementation of the proposed project would have no adverse effect on any federally listed plant species since none occur within the project area based on the known distribution of the species, lack of suitable habitat in the analysis area, and field surveys. Also, implementation of the proposed project is not likely to result in a trend towards federal listing of *Trillium rugelii* since riparian perennial stream buffers in planned harvest units would be implemented to protect populations. Although suitable habitat for several sensitive plant species exists within the project area, no species were found during surveys, and no records of occurrence are known from this area. Implementation of the project is not likely to result in a trend towards federal listing of the 18 sensitive plant species listed in Table A-5 or any other sensitive species since there would be no adverse impact if project implementation is in compliance with the Endangered Species Act and Forest Service Manual 2670.

## List of Preparers

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# Attachment 1 Species Lists for Buncombe County

## Wildlife

| 2001 Pisgah National Forest Rare (Federally Listed and Regionally Sensitive) Terrestrial Wildlife List for Buncombe County | | | | |
|---|---|---|---|---|
| **Group** | **Species** | **Forest** | **Brief Habitat Description {Counties[1]}** | **Analyzed Further/ Evaluation Criteria** |
| **Federally Threatened and Endangered Species** | | | | |
| Mammal | *Felis concolor cougaur*<br>Eastern Cougar<br>(Endangered) | all forests | Extensive forests, remote areas {Bun Ha Sw Ya} | No/6 |
| Mammal | *Glaucomys sabrinus coloratus*<br>Carolina Northern Flying Squirrel<br>(Endangered) | N/P | High elevation forests, mainly spruce/fir<br>{Av Bun Gr Ha Ja Mc Mi Sw Tr Wat Ya} | No/3 |
| Mammal | *Myotis grisescens*<br>Gray Bat<br>(Endangered) | Pisgah<br>(forage) | Roosts in caves; forages mainly over open water {Bun Ha} | No/3 |
| Reptile | *Clemmys muhlenbergi*<br>Bog Turtle<br>(Threatened S/A) | N/P | Bogs, wet pastures, wet thickets<br>{As Av Bun Ch Cl Gr He Ja Mac Mc Mi Tr Wat Ya} | No/4 |
| **August 7, 2001 Region 8 Forester's Sensitive Species** | | | | |
| Mammal | *Corynorhinus rafinesquii*<br>Rafinesque's big-eared bat | all forests | Roosts in old buildings, hollow trees, caves, mines usually near water {Bun Bur Ch Gr Mac Mad Sw Tr} | Yes |
| Mammal | *Myotis leibii*<br>Eastern small-footed bat | N/P | Roosts in hollow trees, rock outcrops, bridges (summer); caves and mines (winter) {Av Bun Gr He Ja Ru Sw Ya} | Yes |
| Mammal | *Sorex palustris puntculatus*<br>Southern water shrew | N/P | Stream banks in montane forests<br>{Av Bun Cl Ha Mac Sw Wat} | No/4 |
| Bird | *Falco peregrinus*<br>Peregrine Falcon | N/P | Cliffs (for nesting) {Av Bun Bur Ha Ja Mad Ru Tr Ya} | No/3 |
| Bird | *Lanius ludovicia migrans*<br>Migrant loggerhead shrike | all forests | Fields and pastures (breeding season only) {None indicated} | No/3 |
| Bird | *Thryomanes bewickii altus*<br>Appalachian Bewick's wren | N/P | Woodland borders or openings, farmlands or brushy fields, at high elevations (breeding season only)<br>{As Av Bun Ha Ja Mac Tr} | No/3 |
| Amphibian | *Plethodon teyahalee*<br>Southern Appalachian salamander | N/P | High elevation, wooded slopes and forests; prefers hardwood forests and logs over pines and hemlocks {None indicated} | No/3 |
| Amphibian | *Plethodon welleri*<br>Weller's salamander | Pisgah | High elevation forests in northern mountains, mainly in spruce-fir, and to a lesser degree in northern hardwood forests<br>{Av Mi Wat Ya} | No/3 |
| Insect | *Callophrys irus*<br>Frosted elfin | N/P | Open woods and borders, usually in dry situations; host plant-lupines, (*Lupinus*) and wild indigos (*Baptisia*)<br>{Bun Ch Po} | Yes |
| Insect | *Cicindela ancocisconensis*<br>A tiger beetle | N/P | Shaded gravel and sandbanks on mountain brooks & small rivers with large boulders {None indicated} | No/3 |
| Insect | *Hypochilus coylei*<br>A cave spider | Pisgah | Rock outcrops (apparently endemic to southern mountains of NC) {Bun He Po Ru} | No/5 |
| Insect | *Hypochilus sheari*<br>A lampshade spider | Pisgah | Rock outcrops (apparently endemic to Buncombe, McDowell, and Yancey counties, NC) {Bun Mc Ya} | No/5 |
| Insect | *Melanoplus divergens*<br>Divergent Melanoplus | N/P | Glades and balds, 1800-4717 feet {None indicated} | No/3 |
| Insect | *Nesticus crosbyi*<br>A cave spider | Pisgah | Spruce-fir forests (apparently endemic to Mount Mitchell)<br>{Bun Ya} | No/3 |
| Insect | *Nesticus silvanus*<br>A cave spider | N/P | Habitat not indicated (apparently endemic to southern mountains of NC) {None indicated} | No/6 |
| Insect | *Scudderia septentrionalis*<br>Northern Bush Katydid | N/P | Forests {None indicated} | No/6 |
| Insect | *Semiothisa fraserata*<br>Fraser Fir Angle | N/P | Spruce/fir forests with fraser fir {None indicated} | No/3 |
| Insect | *Speyeria Diana*<br>Diana fritillary | N/P | Rich woods and adjacent edges and openings; host plants (*Viola*) {None indicated} | No/5 |
| Insect | *Trechus mitchellensis*<br>A ground beetle | Pisgah | Under rocks, logs, and other ground cover in the Black Mountains {Bun Mc Ya} | No/3 |
| Mollusk | *Pallifera hemphilli*<br>Black mantleslug | N/P | High elevation forest, mainly spruce-fir<br>{Av Bun Ha Ja Mi Sw Ya} | No/3 |

[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 US Fish and Wildlife Service.

[2]County Codes

| | | | | | | |
|---|---|---|---|---|---|---|
| Ale=Alexander | All=Allegheny | As=Ashe | Av=Avery | Bru=Brunswick | Bun=Buncombe | Bur=Burke |
| Cal=Caldwell | Car=Carteret | Cat=Catawba | Ch=Cherokee | Cl=Clay | Cur=Currituck | Da=Dare |
| Gr=Graham | Ha=Haywood | He=Henderson | Hy=Hyde | Ir=Iredell | Ja=Jackson | Li=Lincoln |
| Mac=Macon | Mad=Madison | Mc=McDowell | Mi=Mitchell | NH=New Hanover | On=Onslow | Or=Orange |
| Po= Polk | Ru=Rutherford | Sw=Swain | Tr=Transylvania | Wak=Wake | Wat=Watauga | Ya=Yancey |

Evaluation Criteria

1 Does not occur on the Forest based on the known distribution. Given that the species does not occur on the Forest, there will be no negative effect/impact to the species due to implementation of the project.
2 Does occur on the Forest, but not known to occur in the County (according to NCNHP and USFWS). Given that the species does not occur in the County, there will be no negative effect/impact to the species due to implementation of the project.
3 The species is known to occur or to have occurred within the County (based on records and surveys), but not within the analysis area. Given that the species does not occur within the analysis area, there will be no negative effect/impact to the species due to implementation of the project.
4 Suitable habitat is located in the analysis area but outside of the proposed project area (based on field surveys). Given that the species does not occur within the project area, there will be no negative effect/impact to the species due to implementation of the project.
5 Suitable habitat exists within the project area, but the species is not present in the project area based on surveys. Given that the species does not occur within the project area, there will be no negative effect/impact to the species due to implementation of the project.
6 Habitat description for the species is unknown or very general. Effects from project implementation cannot be analyzed or so much of the habitat exists that effects would be negligible to populations across the forest, given that there are no known populations within the project area.

## 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 January 1, 2002 Regional Forester's list)** | | | |
| blotchside darter | *Percina burtoni* | fish | Does Not Occur (1) |
| longhead darter | *Percina macrocephala* | fish | Does Not Occur (1) |
| | | | |

**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 project 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 | Rich Cove Forest, Glade, mafic rock | Sensitive/3 |

| Species | Form | Natural Communities, Habitat | Status/ Occurrence |
|---|---|---|---|
| | plant | | |
| *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 plant | Acidic Cove Forest | Sensitive/3 |
| *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 |

| Species | Form | Natural Communities, Habitat | Status/ Occurrence |
|---|---|---|---|
| *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 plant | Rich Cove Forest, low elevation | Sensitive/1 |
| *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)

# 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 project 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<br>% Analysis Area | 32<br>0.7% | 10<br>0.2% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| 0-10 for Analysis Area is: | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under |
| Compartment 1<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 2<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 3<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 4<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |

| Future | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Compartment 5<br>% Compartment | 20<br>1.5% | 10<br>0.8% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 6<br>% Compartment | 12<br>1.3% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>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<br>% Analysis Area | 128<br>2.8% | 121<br>2.6% | 111<br>2.4% | 111<br>2.4% | 111<br>2.4% | 111<br>2.4% | 111<br>2.4% | 111<br>2.4% | 111<br>2,4% | 111<br>2.4% | 111<br>2.4% | 0<br>0% |
| 0-10 for Analysis Area is: | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under |
| Compartment 1<br>% Compartment: | 96<br>7.0% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 111<br>8.1% | 0<br>0% |
| Compartment 2<br>% Compartment: | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 3<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 4<br>%Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 5<br>% Compartment | 20<br>1.5% | 10<br>0.8% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 6<br>% Compartment | 12<br>1.3% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>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<br>% Analysis Area | 98<br>2.1% | 91<br>2.0% | 81<br>1.7% | 81<br>1.7% | 81<br>1.7% | 81<br>1.7% | 81<br>1.7% | 81<br>1.7% | 81<br>1.7% | 81<br>2.4% | 81<br>2.4% | 0<br>0% |
| 0-10 for Analysis Area is: | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under | Under |
| Compartment 1<br>% Compartment: | 66<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 81<br>5.9% | 0<br>0% |
| Compartment 2<br>% Compartment: | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 3<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 4<br>%Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 5<br>% Compartment | 20<br>1.5% | 10<br>0.8% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 6<br>% Compartment | 12<br>1.3% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>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<br>% Analysis Area | 169<br>3.6% | 162<br>3.5% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 152<br>3.3% | 0<br>0% |
| 0-10 Analysis Area 01 is: | Meets | Meets | Meets | Meets | Meets | Meets | Meets | Meets | Meets | Meets | Meets | Meets |
| Compartment 1<br>% Compartment | 137<br>10.0% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 152<br>11.1% | 0<br>0% |
| Compartment 2<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 3<br>% Compartment | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>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<br>% Compartment | 20<br>1.5% | 10<br>0.8% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% |
| Compartment 6<br>% Compartment | 12<br>1.3% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>0% | 0<br>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<br>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 Project 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 – STANDARD MITIGATION FOR PRESCRIBED FIRE AND PESTICIDE USE

# APPENDIX F – STANDARD MITIGATION MEASURES FOR PRESCRIBED FIRE AND PESTICIDE USE

## Prescribed Fire Mitigation Measures

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 Mitigation Measures

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.
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.

# APPENDIX G – MANAGEMENT INDICATOR SPECIES

# APPENDIX G – 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 G-1** and **G-2:** 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 G-3** and **G-4:** 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 G-5:** 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 G-1: 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 project 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 project 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 G-2: 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 project 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 G-3: 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.<br>Mesic Oak/H: 283,340 ac.<br>Dry Mesic Oak/H: 21,800 ac.<br>Chestnut Oak/H: 8,600 ac.<br>Upland hwd (other): 6,900 ac. | None affected | 45 acres harvested | 32 acres harvested | 79 acres harvested |
| Cove Forests | Rich=107,500 ac.<br>Acidic=174,600 ac.<br>Cove (other)=2,800 ac. | None affected | 66 acres harvested, | 49 acres harvested, | 77 acres harvested, |
| Alluvial Forest | 21,000 ac Alluvial Forest<br>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 G-4: 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)<br>2,040 ac (5 yr avg)<br>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 G-5: 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 significantly 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 project 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 project 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 project 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 project 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 project area. In Alternative B, 111 acres would be created; in Alternative C, 81 acres would be created; and in Alternative C, 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 project 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 project 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 project 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 project 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 project 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 project area. Since rabbit and turkey are the bobcat's primary prey, Alternative D may help to increase the local population of bobcat in the project 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 project 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 project 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 project 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 project 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 project 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 project 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 project area during surveys. Although harvest activities may remove some of these trees, there are plenty across the project 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 project 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 project 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 project 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 project 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 project 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 significantly 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 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 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 project area.