United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Grandfather Ranger District | 109 E Lawing Dr
Nebo, NC 28761-9827
828-652-2144

File Code: 1950-1
Date: November 16, 2005

Dear Interested Members of the Public and Forest Users:

Enclosed is a copy of the Environmental Assessment (EA) for the Upper Creek Project on the Grandfather Ranger District, Pisgah National Forest. The project is located in Burke and Caldwell Counties in the Upper Creek and Lower Wilson Creek Analysis Areas. Three alternatives have been developed and analyzed in detail; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. A decision will be made that selects one of these alternatives or a modification of one. While Alternative C has been identified as the Preferred Alternative, a final decision has not 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 McDowell News*. 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-grandfather@fs.fed.us; regular mail to: Grandfather Ranger District, Attn: District Ranger, 109 East Lawing Drive, Nebo, NC 28761; or faxed to 828-652-9511.

Please contact Michael Hutchins, Interdisciplinary Team Leader at 828-682-6146, or Greg Van Orsow, Project Leader at 828-652-2144 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

/s/ Barbara A. Watring

BARBARA A. WATRING
Acting District Ranger

Enclosure

United States
Department
of
Agriculture

Forest
Service

November
2005

Environmental Assessment

Upper Creek Project

Grandfather Ranger District, Pisgah National Forest
Burke and Caldwell Counties, North Carolina

Upper Creek Project

Environmental Assessment

Location of Action:	Grandfather Ranger District Pisgah National Forest Burke and Caldwell Counties, North Carolina
Lead Agency:	USDA Forest Service
Responsible Official:	Grandfather District Ranger 109 East Lawing Drive Nebo, NC 28761
For More Information:	Greg Van Orsow Project Leader (828) 652-2144 (828) 652-9511 (fax) Michael Hutchins ID Team Leader (828) 682-6146 (828) 682-9179 (fax)
Send Electronic Comments to:	comments-southern-north-carolina-pisgah-grandfather@fs.fed.us

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Table of Contents

CHAPTER 1 – PURPOSE AND NEED 4
1.1 Document Structure 4
1.2 Background 4
1.3 Proposed Action 5
1.4 Purpose and Need for Action 7
1.5 Decision Framework 10
1.6 Public Involvement 10
1.7 Issues 10

CHAPTER 2 – ALTERNATIVES 12
2.1 Range of Alternatives 12
2.2 Alternatives Considered in Detail 12
2.3 Alternatives Considered but Eliminated from Detailed Study 15
2.4 Project Design Features Common to Action Alternatives 16
2.5 Summary Comparison of Actions by Alternative 17
2.6 Summary Comparison of Alternatives by Significant Issue 17

CHAPTER 3 – ENVIRONMENTAL EFFECTS 19
3.1 Water Quality and Aquatic Habitat 19
3.2 Wildlife Habitat 28
3.3 Age-class Distribution 33
3.4 Old Growth Habitat 34
3.5 Herbicide Use 36
3.6 Cultural Resources 38
3.7 Soil Resources 38
3.8 Non-native Plants 40
3.9 Recreation & Scenery Resources 42
3.10 Air Quality 44
3.11 Management Indicator Species/Habitat Components 48
3.12 Threatened, Endangered, and Sensitive Species 55
3.13 Other Areas of Concern 56

CHAPTER 4 – PREPARERS AND PUBLIC INVOLVEMENT 57
4.1 ID Team Members 57
4.2 Federal, State, and Local Agencies Providing Input 57
4.3 Others Providing Input 57

APPENDIX A – BIOLOGICAL EVALUATION 58

APPENDIX B – AGE CLASS DISTRIBUTION 84

APPENDIX C – OLD GROWTH ANALYSIS 89

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS 92

APPENDIX E – FINANCIAL EFFICIENCY 100

APPENDIX F – PROJECT DESIGN FEATURES FOR PRESCRIBED FIRE & HERBICIDE USE 103

UPPER CREEK PROJECT MAPS 107

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 EA discloses direct, indirect, and cumulative environmental effects that would result from the proposal. The document is organized into five 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.
- *Chapter 2 – Alternatives:* This section provides a description of alternative methods for achieving the stated purpose as well as the No-action Alternative. These alternatives were developed based on significant issues raised by the public and other agencies. This discussion also includes project design features. 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 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 EA.

1.1.1 Project Record

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

1.2 Background

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

The ~23,500 acres for analysis is in the Upper Creek and Lower Wilson Creek Forest Plan Analysis Areas (AA) and within the Upper Creek, Parks Creek, and Wilson Creek administrative watersheds about 20 miles north-northeast of the Grandfather Ranger District Office. The Forest Plan AA is within Compartments 87, 89, 90, 92, 93, 94, 95 and 107 in Burke and Caldwell Counties (see Vicinity Map at the end of the EA) and may be different from the AAs individual

resources use to analyze effects. The activity areas and AAs are defined at the beginning of Appendix A, Biological Evaluation.

The proposed activities are within Management Areas (MAs) 1B, 2A, 3B, 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 1B, encompassing 12 percent of the Upper Creek AA and 6 percent of the Lower Wilson Creek AA is managed to "*Emphasize sustained-yield timber management. Emphasize motorized recreation use. Permit road construction. Base method of harvest on site specific analysis. Manage habitats of mixed ages or forests, primarily for deer, grouse, and animals requiring similar environments*" (Forest Plan, page III-54). Management Area 2A, encompassing 25 percent of the Upper Creek AA and 9 percent of the Lower Wilson Creek AA is managed to "*Emphasize visually pleasing scenery. Emphasize motorized recreation use. Permit timber production, but modify it to meet visual quality objectives. Permit road construction. Manage habitat of mature forests primarily for squirrel, pileated woodpecker, and animals requiring similar environments*" (Forest Plan, Page III-54). Management Area 3B, encompassing 29 percent of the Upper Creek AA and 30 percent of the Lower Wilson Creek AA is managed to "*Emphasize sustained yield timber management. Close most roads to motorized vehicles. Permit road construction. Base method of harvest on site-specific analysis. Manage habitat of mixed ages of forests primarily for turkey, and animals requiring similar environments*" (Forest Plan page, III-55). Management Area 18 lands (riparian areas) are embedded in other management areas and encompass 6 percent of the Upper Creek AA and 4 percent of the Lower Wilson Creek AA. 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). Management areas 2C, 4C, 4D, and 6 are also within the Upper Creek and Lower Wilson Creek Forest Plan AAs, but no activities are proposed in them with this project.

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. This alternative would improve existing stand conditions while providing a continuous supply of sawtimber; improve distribution and percent of early successional habitat; identify old growth; reduce invasive exotic plant species; reduce fuel accumulations; and improve wildlife habitat and aquatic-related resources. Tables providing additional details concerning the proposed treatments follow the description of the Proposed Action that would:

- Harvest about 385 acres using the two-age regeneration harvest prescription.
- Site prepare and subsequently release, if needed, in all stands being regenerated (385 acres) using herbicides and manual methods.
- Construct about 0.25 miles of temporary road.
- Use and maintain the existing road system.
- Prescribe burn approximately 350 acres within Compartment 90.

- ◊ Use Glyphosate herbicide to control a total of about five acres or less of invasive exotic (non-native) plants along roads prior to disturbance activities. The species to be treated are Japanese plume grass, *Miscanthus sinensis*; Tree-of-Heaven, *Ailanthus altissima*; and, Princess tree, *Paulownia tomentosa*.
- ◊ Plant individuals or groups of persimmons and/or native crabapple trees in log landings (about 45 acres).
- ◊ Create one vernal pond off the Little Chestnut Mountain Road following harvest activities.
- ◊ Anchor large woody debris into about one mile of streambank along Timbered Branch Creek.
- ◊ Designate about 296 acres of small patch old growth by compartment.

Specific harvest and post harvest (site preparation and release) activities and locations are displayed in the following table and in the Proposed Action map located at the end of the EA.

Table 1-1: Stands Proposed for Treatment – Proposed Action

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
87-22	30	Upland Hwd	84	Two-Age	Skidder	Slash/SS[2]	Streamline
89-01	29	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
90-03	39	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
90-05[3]	17	Upland Hwd	86	Two-Age	Skidder	Slash/SS	Streamline
92-05A	21	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05B	40	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05C	27	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
93-02	12	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
94-01	16	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
94-02	15	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
95-01	4	Upland Hwd	89	Two-Age	Cable	Strm/Inject[4]	Streamline
95-08	15	Upland Hwd	74	Two-Age	Cable	Strm/Inject	Streamline
95-27	9	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
95-36[5]	36	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-37	4	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-40	18	Upland Hwd	79	Two-Age	Cable	Strm/Inject	Streamline
107-02[6]	40	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
107-11	13	Upland Hwd	95	Two-Age	Skidder	Slash/SS	Streamline
Total Acres	**385**						

1 Following harvest activities in the two-age treatment areas, the management type (Forest Plan, page III-75) of each stand would be maintained. Species composition may be different; however, stand conversion from one management type to another would not occur.

2 Site preparation referred to as Slash/SS includes post-harvest cutting of residual trees 2 to 10 inches in diameter and treating the stumps of the "undesirable" species with herbicide to prevent sprouting. This includes but is not limited to species such as maple, dogwood (when available, maintain up to 10 trees per acre of 4"+ dbh), and black gum. The objective is to promote sprouting of desirable species, particularly the oaks, but control competing vegetation by treating the stumps to prevent them from sprouting back at the same time.

3 Requires use of an existing temporary road and a bridge.

4 Site Preparation referred to as Strm/Inject includes "streamline" application of herbicide on undesirable stems 1 to 2.9 inches in diameter and using tree injection or "hack and squirt" cut surface treatment to apply a small amount of diluted herbicide to the stems of individual competing trees 3 to 8 inches in diameter.

5 Requires ¼ mile of temporary road construction for access.
6 Requires an existing temporary road be used for access.

Regeneration of new forest stands would be accomplished by site preparation and reforestation methods as outlined below:

- On five cable logging units (95-01, 95-08, 95-40, 95-36 and 95-37) totaling approximately 77 acres, prior to harvest operations, undesirable tree species less than merchantable size would be treated with an herbicide with the active ingredients Glyphosate or Triclopyr to control competition from those species (for all herbicide applications, Glyphosate would be applied at rates outlined on the label and Triclopyr would be applied at up to 4 pounds of active ingredient per acre as outlined in the revised application rates for the VMAM which is also included in Appendix F of this document);
- Following logging operations, a regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release using an herbicide with the active ingredient Triclopyr would be used, if needed, to maintain adequate stocking of desirable tree species. These areas would be managed for forest types similar to those occurring before harvest;
- In all stands (except 95-01, 95-08, 95-40, 95-36 and 95-37) following logging operations, competing tree species between 2-inch diameter breast height (dbh) and 10-inch dbh that were not knocked down or cut during logging would be treated with an herbicide containing the active ingredient Glyphosate or Triclopyr to control competition from those species. Merchantable tree species not cut during logging, excluding reserved trees and undamaged residual northern red oak, white oak, chestnut oak, hickory, ash and yellow-poplar 6-inch dbh or larger, would be cut with chainsaws. The following table displays the Forest Service Roads along which invasive exotic plants would receive herbicide control:

Table 1-2: Location of Invasive Exotic Plants Control – Proposed Action

Forest Service Road	Japanese plume grass (*Miscanthus sinensis*)	Tree-of-heaven (*Ailanthus altissima*)	Princess tree (*Paulownia tomentosa*)
4096	X	X	
4099		X	X
299		X	X
986	X	X	X
Old Way Ridge	X	X	X
4101	X	X	X
982	X		

1.4 Purpose and Need for Action

The purpose of this proposal is to:

◊ Balance age-class distribution, improve timber stand conditions, and provide for a continuous supply of timber using silvicultural prescriptions that favor red oak, white oak, and hickory tree species where they occur;
◊ Reduce competition and improve species composition in existing and proposed harvest units through herbicide use and manual methods;
◊ Control non-native invasive species through herbicide use;

- ◊ Improve conditions for wildlife by creating additional early-successional habitat and enhancing existing fields;
- ◊ Reduce existing fuel levels and improve habitat and timber stand conditions through prescribed fire near Brown Mountain; and
- ◊ Enhance aquatic habitat by balancing the pool:riffle ratio along a reach of Timbered Branch Creek.

1.4.1 Why Here, Why Now?

The existing condition of the Upper Creek area has been evaluated and compared against the desired future condition for the area as described in the Forest Plan. Where resources in the area are found to be outside the desired future condition, opportunities for moving the resources towards the desired future condition exist. The Upper Creek area was chosen at this time for vegetation management over other areas on the Grandfather 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 (approx. 100 acres in size and/or within past 10 years) in the Upper Creek AA was over 11 years ago (1994) and 115 acres; and in the Lower Wilson Creek AA was over 14 years ago (1991) and 92 acres. Forest Plan standards schedule to revisit each stand in Management Area 1B and 3B every 10 years and stands in MA 2A every 10-15 years to meet early succession habitat standards (Forest Plan, pages III-60, III-68, and III-75). Stands in the watershed currently do not meet Forest Plan standards for early successional habitat (Forest Plan, page III-29) or for small patch Old Growth (Forest Plan, page III-27). Harvesting is proposed to ensure early successional vegetation in the watershed achieves desired ranges identified in the Forest Plan. The Proposed Action was developed to move resources in the area towards the desired future condition using active management. The following table contrasts by resource element the desired future condition and the existing condition of the Upper Creek area:

Table 1-3: Comparison of Desired Future Condition with the Existing Condition

Resource Element	Desired Future Condition	Existing Condition
Vegetation (Forest Plan, pages III-29 – III-39)	a) Provide and maintain plant community diversity to meet overall multiple use goals. b) Use timber management practices to create or improve forest diversity.	a) The forested vegetation consists of common community types dominated by cove hardwoods and upland hardwoods. Age-class distributions are discussed in the "Timber" discussion below. b) There are invasive, non-native (exotic) plants located along FSRs 4096, 4099, 299, 986, 1410, 982, and FSR "old way ridge", which are <1 acre in size total.
Soil and Water (Forest Plan pages III-40 – III-42)	a) Provide measures to protect, maintain, and improve soil, water, and air resources. Provide stream management to balance development, environmental protection, and community, and recreation needs. Manage riparian areas to protect soil, water, vegetation, fish, and wildlife resources.	a) Soil map units in the area are classified as moderately deep and well drained to very deep and well drained with moderate productivity. The aquatic community in the area consists of mostly small, headwater stream reaches that support aquatic macroinvertebrates and contain no habitat for fish. Streams in the analysis area contain fish habitat. Water quality is improving. Forest Plan

Resource Element	Desired Future Condition	Existing Condition
	Maintain and enhance flood plain, wetland, and riparian areas distinctive values and natural functions.	standards (which currently exceed North Carolina best management practices) are followed to ensure resource protection.
Fisheries and Wildlife (Forest Plan, pages III-22 – III-25)	a) Maintain viable populations of existing native and desired non-native vertebrate species in the planning area. b) Assure a regular and sustained flow of habitats across the Forest through space and time for diversity and viability of plant and animal populations. Use timber management practices as the primary tool to create desired habitat. c) Manage habitats of mixed ages of forests primarily for turkey and animals requiring similar environments (i.e. those that thrive in young to middle aged forests). d) Provide at least 0.5% (3% desired level) of MA 3B in grass/forb openings at any one time, including mowed landings and roads.	a) Due to the diversity of habitat within the analysis area, there is a large variety of wildlife within the analysis area. b) There are large blocks of connected forest lands, which provide travel corridors for a variety of species. c) See "Timber" discussion below for age-class distribution. d) There is about <1% grass/forb habitat in the analysis areas.
Old Growth (Forest Plan, pages III-26 – III-28)	a) Small Patches: Select a contiguous area at least 5% the size of the national forest land in the compartment or at least 50 acres, whichever is greater. Compartments containing part of a large or medium patch do not need an additional small patch.	a) All area compartments are short of meeting Forest Plan standards for small patch old growth (see Appendix C for old growth analysis).
Endangered, Threatened, Sensitive Species (Forest Plan, pages III-22 – III-25)	a) Protect and enhance critical habitat for threatened and endangered species. Protect and enhance sensitive plants, animals, or features through appropriate management.	a) See the Biological Evaluation for current populations of threatened, endangered, and/or sensitive species within the landscape, the potential for a given species and related mitigation measures.
Timber (Forest Plan, pages III-29 – III-39, and III-75)	a) Produce a continuous supply of sawtimber and other wood products. Provide timber management practices to produce high quality sawtimber as the primary product. Use a minimum rotation age of 80 years for hardwoods and 60 years for pine in MA 3B. Provide wood products to meet public demands consistent with multiple use objectives, including desired effects on water quality, fish/wildlife habitat, tree	a) The last timber sale to occur in the Upper Creek AA was within Compartments 95 and 96 in 1994, which harvested 115 acres of timber, and the Lower Wilson Creek AA within Compartments 90, 91, 92 and 93 in 1991, which harvested 92 acres of timber (see Table 3-4, Chapter 3).

Resource Element	Desired Future Condition	Existing Condition
	species, recreation use, and aesthetics. b) Disperse early successional habitat across the landscape. Desired levels for; MA 1B are 5-15% of the compartment; MA 2A are 5-10% of the compartment; MA 3B are 5-15% of the compartment.	b) See Appendix B, Age-class Analysis.

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 provided to the public and other agencies for comment during a 30-day scoping period that began on August 20, 2004, and was scheduled to close on September 20, 2004. Due to Tropical Storm Frances, Ivan, and Jeanne, the comment period was extended to October 1, 2004. On August 31, 2004, and September 20, 2004, different members of the public met with Forest Service employees to discuss the proposal. The proposal was also listed in the Schedule of Proposed Actions for winter, spring, summer, and fall 2005. A formal 30-day Notice and Comment period for the Upper Creek Project Environmental Assessment began February 9, 2005, and ended on March 11, 2005. Eight timely letters or e-mails were submitted by members of the public during this comment period. On May 5, 2005, Miera Crawford, Grandfather District Ranger made a decision to select Alternative C and on June 6, 2005, the decision was appealed by the Southern Appalachian Biodiversity Project. On July 26, 2005, Monica Schwalbach, Appeal Deciding Officer reversed the May 5, 2005, decision due to the adequacy of the biological evaluation (BE). This November 2005 EA has been prepared in response to the reversal.

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

1.7 Issues

Issues are defined as a point of discussion, debate, or dispute about environmental effects. Issues are used to develop alternatives, mitigation measures, or analyze environmental effects. The Forest Service separated issues into two groups: significant and other. All comments received during scoping have been reviewed and a determination on significance was made. The issue tracking sheet in the project record lists each comment received and the determination of significance.

1.7.1 Significant Issues

1.7.1.1 Significant Issue #1: Water Quality and Aquatic Habitat – *The proposed action may adversely affect water quality or aquatic habitat*

Indicators

- ◊ Number of new stream crossings
- ◊ Miles of temporary road constructed
- ◊ Type of watershed enhancement activities

1.7.1.2 Significant Issue #2: Wildlife Habitat/Fragmentation – *The proposed action may impact wildlife habitat*

Indicators

- ◊ Acres of grass/forb openings expanded
- ◊ Acres of grass/forb landings planted
- ◊ Miles of road daylighted
- ◊ Percent of grass/forb openings
- ◊ Habitat connectivity

1.7.1.3 Significant Issue #3: Age-class Distribution – *Age-class distributions within the analysis area are not balanced as desired in the Forest Plan*

Indicator

- ◊ Acres by age class before and after implementation

1.7.1.4 Significant Issue #4: Old Growth Habitat – *The proposed action may affect existing and potential old growth habitat*

Indicators

- ◊ Acres treated by age class
- ◊ Acres of newly designated old growth

1.7.2 Other Issues

1.7.2.1 Herbicide Use – *Herbicide use may adversely affect wildlife, water quality, and humans*

1.7.2.2 Cultural Resources – *Harvest related activities may adversely affect cultural resources*

1.7.2.3 Soil Resources – *Harvest related activities may adversely affect sensitive soils*

1.7.2.4 Botanical Resources – *Harvest related activities may affect botanical resources*

1.7.2.5 Scenery & Recreation Resources – *Harvest related activities may adversely affect scenic and recreation resources*

1.7.2.6 Non-timber Related Economics – *Harvest related activities may have adverse effects to non-timber related markets* (see also Appendix E)

1.7.2.7 Air Quality – *Prescribed fire may decrease air quality in the watershed*

1.7.2.8 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.*

CHAPTER 2 – ALTERNATIVES

Chapter 2 is the "heart" of an EA (40 CFR 1502.14) and describes alternatives the agency considered in addition to the proposed action. This chapter compares each alternative considered in detail and lists project design features.

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the IDT was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.4), and by the significant issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more significant issue. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

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

2.2 Alternatives Considered in Detail

Three alternatives were developed by the IDT in response to the issues and concerns regarding the proposal; Alternative A – No Action, Alternative B – Proposed Action, and Alternative C. The action alternatives fulfill the specific purpose and need for these actions. Project design features for activities in each action alternative are also described in this chapter.

2.2.1 Alternative A – No Action

Under this alternative the actions described in the proposed action (Chapter 1, Section 1.3) 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 invasive species, prescribed fire, 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

A complete description of the Proposed Action can be found in Chapter 1, Section 1.3 above.

2.2.3 Alternative C

Alternative C was developed to address public concerns with old growth habitat in the AAs, to develop additional wildlife habitat, and to better address the reforestation of a poorly stocked insect infested stand, all while addressing the similar resource concerns as Alternative B. This alternative differs from Alternative B in the following ways: it proposes an additional 475 acre Medium Patch Old Growth, daylights along FSR 299, proposes an additional 25 acres of prescribed burning, proposes to harvest stand 107-02 by clearcut with reserve trees, and expands a wildlife field in Stand 95-27. A summary chart comparing the actions by alternative is located

in Section 2.5 below. Tables providing additional details on the proposed treatments and a map of the proposed treatments follow the description of Alternative C.

Alternative C would:

- Harvest about 345 acres using the two-age regeneration harvest prescription and 40 acres using the clearcut with reserve tree prescription.
- Use and maintain the existing road system.
- Designate 296 acres of small patch old growth by compartment and an estimated 475 acres of medium patch old growth near Horsepen Creek.
- Site preparing and subsequent release, if needed, in all stands being regenerated using herbicides and manual methods.
- Prescribe burn approximately 350 acres within Compartment 90, and a portion of stand 107-02 if weather conditions allow.
- Following harvest activities create one vernal pond off the Little Chestnut Mountain Road.
- Anchor large woody debris into about one mile of streambank along Timbered Branch Creek to enhance aquatic habitat by balancing the pool:riffle ratio.
- Use Glyphosate herbicide to control a total of about five acres or less of invasive exotic (non-native) plants along roads prior to disturbance activities. The species to be treated are Japanese plume grass, *Miscanthus sinensis*; Tree-of-Heaven, *Ailanthus altissima*; and, Princess tree, *Paulownia tomentosa*.
- Expand existing one acre wildlife field adjacent to Stand 95-27 to 2.5 acres.
- Daylight to create a feathered edge of early successional habitat for an average additional width of 15 feet on each side of FSR 299. This daylighting would be done along much of the length to within 30 feet of the private in-holding but would not be done where topography prohibits it or where no-harvest standards for perennial or intermittent stream crossings occur. Following harvest, revegetate roadbed into alternating patches of clover/warm season vegetation to restore the grass/forb condition.
- Plant individuals or groups of persimmons and/or native crabapple trees in log landings and in the existing/expanded wildlife field adjacent to Stand 95-27.

Table 2-1: Stands Proposed for Treatment – Alternative C

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
87-22	30	Upland Hwd	84	Two-Age	Skidder	Slash/SS[2]	Streamline
89-01	29	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
90-03	39	Upland Hwd	92	Two-Age	Skidder	Slash/SS	Streamline
90-05[3]	17	Upland Hwd	86	Two-Age	Skidder	Slash/SS	Streamline
92-05A	21	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05B	40	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
92-05C	27	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline
93-02	12	Upland Hwd	89	Two-Age	Skidder	Slash/SS	Streamline
94-01	16	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
94-02	15	Upland Hwd	99	Two-Age	Skidder	Slash/SS	Streamline
95-01	4	Upland Hwd	89	Two-Age	Cable	Strm/Inject[4]	Streamline
95-08	15	Upland Hwd	74	Two-Age	Cable	Strm/Inject	Streamline
95-27	9	Upland Hwd	87	Two-Age	Skidder	Slash/SS	Streamline

Compartment -Stand	Est. Acres	Management Type[1]	Age	Harvest Method	Method Of Logging	Site Preparation	TSI (if needed)
95-36[5]	36	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-37	4	Upland Hwd	94	Two-Age	Cable	Strm/Inject	Streamline
95-40	18	Upland Hwd	79	Two-Age	Cable	Strm/Inject	Streamline
107-02[6]	40	Upland Hwd	92	Clearcut w/ reserve trees	Skidder	Slash/SS	Streamline
107-11	13	Upland Hwd	95	Two-Age	Skidder	Slash/SS	Streamline
Total Acres	**385**						

1 Following harvest activities in the two-age treatment areas, the management type (Forest Plan, page III-75) of each stand would be maintained. Species composition may be different; however, stand conversion from one management type to another would not occur.
2 Site preparation referred to as Slash/SS includes post-harvest cutting of residual trees 2 to 10 inches in diameter and treating the stumps of the "undesirable" species with herbicide to prevent sprouting. This includes but is not limited to species such as maple, dogwood (when available, maintain up to 10 trees per acre of 4"+ dbh), and black gum. The objective is to promote sprouting of desirable species, particularly the oaks, but control competing vegetation by treating the stumps to prevent them from sprouting back at the same time.
3 Requires use of an existing temporary road and a bridge for access.
4 Site Preparation referred to as Strm/Inject includes "streamline" application of herbicide on competing stems 1 to 2.9 inches in diameter and using tree injection or "hack and squirt" cut surface treatment to apply a small amount of diluted herbicide to the stems of individual competing trees 3 to 8 inches in diameter.
5 Requires ¼ mile of temporary road construction for access.
6 Requires an existing temporary road be used for access.

Regeneration of new forest stands would be accomplished by site preparation and reforestation methods as outlined below:

- On three cable logging units (95-01, 95-08, 95-40, 95-36 and 95-37) totaling approximately 77 acres, prior to harvest operations, competing tree species less than merchantable size would be treated with an herbicide with the active ingredients Glyphosate or Triclopyr to control competition from those species (for all herbicide applications Glyphosate would be applied at rates outlined on the label and Triclopyr would be applied at up to 4 pounds of active ingredient per acre as outlined in the revised application rates for the VMAM which is also included in Appendix F of this document);
- Following logging operations, a regeneration survey would be conducted to determine whether an area had sufficient natural regeneration from seed, seedlings, or sprouts. If not, seedlings would be planted at a rate per acre that would supplement natural regeneration to create fully stocked stands. After 3 to 4 growing seasons, streamline release using an herbicide with the active ingredient Triclopyr would be used, if needed, to maintain adequate stocking of desirable tree species. These areas would be managed for forest types similar to those occurring before harvest;
- In all stands (except 95-01, 95-08, 95-40, 95-36 and 95-37) following logging operations, competing tree species between 2-inch diameter breast height (dbh) and 10-inch dbh that were not knocked down or cut during logging would be treated with an herbicide containing the active ingredient Glyphosate or Triclopyr to control competition from those species. Merchantable tree species not cut during logging, excluding reserved trees and undamaged residual northern red oak, white oak, chestnut oak, hickory, ash and yellow-poplar 6-inch dbh or larger, would be cut with chainsaws.
- In addition to a herbicide site preparation treatment on one area totaling approximately 25 acres (a portion of 107-02), the area would receive an underburn if weather conditions permit

to reduce brush and logging slash and force basal sprouting on hardwood stumps. The following winter, shortleaf and/or pitch pine would be planted on a 12-foot by 12-foot spacing, which is wide enough to allow concurrent development of desirable hardwoods, especially oaks. Hardwood inclusions, such as moist coves, would not be planted, but would be managed for hardwood regeneration. After 3 to 4 growing seasons, streamline release using herbicides would be used if needed to maintain adequate stocking of oak, pine and other desirable tree species.

The following table displays the Forest Service Roads along which invasive exotic plants would receive herbicide control:

Table 2-2: Location of Invasive Exotic Plants Control – Alternative C

Forest Service Road	Japanese plume grass (*Miscanthus sinensis*)	Tree-of-heaven (*Ailanthus altissima*)	Princess tree (*Paulownia tomentosa*)
4096	X	X	
4099		X	X
299		X	X
986	X	X	X
Old Way Ridge	X	X	X
4101	X	X	X
982	X		

- Native plants would be utilized in wildlife habitat improvement and roadside erosion control;
- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse;
- During timber stand improvement, soft mast species of holly and dogwood (4”+ in dbh, up to 10 trees per acre), and black gum (12”+ in dbh, up to 5 trees per acre) would be retained to ensure continued production of food utilized by numerous bird species and mammals; and
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.

2.3 Alternatives Considered but Eliminated from Detailed Study

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

2.3.1 Alternative 1 – Designate a 475-acre Medium Patch Old Growth in lieu of Small Patch Old Growth

This alternative would have designated 475 acres of medium patch old growth near Horsepen without designating small patch old growth by compartment. The Forest Plan has a standard that small patch old growth be designated in compartments prior to ground disturbing activity unless 5 percent of the compartment is already part of a large or medium patch (Forest Plan, pages III-26 and 27). Within the Upper Creek AA, there is 17,100 acres of large patch old growth designated (Patch 29, Steels Creek-Upper Creek-Wilson Creek, Forest Plan, page K-8). However, this large patch does not make up at least 5 percent of each compartment in the AA. Designating the medium patch near Horsepen exclusive of small patch old growth by

compartment would not meet Forest Plan standards for small patch old growth. As a result, this alternative was eliminated from detailed study.

2.3.2 Alternative 2 – No Timber Harvesting or Temporary Road Construction

This alternative focused on an ecosystem restoration proposal without commercial timber harvest. Prescribed burning, wildlife habitat improvement, stream improvement/restoration, and control of invasive exotic plants would still occur. This alternative was dropped from detailed study because it did not meet the Upper Creek Purpose and Need, nor was it consistent with Forest Plan standards and guidelines for Management Area 1B, 2A, and 3B (Forest Plan, pages III-60, 68, and 75). This alternative does not provide a supply of wood products to meet public demands, nor is it reasonable to assume that funding would be available to accomplish the recreation, wildlife, and prescribed fire improvement projects. In addition, the use of prescribed fire alone is not a reasonable method of accomplishing regeneration objectives over a large number of acres because it is not possible to pick the desirable individual residual trees over less desirable species. The use of stand replacement fire to accomplish regeneration objectives is also not a reasonable alternative as it would be difficult to safely implement and does not meet Forest Plan standards and guidelines for Management Area 1B, 2A, and 3B. Similarly, a cut and leave treatment to accomplish regeneration objectives would not supply wood products to meet public demand and would lead to significant concerns with hazardous fuel loadings and subsequent destructive wildfires within the AA. Portions of this alternative are also met with Alternative A – No Action.

2.4 Project Design Features Common to Action Alternatives

The action alternatives share these project design features and would become mandatory if the responsible official selects an action alternative for implementation (see also Appendix A and Appendix F).

- To reduce the possible effect of invasive exotic plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa,* and *Ailanthus altissima* would be controlled prior to disturbance activities. *Miscanthus sinensis* was found along Forest Service Roads. All populations total less than five acres. Control of *Miscanthus sinensis, Paulownia tomentosa* and *Ailanthus altissima* is best done by the use of herbicide (Glyphosphate).
- It is recommended that native plants be utilized in wildlife improvement and roadside erosion control.
- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse.
- During timber stand improvement, soft mast species of holly, black gum, and dogwood would be maintained to ensure continued production of food utilized by numerous bird species and mammals.
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.

The following project design features apply to the scenery resources located in Section 3.9, Chapter 3:

A. Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/acre to screen and blend-in harvest activities as seen from Trail 273.
B. Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet.

2.5 Summary Comparison of Actions by Alternative

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

Table 2-3: Management Activities for Action Alternatives

Activity	Alternative[1]		
	A	B	C
Regeneration Harvest	0	385	385
Slash/Stump Spray Site Preparation	0	308	308
Pre-harvest Streamline/inject Site Preparation	0	77	77
Streamline Release (TSI) if needed	0	385	385
Prescribed Fire	0	350	375
Plant Yellow Pine	0	0	40
Plant Persimmon/Crabapple in Log Landings and a Wildlife Field	0	45	45
Treat Invasive Plant Species Along Six Forest Service Roads	0	5	5
Designate Small Patch Old Growth	0	296	296
Designate Medium Patch Old Growth	0	0	475 (est.)
New Temporary Road Construction (miles)	0	0.25	0.25
Create Vernal Ponds (number)	0	1	1
Anchor Large Woody Debris Along Timbered Branch Creek (miles)	0	1	1
Expand An Existing Wildlife Field	0	0	1
Daylight Along Forest Service Road 4099	0	0	6.5

1 Measurements are in acres unless otherwise specified

2.6 Summary Comparison of Alternatives by Significant Issue

The following table compares environmental effects of alternatives by significant issue:

Table 2-4: Comparison of Environmental Effects of Alternatives by Significant Issue

Significant Issue	Indicators	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Significant Issue#1: Water Quality and Aquatic Habitat	Number of new stream crossings	0	1	1
	Miles of temporary road constructed	0	0.25	0.25
	Type of watershed enhancement activities	0	Large woody debris placed in Timbered Branch	Large woody debris placed in Timbered Branch

Significant Issue	Indicators	Alternative A (No Action)	Alternative B (Proposed Action)	Alternative C
Significant Issue#2: Wildlife Habitat/ Fragmentation	Acres of grass/forb openings expanded	0	0	1.0
	Acres of grass/forb landings planted	0	10.5	10.5
	Miles of road daylighted	0	0	1.8
	Percent of grass/forb openings	0.2	0.28	0.29
	Habitat connectivity	Maintained	Maintained	Maintained
Significant Issue #3: Age-class Distribution	Age-class Distribution			
	Upper Creek AA			
	0-10 years old	1.1%	3.5%	3.5%
	11-20 years old	9.6%	9.6%	9.6%
	21-30 years old	4.4%	4.4%	4.4%
	31-40 years old	2.7%	2.7%	2.7%
	41-50 years old	1.0%	1.0%	1.0%
	51-60 years old	0%	0%	0%
	61-70 years old	6.5%	6.5%	6.5%
	71-80 years old	30.8%	30.5%	30.5%
	81-90 years old	29.5%	28.6%	28.6%
	91-100 years old	11.0%	9.8%	9.8%
	101+ years old	3.4%	3.4%	3.4%
	Wilson Creek AA			
	0-10 years old	1.8%	2.4%	2.4%
	11-20 years old	8.3%	8.3%	8.3%
	21-30 years old	2.5%	2.5%	2.5%
	31-40 years old	2.8%	2.8%	2.8%
	41-50 years old	1.0%	1.0%	1.0%
	51-60 years old	0.6%	0.6%	0.6%
	61-70 years old	3.7%	3.7%	3.7%
	71-80 years old	22.7%	22.7%	22.7%
	81-90 years old	36.5%	35.9%	35.9%
	91-100 years old	15.6%	15.6%	15.6%
	101+ years old	4.5%	4.5%	4.5%
Significant Issue #4: Old Growth Habitat	Acres treated by age class	0	0	0
	Acres of newly designated old growth	0	296	771 (est.)

CHAPTER 3 – ENVIRONMENTAL EFFECTS

Included in this chapter are disclosures of direct, indirect, and cumulative effects of the alternatives on the different resources. Reports from different resource specialists supplied information for portions of the analysis in this chapter. Definitions of specific biological analysis areas (AA) effects are analyzed to are located at the beginning of Appendix A, Biological Evaluation (BE).

3.1 Water Quality and Aquatic Habitat

Additional analysis on aquatic habitat is disclosed in Appendix A, BE and Section 3.11, Management Indicator Species (MIS)/Habitat Component. This analysis addresses activity area waters and aquatic biological AA waters. Activity area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The AA encompasses waters downstream that potentially could be impacted by project activities, in addition to activity area waters.

3.1.1 Existing Condition

Substrate within the project area waters (see following table) was evaluated and visually estimated. The three primary types of substrate that existed were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for PETS species, MIS species as well as any other aquatic organisms.

Table 3-1: Forest Plan Administrative Watersheds 57(Upper Creek), 58(Parks Creek), and 59 (Wilson Creek)

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Areas	Miles in AA
Upper Creek	93, 94, 107	0.8	2.6
UT 1	94-01	0.11	0.11
UT 2	107-02	0.4	0.8
UT 3	107-02	0.2	0.2
UT 4	107-02	0.2	0.2
Timbered Branch	95, 87	2.2	2.2
UT 1	95-08	0	0.4
UT 2	95-08	0	0.5
Pearcey Creek	92-05	0.2	0.8
UT 1	92-05	0.6	0.8
UT 2	92-05	0.4	0.9
Carroll Creek	90-05,03	0.4	0.9
UT 1	90-03	0.4	0.4
UT 2	89-01	0.4	1.0
Craig Creek Watershed Project		288 feet	2.5 miles

Pearcey Creek is located adjacent to Compartment 92 Stand 05 and crossed by Forest Service Road (FSR) 4101. All culverts on this road are in good working condition. The average width of Pearcey Creek where FSR 4101 crosses is approximately 4 feet and a maximum of 6 feet.

Substrate consists of 50% bedrock, 30% cobble, 10% gravel, and 10% sand and silt. Fish habitat exists approximately 100 meters downstream of where FSR 4101 intersects Pearcey Creek.

An unnamed tributary (UT) to Pearcey Creek is also crossed by FSR 4101 (UT Maps, project record). This intermittent stream intersects another intermittent channel approximately 100 feet down slope of the crossing with FSR 4101 where it becomes perennial. Since these two intermittent channels are within Compartment 92 Stand 05 there would be a 30 foot designated "no cut" riparian area on either side of the stream channel. Where the stream becomes perennial there would be a 100 foot riparian area designation. The substrate within UT 1 Pearcey Creek is 70% cobble and 30% gravel and sand. Another small unnamed tributary to Pearcey Creek is crossed by FSR 4101 within Compartment 92 Stand 05. This small tributary (UT 2) has little to no habitat for aquatic organisms and contains mostly cobble and silt habitat.

The UT to Upper Creek (UT 2 Upper Creek) associated with Compartment 107 Stand 02 is located outside of the activity area but is within the aquatic biological AA. The section of this tributary that runs adjacent to the stand contains very little fish habitat due to restricted flow regimes and little flow. Substrate consists of cobble with gravel and sand. The other two drainage areas within the stand are dry and contain no substrate, only vegetation.

The UT to Upper Creek (UT 1 Upper Creek) associated with Compartment 94 Stand 01 is crossed with a culvert by FSR 986. The substrate within this stream is gravel, sand, and silt with restricted flow regimes. There is no fish habitat.

Compartment 94 Stand 01 is approximately 300 feet from the main stem of Upper Creek. Upper Creek supports a wide variety of fish species. Habitat was surveyed during spring 2003 by USFS District Technicians trained in the basin-wide visual estimation technique or BVET (Doloff, et.al.1993). Habitat within Upper Creek was visually estimated for approximately 1.3 miles. Substrate consisted of 30% boulders, 25% sand, 20% cobble, 15% silt, and 10% gravel.

Timbered Branch runs adjacent to Compartment 95 Stands 36 and 37 and Compartment 95 Stand 01. The existing condition of Timbered Branch is affected by the presence of FSR 982. This road is parallel to Timbered Branch for approximately 1.5 miles. Several projects within this area have improved aquatic habitat including a large woody debris project in the 1980s and a cooperative best management practices (BMPs) effectiveness project with the NC Department of Environmental Management's Water Quality section. The Grandfather Ranger District has also performed dispersed recreational improvements that have aided in controlling run-off. Timbered Branch was evaluated for habitat which consisted of primarily cobble (60%), 20% small boulders, 10% gravel, and 10% sand and silt. There is a pool to riffle ratio of 1:1, which was created by the early 1990s large woody debris project.

The UTs to Timbered Branch associated with Compartment 95 Stand 40 are located below the activity areas. The drainage areas within the stand were evaluated for aquatic habitat with little to none existing. These streams are high gradient with restricted flow regimes. Outside the project area in UT 1 Timbered Branch and UT 2 Timbered Branch habitat consisted of small cobble and gravel. Neither of these tributaries were more than one meter wide below the activity area.

Carroll Creek is associated with Compartment 90 stands 03 and 05. Substrate within Carroll Creek consists of 45% boulders, 40% gravel, 10% cobble, and 5% organic. The average depth is eight inches with a maximum of two feet. The average width is approximately 12 feet with a

maximum of 20 feet. Both Carroll Creek and the UT to Carroll Creek are impacted by road run-off from FSR 299 and FSR 4096. Improvements have been made by the Grandfather Ranger District that is effectively keeping sediment and off highway vehicles out of Carroll Creek and its tributaries. The activity area of the UT to Carroll Creek adjacent to Compartment 90 stand 03 is a low gradient stream. This stream was evaluated for aquatic habitat. Fifty percent of the substrate observed was silt and sand, 30% cobble, and 20% gravel. It appears as though the gradient is so slight in this tributary that the flushing of natural sediments does not occur. No failures to best management practices (BMPs) were noted on FSR 4096 which runs parallel to this UT to Carroll Creek for approximately 0.4 miles. The headwaters of UT 2 Carroll Creek flows parallel to Stand 89-01—habitat within this UT exhibit similar characteristics of Carroll Creek.

There is no harvest activity proposed in the Craig Creek drainage area. However, the USFS Hydrologist Brady Dodd has proposed a watershed restoration project on Craig's Creek. The creek is currently heavily impacted. Historically, Craig Creek was moved from its original channel into a man-made channel that is currently heavily eroded and causing sedimentation of habitat. The watershed project would redirect the flow of Craig Creek into its natural abandoned channel and enhanced for fish and aquatic species habitat. Enhancements would include large woody debris placement and reconnection with the natural floodplain. A detailed description of the project is included in Attachment 4 of the aquatic resource report, project record.

Culverts along FSRs 4099, 982A, 982, 986, 987, 4102, 299, and 4096, the roads themselves, and existing old roads and skid trails in the activity area are the existing threats to the streams and drainages. 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 some of the roads (FSR 4099, 982A, 986, and 987) are closed to all but administrative and fire control traffic (i.e. road disturbance is limited). FSR 4102, 299, and 4096 are open seasonally and FSR 982 is open year-around. There were no culverts found within the aquatic biological AA that were non-functioning. All stream crossings are in good working condition.

Fish habitat exists within the activity areas of Timbered Branch and Upper Creek. Although habitat exists in the project area of Carroll Creek, no fish were found during project surveys or during the 1994 Brook Trout Distribution Surveys conducted by the USFS and the NCWRC. There is limited habitat for fish species within other activity area waters due to small stream size and restricted flow regimes. Activity area waters provide habitat for macroinvertebrates. The following table displays streams, survey years, and aquatic species found in aquatic biological AA waters.

Table 3-2: Species Data from 1994-1995 Trout Distribution Surveys, NCWRC Surveys, and NCDENR Surveys

Stream	Sample Year	Species Found
Timbered Branch	1992, 1993, 2004	Rainbow trout, brown trout, rosyside dace, bluehead chub, greenhead shiner, blacknose dace, margined madtom, fantail darter, creek chub.

Stream	Sample Year	Species Found
Upper Creek	1993, 1994, 1997, 1999	Rainbow trout, brook trout, brown trout, santee chub, fieryblack shiner, greenfin shiner, central stoneroller, warpaint shiner, white sucker, greenhead shiner, striped jumprock, piedmont darter, margined madtom, sandbar shiner, spottail shiner, bluehead chub, fantail darter, rock bass, snail bullhead, v-lip redhorse, flat bullhead, central stoneroller, thicklip chub, tessellated shiner, seagreen darter, redbreast sunfish, bluegill, smallmouth bass, largemouth bass, creek chub, striped jumprock, piedmont darter, yellow perch and spottail shiner.
UT 2 Upper Creek	1993	Brown trout, rosyside dace, bluehead chub, greenhead shiner, creek chub, fantail darter
Carroll Creek	1994	No fish above falls and no trout below falls at bridge (SR 1405)

3.1.2 Summary of Alternatives

The following table displays the number of stream crossings, miles of temporary road, and type of watershed enhancement activities proposed by alternative:

Table 3-3: Stream Crossings, Temporary Roads, and Watershed Enhancement Activities by Alternative

Indicators	Alternative A	Alternative B	Alternative C
Number of new stream crossings	0	1	1
Miles of temporary road constructed	0	0.25	0.25
Type of watershed enhancement activities	n/a	Large woody debris placed in Timbered Branch	Large woody debris placed in Timbered Branch

The following table discloses a summary of effects by alternative:

Table 3-4: Summary of Effects to Aquatic Resources by Alternative

	Summary of Effects		
Resource Area	Alternative A	Alternative B	Alternative C
Effects on aquatic MIS	Existing habitat and population trends continue.	Existing habitat and population trends continue.	Existing habitat and population trends continue.
Effects on water quality (Associated with the amount of soil disturbance)	No change from existing condition.	No expected turbidity and sediment loading expected. May increase slightly during bridge installation and implementation of the Craig Creek Restoration. Should diminish downstream and cease with site rehabilitation.	No expected turbidity and sediment loading expected. May increase slightly during bridge installation and implementation of the Craig Creek Restoration. Should diminish downstream and cease with site rehabilitation.
Effects on aquatic habitat and populations	Existing habitat and population trends continue.	May temporarily affect aquatic habitat in Carroll Creek (bridge installation)	May temporarily affect aquatic habitat in Carroll Creek (bridge installation)

	Summary of Effects		
Resource Area	**Alternative A**	**Alternative B**	**Alternative C**
		and Craig Creek (during restoration) but would improve over time.	and Craig Creek (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 crossing on Carroll Creek. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.	Remain in present state except at stream crossing on Carroll Creek. Aquatic habitat would improve, as riparian areas grow older, increasing large woody debris in streams.
Effects of herbicide	No impact	No impact as no spraying would occur within the riparian areas of streams.	No impact as no spraying would occur within the riparian areas 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

3.1.3 Effects of Access Management on Aquatic Resources

3.1.3.1 Alternative A Direct and Indirect Effects

Implementation of this alternative would perpetuate the existing condition described above. Aquatic habitat quality and 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 12 Forest concern (FC) species or the four MIS species from implementation of this alternative.

3.1.3.2 Alternatives B and C Direct and Indirect Effects

Direct Effects

Access to the proposed units would involve the construction of ¼ mile of temporary road off of Old Way Ridge Road (FSR 9824) and the development of skid trails and log landings. The new temporary road construction is occurring near Old Way 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 stream crossings. There is only one new stream crossing proposed with the Upper Creek Project which is a bridge across Carroll Creek to access Stand 90-05.

The Carroll Creek stream crossing has been designed so that it would be least impacting on the activity area's aquatic resources. Carroll Creek would be crossed perpendicular to its channel so the access road enters the riparian area, crosses the stream, and exits the riparian area. Road drainage would be designed so it flows off the roaded area and enters into vegetation rather than directly into activity area streams. Bridges allow for the movement of aquatic organisms by maintaining habitat under the crossing.

More mobile aquatic species such as aquatic salamanders, crayfish and fish are expected to emigrate downstream away from the disturbed area during bridge installation. The loss of less

mobile individuals such as macroinvertebrates would likely occur during this process. It is unlikely that the less mobile fish species within the aquatic analysis area would be impacted due to their absence within the activity area.

Sedimentation of aquatic habitats within the aquatic analysis area could result in the loss of clear-flowing spring habitats and important headwater stream origins. Aquatic species utilizing these areas (such as dragonflies) could be locally lost. Spawning areas for fishes occupying downstream reaches of Timbered Branch, Upper Creek, and Pearcey Creek could also be reduced or lost to sedimentation. Stream gradients and flow regimes within the aquatic biological AA may not be dynamic enough to rely on natural flushing to occur. Therefore, any losses have potential to be permanent.

Access to the other compartments and stands include roads proposed in Alternative B. These existing roads include; FSR 4099, 982A, 986, 897, 4102, 299, and 4096. There are no new stream crossings associated with these roads. Where there are existing crossings, no additional work would be necessary as they are in good working condition.

Indirect Effects

There may be off-site movement of soil into activity area waters from temporary road construction and the bridge construction. 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 and hellbenders are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Eggs and juveniles may be lost 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.

Smaller, less mobile organisms such as crayfish and aquatic insects may not be able to move to more suitable habitat. Populations 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 the contract clauses and erosion control precautions described above should 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 activity 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) or culverts, or channel armor (e.g. stone or brush). These temporary crossings along with BMPs and North Carolina Forest Practices Guidelines (NC FPGs) would protect ephemeral drainages, and would not cause bare soil to be transported downslope into intermittent or perennial streams.

3.1.4 Effects of Timber Harvest on Aquatic Resources

3.1.4.1 Alternative A Direct and Indirect Effects

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

3.1.4.2 Alternative B Direct and Indirect Effects

Required NC FPGs and Forest Plan standards (BMPs) would be applied to the harvest activity. Applications of Forest Plan standards are intended to meet (and in some cases, exceed) 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.

3.1.4.3 Alternative C Direct and Indirect Effects

Effects of timber harvest to aquatic resources would generally be the same as Alternative B. The only difference is the management method for Compartment 107 Stand 02. With Alternative B, this stand is a two-age harvest; in Alternative C it is a clearcut. 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. Compartment 107 Stand 02 has two ephemeral drainage areas located in the middle of the stand. During activity area surveys, there was no water located in either of these drains. However, during heavy rainfall there could be some surface water flowing through them. Either the clearcut or the two-age harvest would likely increase the amount of water that flows through these ephemeral channels during storm events. The implementation of Alternative C would likely increase the drainage more than Alternative B, but would not have any measurable adverse impacts on aquatic resources. No skidding would occur across these drains and trees would be directionally felled away from the channels, reducing risk of any sediment reaching UT Upper Creek or Upper Creek.

3.1.5 Effects of Timber Harvest on Water Quality

3.1.5.1 Alternative A Direct and Indirect Effects

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

3.1.5.2 Alternatives B and C Direct and Indirect Effects

Water quality should not be affected as long as Forest Plan and NC FPG standards are followed and timber sale contract clauses are implemented. Stream temperatures would not be affected because adequate shade would be maintained along perennial and intermittent streams.

3.1.6 Effects of Timber Harvest on Riparian Areas

3.1.6.1 Alternative A Direct and Indirect Effects

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

3.1.6.2 Alternative B Direct and Indirect Effects

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

3.1.6.3 Alternative C Direct and Indirect Effects

Effects to aquatic resources would generally be the same as Alternative B. The clearcut associated with Compartment 107-02 would cause additional surface run-off and likely increase the amount of water that flows down the two ephemeral drainage areas within the stand, but would not have any measurable adverse impact on riparian areas.

3.1.7 Effects of Herbicide Use

3.1.7.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as herbicide use is not proposed.

3.1.7.2 Alternatives B and C Direct and Indirect Effects

The use of herbicides for silvicultural treatments is analyzed in detail in the Vegetation Management Environmental Impact Statement for the Southern Appalachians (Section 1.2, Chapter 1). Included in this document is a detailed analysis of the effects of silvicultural treatments on aquatic resources. No herbicide would be used in the 100-foot designated riparian area of any perennial streams within the Upper Creek Project and no herbicide would be sprayed within the 30-foot designated riparian area of any intermittent streams within the activity area (see also Section 3.5 below).

3.1.8 Effects of Prescribed Burning

3.1.8.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as prescribed burning is not proposed.

3.1.8.2 Alternatives B and C Direct and Indirect Effects

Both alternatives involve a 350-acre prescribed burn in Compartment 90. No “dozer” fire line construction is planned as the burn would be contained by existing trails in the Brown Mountain Off-highway Vehicle (OHV) 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 treatment. Areas of erosion are identified and controlled during inspection to eliminate stream sediment sources (i.e. seeding, water bars, and/or rehabilitation). There would be no measurable adverse effect to aquatic resources from this activity.

3.1.9 Effects of Large Woody Debris (LWD) Placement in Timbered Branch

3.1.9.1 Alternative A Direct and Indirect Effects

There would be no effect under this alternative as LWD placement is not proposed.

3.1.9.2 Alternatives B and C Direct and Indirect Effects

An LWD project is proposed in Timbered Branch as a part of the Upper Creek Project. Large wood within a stream is defined as woody debris greater to or equal to 10 centimeters in diameter (Meehan, 1991). Large wood contributes to structure and hiding cover, maintains physical stability and provides a range of habitats for stream organisms (Dolloff, 1986). Installing LWD would also provide for a well balanced pool to riffle ratio within Timbered Branch. A well balanced ratio of these two habitats allows for species diversity. A similar project was conducted in the late 1970's. Some of the LWD put into place then is still effective today. The implementation of this aspect of the Upper Creek Project would enhance habitat for all aquatic species, including rare species in approximately two miles of trout stream.

3.1.11 Cumulative Effects

There should be no adverse cumulative effects to aquatic resources in the aquatic biological AA based on project design features listed in Section 2.4, Chapter 2. Past projects and events within the analysis area include private and Forest Service timber projects, including Pearcey Creek (late 1990s), Little Chestnut (mid 1990s), and Timbered Branch (1990s). Other disturbances within the aquatic biological AA include a dam on private lands located on UT 2 Upper Creek (downstream from the activity area), the Upper Creek area watershed improvement project which is to be completed in 2005, illegal OHV use, and a 140-acre wildfire in the Chestnut Mountain area that occurred in November 2001.

Two tropical storms moved through the activity and aquatic biological AA in September 2004 during an eight day period, both producing 100-year flood events. Both storms released up to 14 inches of rain within 48 hours. Many streams within the Catawba drainage were heavily impacted by the storm events. The streams within the Upper Creek Project area were affected by the storm events. As observed in other watersheds across the Pisgah National Forest, often these large storm events act as a "restart mechanism" for cumulative effects. Substrates have been cleaned or washed out, creating habitat for aquatic organisms which rely on interstitial space, or 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 lower part of the aquatic biological AA remains heavily impacted by private land use. On National Forest System (NFS) lands, impacts to the watershed include dispersed campsites, roads, illegal OHV use, and the Brown Mountain OHV area. The Grandfather Ranger District has several ongoing projects to eliminate impacts to the area's aquatic resources. These include the enforcement of illegal OHV use, maintenance of Forest Service roads, the improvement and/ or removal of campsites from within riparian areas in the watershed which are improving riparian vegetation, preventing vehicles from entering area streams, and preventing off-site

movement of soil. As a result, the expected cumulative effects should not be any greater than the direct effects disclosed above. There are no expected adverse cumulative effects anticipated with these alternatives when their direct and indirect effects are combined with the past actions displayed in the following table and the flood events and actions described below:

Table 3-5: Past Activity within the Upper Creek and Lower Wilson Creek Analysis Areas by Year[1]

Analysis Areas	Year	Compartment(s)	Volume (ccf)	Acres
Upper Creek	1994	95, 96	2,350	115
Lower Wilson Creek (LWC)	1991	90, 91, 92, 93	2,205	92
Total Harvest Related			**4,555**	**307**
Wildfire	1981-2004			3,500
Prescribed Fire	1981-2004			300
Total Fire Related				**3,800**

1 No additional Forest Service timber sales are planned in the AAs over the next 10 years. A landowner is proposing to harvest 100 acres of private land adjacent to compartments 87 and 88 to be implemented in the next two years.

3.2 Wildlife Habitat

Additional analysis on wildlife habitat is disclosed in Appendix A, BE; Section 3.11, MIS/Habitat Component; Section 3.12, Threatened, Endangered, and Sensitive Species; and wildlife resource report, project record. The wildlife biological analysis area (AA) is the Upper Creek and Wilson Creek watersheds. The following table displays habitat proposed for treatment by alternative:

Table 3-6: Habitat Proposed for Treatment by Alternative (early successional habitat created; 0-20 years)

Action	Alternative A	Alternative B	Alternative C
Early Successional (ac)	0	385	385
Grass/Forb Openings Expanded (ac)	0	0	1.0
Grass/Forb Planted Landings (ac)	0	10.5	10.5
Daylighting/Early Successional (ac & mi)	0 & 0	0 & 0	6.5 & 1.8

3.2.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, the early successional habitat (0-20 years) would remain at 2,584 acres, or 11 percent of the wildlife biological analysis area; the grass/forb openings would remain at 0.2 percent, which currently does not meet required Forest Plan minimum standards (Forest Plan, page III-23); and habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with past activities listed in Table 3-5 above.

3.2.2 Alternatives B & C – Direct, Indirect, and Cumulative Effects

Both alternatives propose about 385 acres of early successional habitat (0-20 years). Converting these acres to early successional habitat would have positive, adverse, or no effects depending on individual species (see also Sections 3.11, 3.12, and Appendix A below).

3.2.2.1 Forest Concern Wildlife Species

The Allegheny woodrat is known within Caldwell County. Nest sites in and around boulder clusters and rock outcrops have been determined to be the only limiting factor for woodrat species utilizing habitat. No nest sites were found during surveys; however, not all outcrops in the wildlife biological AA were surveyed. Recent research (Latchford 1998) has demonstrated that rock or boulder clusters up to ½ acre in size provide suitable nesting habitat—the rock outcrop within stand 95-36 is not suitable nesting habitat because it is too small. This stand is proposed for harvesting by skyline logging systems and the rock outcrop is outside proposed cable corridors—additional basal area would be left in the vicinity of the rock outcrop. The woodrat is most commonly found in areas of rich, moist forests located within riparian areas of the AAs. Since proposed vegetative management would not occur in them, there would be no direct, indirect, or cumulative effect to populations of this species or its habitat by either of these alternatives.

3.2.2.2 US Fish and Wildlife Service Bird Species of Concern

The wildlife biological AA lays within the US Fish and Wildlife Service's Appalachian Mountains Birds of Concern (BCR 28). Bird surveys recorded the worm-eating warbler, wood thrush, and Acadian flycatcher (the flycatcher is also a Forest MIS) as occurring within the wildlife biological AA. The Partners in Flight (PIF) Conservation Plan (Hunter et. al. 1999) states the southern Blue Ridge area in the Southeast United States remains the most heavily forested habitat. Nevertheless, breeding bird survey (BBS) data indicates bird population declines in excess of those in other areas in the region. Declines are seen in long-distance migrants, short-distant migrants, and permanent residents. One possible explanation from Hunter et. al. (1999) is that BBS routes are situated along roads and most roads in the Southern Blue Ridge area are in valleys where private development and habitat loss in recent years has been greatest.

High elevation forest types and early successional conditions have declined in extent in recent years due to insect, disease, and low levels of management activities. Low elevation riparian forest loss and fragmentation remains most affected by private development and agricultural growth. The wood thrush and worm-eating warbler were recorded in an upland hardwood-white pine stand that is 83 years old (stand 87-22). The Acadian flycatcher was recorded in a white pine-upland hardwood stand that is 78 years old (stand 95-02). There are 5,114 acres (22%) of this forest type in the wildlife biological AA—either a hardwood stand with a white pine component or a white pine stand with a hardwood component. Alternatives B and C both propose to regenerate 71 acres (less than 1.4%) of this forest type.

The future projects of restoring the Craig Creek, Upper Creek, and Timbered Branch would have beneficial effects to all riparian species over the next ten years.

<u>Worm-eating Warbler</u>

This bird is known to breed within the Appalachian region, occurring in ravines and mountainsides in the mountains of Western North Carolina. The preferred habitat is deciduous or mixed forests with a dense or abundant shrub layer, often composed of rhododendron or laurel. Nests are well hidden in the leaf litter on the forest floor. Adults forage for insects and other invertebrates (rarely on worms) found on the forest floor or shrubs.

Habitat of rhododendron and laurel understory is found throughout the wildlife biological AA. Stands 95-8 and 95-40 exhibit a dense laurel shrub layer, as does stand 95-27. The remaining

stands proposed for harvest in Alternatives B and C exhibit little understory or the main shrub component is red maple saplings. If harvesting activities occur during nesting season, young may be adversely affected over approximately 42 acres. The BBS 20 year population trend data demonstrates little change in this species. Past wildfires that burned an average of 165 acres per year in addition to the proposed 350 acres of prescribed fire under Alternatives B or C would allow more vigorous growth of the shrub layer, including rhododendron and laurel species. Although prescribed fires rarely enter riparian habitat due to the cool, moist conditions, any wildfire that occurs in the drier summer or fall months may adversely affect the riparian habitat for one to two growing seasons. Therefore, wildfire may have adverse direct effects to any bird nesting in this habitat.

Wood Thrush

This bird is known to have a high breeding population within the watersheds of Western North Carolina. The preferred habitat is mixed pine-hardwood forests where the deciduous shrubs are numerous, especially where moist conditions exist. Nests are built in the shrub/sapling height class of 5–15 feet from the ground. The thrush forages for insects and other invertebrates, mainly on the forest floor among the leaf litter.

High elevation forest types and early successional conditions have declined in extent in recent years due to insect, disease, and reduced management. Low elevation riparian forest loss and fragmentation remains most affected by private development and agricultural growth.

As surveys recorded, both the wood thrush (and Acadian flycatcher) favors habitats in bottomland hardwoods and rich deciduous forests, especially near streams. The BBS trend data show the wood thrush population in North Carolina has decreased 2.53 from 1966 to 2002, while the Acadian flycatcher and worm-eating warbler data displays little change in population. Alternatives B and C would increase the availability of early successional habitat for the wood thrush (and Acadian flycatcher) near riparian corridors without decreasing the large areas of mature forest communities. Overall, either action alternative would benefit wood thrush populations across the wildlife biological AA over the next planning period.

Rivera et. al. (1997) and Anders et. al. (1998) found that wood thrush fledglings disperse to early successional shrub/sapling forest patches at a rate of 96.7%. Powell et. al. (2000) found that mortality in fledglings occurred immediately upon long-distance dispersal from nest sites. No male mortality was recorded and female mortality occurred during the nesting period, at or very near the nest site. Low mortality was recorded by Powel during August and early September in both adults and fledglings, corresponding to a dramatic move towards denser habitat (Lang 1998, Powell 1998). Anders et. al. (1998) concluded that large tracts of mature deciduous forest with a mosaic of early and mid-successional forest stands, along with mature riparian forests, would accommodate both breeding and post-dispersal habitat requirements of wood thrushes and other neotropical migratory birds.

Stands that exhibit habitat for this species are found throughout the wildlife biological AA with the highest potential in 4,445 acres of cove or poplar forests. Alternatives B and C propose to harvest approximately 52 acres (less than 1.2%) of the acidic cove forest type community. Maintaining the mosaic of early successional habitat surrounding the large tracts of mature forests would maintain high potential habitat for this species. There would be an adverse effect on nests within the 52 acres of proposed harvest in either action alternative.

Acadian Flycatcher

This flycatcher has a high breeding population within the mountains of Western North Carolina. The preferred habitat is moist, deciduous forests with a moderate understory, most commonly near streams. Nests are built on down-hanging branches of deciduous trees, usually over a stream. The flycatcher forages on flying insects 10-40 feet above the ground. The action alternatives would not harvest trees within riparian areas of streams; therefore, there would be no effect to nests or foraging habitat of the Acadian flycatcher.

Both the wood thrush and Acadian flycatcher favor habitats in bottomland hardwoods and rich deciduous forests, especially near streams recorded during surveys. The wood thrush is also found within mixed forest communities with a deciduous understory. The BBS trend data show the wood thrush population in North Carolina as decreasing 2.53 from 1966 to 2002, while the Acadian flycatcher data displays little change.

Although little research has been done on the Acadian flycatcher, this species would likely benefit from the forest mosaic described for wood thrush habitat with emphasis on mature riparian forests. The flycatcher is considered by PIF to be a priority species within mature lowland riparian woodlands, and to a lesser degree within Appalachian oak forests.

Current understanding of bird-habitat relationships within largely forested landscapes, especially mountainous area, indicates that forested riparian habitat is indeed important for supporting many species (Hunter et. al. 1999). Forest Service standards maintain riparian areas as “no cut” areas unless there are aquatic or riparian needs identified.

Anders et al (1998) determined that the wood thrush fledglings and other forest interior species fledglings were found at much higher rates within early successional habitat with dense vegetation. The other two habitats utilized by these fledgling birds were forest edge and riparian habitats. The study also found juvenile red-eyed vireo, ovenbird, Kentucky warbler, and black-and-white warbler’s utilized dense, early successional/brush habitat. Anders et. al. (1998) determined that although it is possible that juveniles of some of these species fledged from nests within early successional habitat (Kilgo et. al. 1996), the presence, as well as the high densities of individuals in these areas indicate that forest-breeding migrants other than wood thrushes are using early successional, riparian and edge habitat during the post-dispersal period. Anders et. al. (1998) theorized that protective, dense cover from aerial predators (i.e. hawks) and food availability in the form of insects and blackberries, or other soft mast within an early successional/brush habitat setting, is the most likely attraction for juvenile birds to use this habitat. Keith Watson stated an increase of early successional habitat at high elevations was also desirable to improve the conditions for golden-winged warbler and other species of early successional high elevation habitat that are experiencing decline. The need for early successional habitat to support wood thrush fledglings is critical, given their decrease in numbers and habitat. Hunter et. al. (2001) concluded that many disturbance-dependent species may, in the near future, require greater levels of legally based conservation action, such as federal listing, in the absence of aggressive restoration of disturbance-maintained communities.

3.2.2.3 Grass/Forb Openings

The following table displays the grass/forb openings by alternative:

Table 3-7: Percent of Grass/Forb Openings by Alternative

Minimum Forest Plan Level	Alternative A	Alternative B	Alternative C
0.5%	**0.2%**	**0.28%**	**0.29%**

The Forest Plan identifies at least 0.5 percent grass/forb habitat be maintained and desires 3 percent in Management Area 3B (Forest Plan, pages III-23 and III-74). Although Alternative B would slightly improve the existing grass/forb habitat in the analysis area by creating about 10.5 acres of habitat on landings and Alternative C would expand an existing grass/forb opening by about one acre in addition to creating the 10.5 acres of habitat on landings; neither alternative would meet minimum Forest Plan standards.

3.2.2.4 Habitat Connectivity

Neither Alternatives B or C would adversely affect habitat connectivity because contiguous areas of moderate disturbance level, large contiguous forest areas, and riparian areas would remain intact in the wildlife biological AA. Habitat connectivity would be maintained under either alternative.

3.2.2.5 Cumulative Effects

There would be no adverse cumulative effects with this alternative when combined with past activities listed in Table 3-5 above. Within five years, the increase in soft mast production would somewhat offset any loss of hard mast production through the regeneration harvest proposed, resulting in a slight recovery. With project design features retaining hard mast species where they exist, the loss of hard mast production from the regeneration activity would be minimal. No changes to the integrity of Bird Patch #37 are proposed—the Craig Creek Watershed project would benefit resource conditions within this bird patch.

The proposed Craig Creek Watershed project involves returning the creek to its original location. The project to delineate the dispersed campsites along Timbered Branch Creek and the intersection of FSRs 197 and 286 is on-going. This project would result in less bare soil and vehicle traffic within the areas immediately adjacent to the creeks. The campsites being delineated and hardened, along with the toilet facility are outside of the immediate riparian corridor of Upper Creek. These recreation and soil and water resource projects would benefit wildlife species within the wildlife biological AA by maintaining wildlife access to water sources and the integrity of the riparian areas. Hunter et al (1999) concluded that most riparian areas were cleared decades ago for farmland, residential areas, businesses, and roads. Approximately 65,000 acres of riparian habitat is currently present within the Southern Blue Ridge region, with over 90% occurring at low elevations on private lands (Hunter et al 1999).

There have been approximately 3,500 acres of wildfires within these analysis areas since 1981 and approximately 300 acres of prescribed fire. This fire history has resulted in an average of about 150 acres per year being burned. Where these fires occurred, the shrub layer has been reduced and scattered tree mortality occurred. Wildfires and prescribe burns rarely enter riparian areas where they exhibit cool, low intensity flame heights within this moist environment.

The southern pine beetle (SPB) epidemic within the past five years has resulted in large clumps and scattered yellow pine species mortality, especially along ridge tops on the south end of the Upper Creek AA. Natural regeneration is occurring, and a prescribed burn is planned in the

vicinity to reduce the dead and down debris which may be interfering with regeneration to a fully stocked condition.

3.3 Age-class Distribution

3.3.1 Existing Condition

The Upper Creek Project is located within two AAs; Upper Creek AA and Lower Wilson Creek AA. Within the Upper Creek AA, approximately 75 percent of forested acres are 71 years old or older. Only one percent is in the 0-10 year age-class, and 10 percent is in the 11-20 year age-class. Within the Lower Wilson Creek AA, approximately 79 percent of forested acres are 71 years old or older. Only two percent is in the 0-10 year age-class, and eight percent is in the 11-20 year age-class.

In many of the older stands, especially on upland sites, there are abundant dead standing and dead fallen trees, mostly yellow pines and scarlet oaks. The area has suffered through several outbreaks of SPB (most recently in 2000-2002) and drought (most recently 1998-2002), and many oaks exhibit symptoms of oak decline.

The age-class distribution is very unbalanced for MA 3B where sustainable timber harvest and provision of young forest is emphasized (Forest Plan, page III-71). Mortality losses would continue to increase as stands get older.

Additional analysis on age-class distribution is disclosed in Appendix B, Age-Class Distribution. The following tables display the existing acres by age-class by MA and AA:

Table 3-8: Forest Plan Allowed 0-10 Year Age-Class for Upper Creek AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**
1B, 3B	5,541	277	831	130	147	699
2A	3,282	164	328	15	149	313
4A & 4D	528	n/a	53	2	n/a	51
Other	4,024	-	-	-	-	-
Total	**13,375**	**441**	**1,212**	**147**	**296**	**1,063**

Summary: *In Upper Creek, harvest 147 to 699 acres in MA 1B and 3B and harvest 149 to 313 acres in MA 2A and harvest 0 to 51 acres in MAs 4A and 4D.*

Table 3-9: Forest Plan Allowed 0-10 Year Age-Class for Lower Wilson Creek AA 512-W

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	**Forested Acres**	**Min. Desired**	**Max. Allowed**	**Existing 0-10 Yr.**	**Min.**	**Max.**
1B, 3B	3,618	181	543	188	0	355
2A	870	44	87	0	44	87
4A & 4D	2,413	n/a	241	0	n/a	241
Other	3,291	-	-	-	-	-
Total	**10,192**	**225**	**871**	**188**	**44**	**683**

Summary: *In Lower Wilson Creek, harvest 0 to 355 acres in MA 1B and 3B and harvest 44 to 87 acres in MA 2A and harvest 0 to 241 acres in MAs 4A and 4D.*

3.3.2 Alternative A – No Action

3.3.2.1 Direct and Indirect Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting the Forest Plan for early successional habitat would continue.

3.3.2.2 Cumulative Effects

There would be no adverse cumulative effects of past projects when combined with this alternative because there are no direct or indirect effects (see Table 3-5 above).

3.3.3 Alternatives B & C

3.3.3.1 Direct and Indirect Effects

Under these alternatives, about 385 acres would be harvested using a regeneration silvicultural treatment. Both alternatives would help balance the age-class distribution. The 0-10 year age-class in the project area would be brought up to almost 6.5 percent in 2006, meeting Forest Plan standards. All stands proposed for harvest are from 74 to 99 years old. This project is the only one scheduled in the AAs for this ten-year period, and would stay within Forest Plan standards for the desired range of harvest for proper age-class distribution in the future.

The majority of harvest is concentrated in the vicinity of existing roads. This keeps the non-harvested areas away from roads in a more undisturbed state. Such concentration is also more economically efficient.

3.3.3.2 Cumulative Effects

There are no adverse cumulative effects anticipated with this alternative when its direct and indirect effects are combined with past actions (see Table 3.5 above). Cumulatively, past, present, and reasonably foreseeable future events are expected to result in the desired range of age-class distributions at any given time.

Current management direction for the Upper Creek project area is to maintain 5%-15% of MA 1B and 3B in young forest (0 to 10 year age-class) and 5%-10% of MA 2A, 4A, and 4D in young forest. These alternatives would continue the established pattern of management in the area for which prior investments have been made. The proposed project would maintain the general land use as a forested environment in the short and long term.

3.4 Old Growth Habitat

The following table displays compartments in the Upper Creek project area that are short of meeting Forest Plan standards for small patch old growth (additional analysis on old growth is disclosed in Appendix C, Old Growth Restoration):

Table 3-10: Small Patch Old Growth Needed by Compartment for the Upper Creek Project

Compartment	Small Patch Old Growth Acres Needed
89	63
90	79
93	50
95	54
107	50

Compartment	Small Patch Old Growth Acres Needed
Total	296

3.4.1 Alternative A – No Action

3.4.1.1 Direct, Indirect, & Cumulative Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting Forest Plan standards for designated small patch old growth habitat in the eight compartments would continue. Existing stands would remain intact. Past, present, and reasonably foreseeable actions would not have adverse cumulative effects when combined with this alternative.

3.4.2 Alternative B

3.4.2.1 Direct, Indirect Effects

No designated old growth (as defined by the Forest Plan) would be harvested under this alternative. There may be individual trees greater than 90 years of age harvested under this alternative, but old growth is a community and not an individual tree. Designating about 296 acres of small patch old growth under this alternative along with the existing large patch old growth would ensure old growth habitat is distributed throughout the project area. The following table summarizes age-class reductions for the two AAs by alternative along with old growth disclosures:

Table 3-11: Age-Class for Compartment 401 by Alternative and Old Growth Disclosures

Measurement	Alternative A (existing)	Alternative B (after implementation)	Alternative C (after implementation)
Acres treated by age-class			
Upper Creek AA			
0-10 years old	1.1%	3.5%	3.5%
11-20 years old	9.6%	9.6%	9.6%
21-30 years old	4.4%	4.4%	4.4%
31-40 years old	2.7%	2.7%	2.7%
41-50 years old	1.0%	1.0%	1.0%
51-60 years old	0%	0%	0%
61-70 years old	6.5%	6.5%	6.5%
71-80 years old	30.8%	30.5%	30.5%
81-90 years old	29.5%	28.6%	28.6%
91-100 years old	11.0%	9.8%	9.8%
101+ years old	3.4%	3.4%	3.4%
Lower Wilson Creek			
0-10 years old	1.8%	2.4%	2.4%
11-20 years old	8.3%	8.3%	8.3%
21-30 years old	2.5%	2.5%	2.5%
31-40 years old	2.8%	2.8%	2.8%
41-50 years old	1.0%	1.0%	1.0%
51-60 years old	0.6%	0.6%	0.6%
61-70 years old	3.7%	3.7%	3.7%
71-80 years old	22.7%	22.7%	22.7%
81-90 years old	36.5%	35.9%	35.9%
91-100 years old	15.6%	15.6%	15.6%
101+ years old	4.5%	4.5%	4.5%

Measurement	Alternative A (existing)	Alternative B (after implementation)	Alternative C (after implementation)
Acres of existing Forest Plan designated old growth proposed for harvest	0	0	0
Acres of newly designated old growth	0	296	771 (est.)

3.4.2.2 Cumulative Effects

Under this alternative both AAs would meet Forest Plan standards for small patch old growth. As a result, there would be no adverse cumulative effect anticipated with this alternative when its direct and indirect effects are combined with the past actions displayed in Table 3-5 above.

3.4.3 Alternative C

3.4.3.1 Direct, Indirect Effects

No designated old growth (as defined by the Forest Plan) would be harvested under this alternative. There may be individual trees greater than 90 years of age harvested under this alternative, but old growth is a community and not an individual tree. Designating about 296 acres of small patch old growth and 475 acres of medium patch old growth near Horsepen Creek under this alternative, along with the existing large patch old growth would ensure old growth habitat is well distributed throughout the project area (see also Table 3-11 above).

3.4.3.2 Cumulative Effects

Under this alternative both AAs would meet Forest Plan standards for small patch old growth. As a result, there would be no adverse cumulative effect anticipated with this alternative when its direct and indirect effects are combined with the past actions displayed in Table 3-5 above.

3.5 Herbicide Use

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.5.2 Alternatives B and C Direct, Indirect, and Cumulative Effects

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

Table 3-12: Maximum Acres of Pesticides Applied Manually by Alternative[1]

Pesticide	Alternative B	Alternative C
Triclopyr/Glyphosate (ac)[2]	390	390

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, exotic 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, Forest Plan standards and guidelines (Forest Plan, page III-181), and design features disclosed in Appendix F. 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 are 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.

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

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 Grandfather Ranger District Work Center and not in the field and applicators do not carry concentrated amounts of herbicide in the field. There are no other known foreseeable applications of herbicides on NFS lands in the Upper Creek area that could affect herbicide use with this proposal—the last measurable herbicide use on NFS lands in the Upper Creek area was about 10 years ago in Compartments 95 and 96 (see Table 3-5 above). The Forest Service is unaware of any large-scale quantities of herbicide being applied on adjacent non-NFS lands within the watershed that could cause adverse cumulative effects. Individual home owners are expected to use herbicides on their properties; however,

determining measurable amounts, formulations, locations, frequency, and timing of their use would be speculative. Cumulative effects of herbicides applied on NFS lands "mixing" with herbicides applied on non-NFS lands are not expected to be measurable due to the type of herbicide proposed for NFS lands and project design features (see Appendix F).

3.6 Cultural Resources

A total of 44 archeological sites (31CW354 – 358, 31CW363 – 365, 31BK430 – 464 & 31BK473) were located and recorded during the survey on areas proposed for treatment in the Upper Creek proposal. In addition, three prerecorded archeological sites (31CW34, 31BK86, 31BK330) were relocated and two of these evaluated. Five sites are rated Class I (31BK86, 31BK435, 31BK447, 31BK351, 31BK462) and are eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria D (36 CFR 60.4). Two sites are currently unevaluated (31CW34 & 31BK464), and may be eligible to the NRHP upon further assessment. The remaining sites are rated Class III and are not considered eligible to the NRHP.

3.6.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

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

The Class III sites are not eligible to the NRHP and may be affected by the proposed activities. There are no expected adverse direct, indirect, or cumulative effects to Class I and unevaluated sites with implementation of either of these alternatives as identified cultural sites would be protected by excluding them from the treatment areas.

3.7 Soil Resources

The following is an analysis of the soils that would be impacted by logging or temporary road construction activities in the project area. The following table lists the soil map units found by stand number:

Table 3-13: Primary Soil Map Units by Stand by Action Alternative

Stand	Primary Soil Map Unit Name[1]	Avg. Slope Percent	Alternative B (acres)	Alternative C (acres)
87-22	Evard Complex	25-60	21	21
90-03	Evard-Cowee Complex	8-50	38	38
92-05B	Evard-Cowee Complex	8-50	33	33
92-05C	Evard-Cowee Complex	8-50	26	26
93-02	Evard-Cowee Complex	25-90	12	12
94-01	Evard-Cowee Complex	25-90	16	16
94-02	Evard-Cowee Complex	15-90	15	15
95-08	Evard-Cowee Complex	8-90	12	12
95-27	Evard-Cowee Complex	8-50	9	9
95-36[2]	Evard-Cowee Complex	15-90	36	36
95-37	Evard-Cowee Complex	25-90	4	4
95-40	Evard-Cowee Complex	8-90	17	17
107-02[3]	Evard-Cowee Complex	25-50	27	27

Stand	Primary Soil Map Unit Name[1]	Avg. Slope Percent	Alternative B (acres)	Alternative C (acres)
107-11	Evard-Cowee Complex	15-90	13	13
Total Evard Complex			**279**	**279**
89-01	Chestnut-Edneyville Complex	15-50	17	17
90-05	Ashe-Chestnut Complex	25-50	7	7
92-05A	Ashe-Chestnut Complex	8-25	21	21
Total Chestnut Complex			**45**	**45**
95-01	Edneytown-Pigeonroost Complex	25-50	4	4
Total Edneytown-Pigeonroost Complex			**4**	**4**

1 – Indicates the soil map unit that is a majority of the stand—other soil map units make up the remainder of the stand
2 – Requires ¼ mile of temporary road construction for access
3 – Clearcut harvest prescription under Alternative C and two-age harvest prescription under Alternative B

The following table displays characteristics of each soil map unit:

Table 3-14: Comparison of Soil Map Units

Map Unit Name	Characteristics
Evard-Cowee	Evard soils are very deep and well drained; Cowee soils are moderately deep and well drained over soft bedrock. Map unit has moderate productivity, and moderate risk (erodibility) and sensitivity.
Chestnut-Ashe-Edneyville	Ashe soils are somewhat excessively drained and moderately deep over hard bedrock. Chestnut soils are moderately deep to soft bedrock. Edneytown soils are very deep and well drained. Map unit has low productivity, and high risk (erodibility) and sensitivity.
Edneytown-Pigeonroost	Edneytown soils are very deep and well drained; Pigeonroost soils are moderately deep and well drained over soft bedrock. Map unit has moderate productivity, and moderate risk (erodibility) and sensitivity.

3.7.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.7.2 Alternatives B and C Direct, Indirect, and Cumulative Effects

There are no anticipated adverse effects to soils with either of these alternatives because the soil types in the project area are moderately deep and well drained (reducing potential for compaction); would not be taken out of production with permanent road construction; and would have project design features (Section 2.4, Chapter 2) and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. There would be some minor, short-term erosion with the construction of ¼ mile of temporary road in both alternatives. However, the effects would be short-term and limited in their extent when applied to the total area of operation. Both alternatives propose 77 acres of harvest with cable logging systems (partial suspension of logs) and 308 acres of harvest with ground based logging equipment (skidders or caterpillars); only about 1.6% of the two AAs. Cable logging systems afford higher protection to soils than ground based systems, but adverse effects to soils are not expected to occur for the reasons stated above.

3.8 Non-native Plants

Existing Condition

There are 124 species of non-native plant species documented to occur on the Pisgah and Nantahala National Forests (Danley and Kauffman). An increase of non-native plant species in the proposed activity area is expected. Many of these species have benefits for wildlife and erosion control. However, as succession progresses, most ruderal species tend to become much less prevalent and generally do not persist in the area. Most ruderal (weedy) plant species are expected to decrease to non-significant population levels within 10 years after initial disturbance.

The persistence of most non-native plant species is not considered desirable to natural ecosystem health. There are primarily two ways in which non-native plant species may persist in the forested ecosystems. A non-native plant species may persist by the introduction of an "invasive non-native species" to the ecosystem or by modifying the ecosystem in such a way that an invasive species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah 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 invasive non-native species.

Eight species on the Regional Forester's invasive non-native plant species are known within the botanical biological AA (Compartments 87, 89, 90, 92-98, and 107). The invasive plants *Microstegium vinineum*, *Lonicera japonica,* and *Allium vineale* are all 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 following table displays non-native invasive plant species in the activity areas:

Table 3-15: Non-native Invasive Species Summary in the Upper Creek Area

Species	Regional Category*	Location in Project Area	Recommendation
Ailanthus altissima	1	FSRs 986, 4110, 4096, 982, 299, Old Way Ridge etc	Control all populations prior to disturbance on NFS land
Lespedeza cuneata	1	Wildlife Fields, roadsides	This species does not display invasive tendencies. Not recommended to control.
Paulownia tomentosa	1	FSRs 986, 4110, 4096, 982, 299, Old Way Ridge etc. and adjacent stands	Control all populations prior to disturbance on NFS land
Lolium arundinaceum	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control.
Lonicera japonica	1	Alluvial Forest along Upper	No effective control method known.

Species	Regional Category*	Location in Project Area	Recommendation
		Creek	No recommendation to control.
Microstegium vinineum	1	Mostly in Alluvial Forests and cove. Very well established bottoms	No effective control method known. No recommendation to control.
Miscanthus sinensis	2	FSRs 986, 4110, 4096, 982, 299, Old Way Ridge etc. and adjacent stands	Control all population prior to disturbance on NFS land
Allium vineale	1	Wildlife Fields	Wildlife Fields
Coronilla varia	2	Found only along system roads	This species does not display invasive tendencies. Not recommended to control

* 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 TES species is disclosed in Appendix A, BE and Section 3.11, MIS.

3.8.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative no actions are proposed. There would be no potential increase in non-native plant species as a result of ground disturbing actions. However, there would also be no control measures implemented to reduce the continued spread of these species. It is expected that non-native plant species would continue to increase with or without planned activities. There are no other known foreseeable actions in the activity areas that could adversely affect non-native plants.

3.8.2 Alternatives B and C – Direct, Indirect, and Cumulative 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 3-16: Treatment of Non-native Plant Species in the Upper Creek Activity Areas by Alternative

Species	Treatment	Alt B	Alt C
Ailanthus altissima (Tree-of-Heaven)	Control all populations along FSRs in the botanical biological AA	<2 ac	<2 ac
Lespedeza cuneata (Sericea)	This species does not display invasive tendencies—not recommended to control.	0	0
Paulownia tomentosa (Princess tree)	Control all populations prior to ground disturbance within the botanical biological AA	<2 ac	<2 ac
Lolium arundinaceum (Tall fescue)	This species does not display invasive tendencies—not recommended to control.	0	0
Lonicera japonica (Japanese honeysuckle)	No effective control method known—no recommendation to control.	0	0
Microstegium vinineum (Japanese stilt grass)	No effective control method known—no recommendation to control.	0	0
Miscanthus sinensis (Plume grass)	Control all populations along FSRs in the botanical biological AA	<0.5 ac	<0.5 ac
Allium vineale (Field garlic)	This species does not display invasive tendencies—not recommended to control	0	0

Coronilla varia (Crown vetch)	This species does not display invasive tendencies—not recommended to control	0	0
Acres Treated		**<5 ac**	**<5 ac**

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 slightly increase the persistence 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, the presidential executive order 11987, 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.

3.9 Recreation & Scenery Resources

3.9.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, all Forest Plan standards for scenery and recreation resource management would be met. No changes to the visual landscape would occur as a result of this alternative since no activities are proposed.

3.9.2 Alternatives B and C Direct and Indirect Effects to Recreation

As a result of implementation of either Alternatives B or C, hunting opportunities would be improved. Motorists, horseback riders, or mountain bikers may encounter logging trucks or activities when accessing Forest Service roads and views of additional timber harvest areas may be seen by recreation users along these roads. This would be true for Brown Mountain OHV trail riders as well. Hikers, campers, swimmers, fishermen, picnickers or Wild and Scenic River users may hear the distant sounds of logging activities. All potential impacts to recreation would be of a temporary nature, therefore no recreation opportunities would be permanently altered or diminished.

3.9.3 Alternative B – Direct and Indirect Effects to Scenery

This alternative proposes 385 acres of two-age harvest, 350 acres of prescribed burning, and ¼ mile of temporary road construction. The following table summarizes this alternative:

Table 3-17: Summary of Alternative B Effects to Scenery

Stand	Ac	MA	Method	Temp Rd Constr.	Viewpoint (VP)[1]	VQO	Design Feature[2]
87-22	30	3B	Two-Age		N/A	M	N/A
93-02	12	3B	Two-Age		11	M	N/A
94-01	16	3B	Two-Age		11	M	N/A
94-02	15	3B	Two-Age		11	M	N/A
95-01	4	3B	Two-Age		1, 4, 8	M	N/A

Stand	Ac	MA	Method	Temp Rd Constr.	Viewpoint (VP)[1]	VQO	Design Feature[2]
95-27	9	3B	Two-Age		4	M	N/A
95-36	36	3B	Two-Age	¼ mile	4, 13	M	N/A
95-37	4	3B	Two-Age		4, 13	M	N/A
107-02	40	3B	Two-Age		1	M	N/A
107-11	13	3B	Two-Age		N/A	M	N/A
95-08	15	2A	Two-Age		4, 7	PR	A
95-40	18	2A	Two-Age		4, 7	PR	A
89-01	29	1B	Two-Age		N/A	M	N/A
90-03	39	1B	Two-Age		5, 12	M	B
90-05	17	1B	Two-Age		5, 12	M	N/A
92-05 A	21	1B	Two-Age		6	M	B
92-05 B	40	1B	Two-Age		6, 9	M	B
92-05 C	27	1B	Two-Age		6	M	N/A
90	350	2A	Burn		9	PR	N/A

A Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/acre to screen and blend-in harvest activities as seen from trail 273

B Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet

1 Viewpoints (VP): (1) NC 181, (2) SR 1328, (3) SR 1405, (4) FSR 982, (5) FSR 299, (6) FR 4101, (7) TR 273, (8) Brown Mountain Overlook, (9) Brown Mountain OHV Area trails, (10) Wilson Creek, (11) Upper Creek, (12) Carroll Creek, (13) Timbered Branch, and (14) Brown Mt. Beach

2 See also Section 2.4, Chapter 2

3.9.4 Alternative C – Direct and Indirect Effects to Scenery

This alternative proposes 345 acres of two-age harvest, 40 acres of clearcut harvest, 350 acres of prescribed burning, ¼ mile of temporary road construction, and day-lighting along FSR 299. The following table summarizes this alternative:

Table 3-18: Summary of Alternative C Effects to Scenery

Stand	Ac	MA	Method	Temp Rd Constr.	Viewpoint (VP)[1]	VQO	Design Feature[2]
87-22	30	3B	Two-Age		N/A	M	N/A
93-02	12	3B	Two-Age		11	M	N/A
94-01	16	3B	Two-Age		11	M	N/A
94-02	15	3B	Two-Age		11	M	N/A
95-01	4	3B	Two-Age		1, 4, 8	M	N/A
95-27	9	3B	Two-Age		4	M	N/A
95-36	36	3B	Two-Age	0.25 mile	4, 13	M	N/A
95-37	4	3B	Two-Age		4, 13	M	N/A
107-02	40	3B	Clearcut		1	M	N/A
107-11	13	3B	Two-Age		N/A	M	N/A
95-08	15	2A	Two-Age		4, 7	PR	A
95-40	18	2A	Two-Age		4, 7	PR	A
89-01	29	1B	Two-Age		N/A	M	N/A
90-03	39	1B	Two-Age		5, 12	M	B
90-05	17	1B	Two-Age		5, 12	M	N/A
92-05 A	21	1B	Two-Age		6	M	B
92-05 B	40	1B	Two-Age		6, 9	M	B
92-05 C	27	1B	Two-Age		6	M	N/A
90	350	2A	Burn		9	PR	N/A
90-FSR 299	N/A	2A, 1B	Day-Light		5, 9	PR, M	N/A

A Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/acre to screen and blend-in harvest activities as seen from trail 273
B Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet
1 Viewpoints: (1) NC 181, (2) SR 1328, (3) SR 1405, (4) FSR 982, (5) FSR 299, (6) FR 4101, (7) TR 273, (8) Brown Mountain Overlook, (9) Brown Mountain OHV Area trails, (10) Wilson Creek, (11) Upper Creek, (12) Carroll Creek, (13) Timbered Branch, and (14) Brown Mt. Beach
2 See also Section 2.4, Chapter 2

3.9.5 Alternatives B & C Cumulative Effects

As previously stated, past timber harvest areas and existing roads are visible on National Forest System (NFS) lands from analyzed VPs. From some VPs, existing harvest areas would not be noticeable to the average viewer. Existing roads and landings may remain visible for many years, but are primarily seen during leaf-off season. A 100 acre harvest is proposed for the private tract east of Stand 95-08 and would be visible from the eastern terminus of Trail 273 and a closed (gated) section of FSR 299. This private tract would not be visible in conjunction with any proposed Upper Creek treatments from any analyzed VPs; therefore cumulative scenery impacts would not be an issue. Treatments proposed for some Upper Creek units would create visible openings, or the canopy may appear thinner as seen from analyzed viewpoints. However, all assigned VQOs would be met, even where these proposed treatments would be seen in conjunction with existing management activities.

3.10 Air Quality

Existing Condition - Summary

The USDA Forest Service (FS) has proposed a prescribed fire near the Brown Mountain Off-road vehicle area as part of the Upper Creek project. The FS proposes to use prescribed fires to reduce fuels within Burke County. The location is classified as attaining the ozone National Ambient Air Quality Standard (NAAQS), and unclassified for fine particulates (PM2.5).

The prescribed fire would take place in a rural area where the closest community (Linville Falls) is approximately 9.5 miles northwest of the proposed project area. Though the equipment does not meet the Environmental Protection Agencies (EPA) criteria for determining the attainment status the ambient monitoring results for the 2001 through 2003 for data collected near Linville Falls indicates both the 24-hour and annual average National Ambient Air Quality Standard (NAAQS) is not being exceeded.

Table 3-19: Monitoring results for fine particles ($PM_{2.5}$) for the years 2001 through 2003*. Bold values exceed the National Ambient Air Quality Standard

Location	2001 24-hour (ug/m^3)	2002 24-hour (ug/m^3)	2003 24-hour (ug/m^3)	24-hour 3-year Average	2001 Annual Average (ug/m^3)	2002 Annual Average (ug/m^3)	2003 Annual Average (ug/m^3)	Annual 3-year Average
Linville Gorge	27	24	26	25.7	9.9	9.4	8.8	9.37

* 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. Please note the Linville Gorge monitoring site does not meet ambient monitoring standards to determine if the $PM_{2.5}$ standard is achieved.

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 the proposed prescribed fire may have on air quality and visibility. It should be kept in mind that 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/or transport wind speeds are greater on the day of the prescribed fire than the values used in the modeling analysis. The VSMOKE model produces three types of outputs that estimate: a.) The ability of the atmosphere to disperse smoke and the likelihood the smoke would contribute to fog formation, b.) Downwind concentrations of particulate matter and carbon monoxide, and c.) Visibility conditions downwind of the fire.

The initial analysis of the proposed project indicated that any unhealthy smoke concentrations or visibility impairment are likely to remain of National Forest ownership. Also, no smoke sensitive targets are likely to be impacted by the proposed project.

3.10.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.10.2 Alternatives B and C – Direct, Indirect, and Cumulative Effects

Summary

The initial analysis of the proposal indicates that any unhealthy smoke concentrations or visibility impairment are likely to remain on NFS lands. Also, no smoke sensitive targets are likely to be impacted by the proposal. A more detailed smoke management analysis (as part of a prescribed fire plan) would be prepared if the proposed project is approved to be implemented.

Alternative B proposes about 350 acres of prescribed burning and Alternative C proposes about 350 acres of prescribed burning and 25 acres of site preparation burning in stand 107-20. The following table (based on the VSMOKE model) displays estimated fine particles (PM 2.5), carbon monoxide (CO), and visibility downwind (northeast) and within 1,056 feet (~¼ mi) of the burns:

Table 3-20: Acres and VSMOKE Estimates for PM2.5, CO, and Visibility at 1,056 Feet Downwind (northeast) of Prescribed Burn

Acres	PM2.5[a]	CO[b]	Crossplume Visibility	Contrast Ratio	Alt B Burn?	Alt C Burn?
350	1,050.22	13.70	19.49	0.26	Yes	Yes
Minimum Level to be Assigned Green[c]	37.20	4.35	0.26	0.06		

Acres	PM2.5[a]	CO[b]	Crossplume Visibility	Contrast Ratio	Alt B Burn?	Alt C Burn?
by the EPA						
Upper Extreme Level	2,179.54	26.41	0.26	0.06		
Minimum Distance to be Assigned Green[c] by the EPA	6.21 mi	1.24 mi	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

The prescribed fires would be conducted when the atmospheric conditions are favorable for the dispersion of the smoke so that no smoke sensitive targets are impacted. The prescribed burns would not occur during atmospheric stagnations when fine particles and ozone concentrations are typically at their greatest. Wind directions would be chosen that would disperse the pollutants away from any smoke sensitive targets, and atmospheric conditions would be chosen which favor smoke dispersal. Effects from the prescribed burn proposed in the action alternatives would be temporary in nature. That is, the active fire phase typically lasts less than 8 hours and the area would be treated one or two time during the next five years.

The 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. Smoke from prescribed and wildfires can irritate the eyes and airways causing stinging eyes, a runny nose, coughing, a scratchy throat, irritated sinuses, or headaches. A person with heart or lung disease might have their symptoms become worse with the increase in pollution from the fires. The biggest health threat from smoke comes from the fine particles since they can penetrate deep into the lungs or get into the bloodstream, where they can cause illnesses such as bronchitis. Fine particles can aggravate chronic heart and lung diseases - and even are linked to premature deaths in people with these conditions.

People with heart disease might experience chest pain, palpitations, shortness of breath, or fatigue. People with lung disease may not be able to breathe as deeply or as vigorously as usual, and they may experience symptoms such as coughing, phlegm, chest discomfort, wheezing and shortness of breath. When smoke levels are high enough, even healthy people may experience some of these symptoms.

Usually, older adults are more likely to be affected by smoke, possibly because they are more likely to have heart or lung diseases than younger people, and the amount of air that can be taken into their lungs with each breath decreases with age. Children also are more susceptible to smoke than healthy adults for several reasons, including: their respiratory systems are still developing, they breathe more air (and air pollution) per pound of body weight than adults, and they're more likely to be active outdoors.

The smoke dispersion modeling analysis (using VSMOKE and/or VSMOKE-GIS) for this project was performed for 45 acres to be burned on or about 3/15/2006 at the time period of 1600 hours. The time period has daytime dispersion characteristics to disperse the pollutants from the fire. 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 350 acres would have prescribed fire treatment between 10:00 am and 5:00 pm with a fire rate spread of approximately 40 to 45 acres per hour. It should be noted that only 80 percent of the area would have fuel consumed, so this analysis is likely to overestimate the impact since it assumes an average of 4.9 tons per acre would be consumed on the 45 acres.

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 1000 square miles under uniform weather conditions. Typically, the Dispersion Index value should be greater than 30 when igniting a large number of acres within an area. The calculated Dispersion Index value was 41, which predicts the atmosphere has a good capacity to disperse smoke.

Combining the Dispersion Index and relative humidity values provide an estimate (like is used in insurance actuary tables) of the likelihood of the smoke contributing to fog formation. The Low Visibility Occurrence Risk Index (LVORI) ranges from 1 (lowest risk) to 10 (greatest risk) and usually you want the value to be less than 4. The base line risk of having low visibility as a result of smoke contributing to fog formation is about 1 in 1,000 accidents. The Low Visibility Occurrence Risk Index value for this VSMOKE analysis was 1 and this is equal to the base line.

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 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 1.56 miles 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 3.11 miles are predicted to be code orange or worse. At distances less than 0.25 miles from the edge of the fire the one-hour carbon monoxide concentrations are predicted to be code red or worse, and distances less than 0.39 miles from the fire are predicted to be code orange or worse. Information related to this coding system is disclosed in the table above.

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. Visibility conditions may exceed the threshold less than 317 feet from the edge of the fire.

The VSMOKE-GIS model provided estimates for five 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 AQI values of code red or worse are likely to remain on NFS lands. The first large amount of large private ownership that could be encountered by the smoke plume is the Wilson Creek area (about 1-5 miles northeast of the proposed burn area). Most likely the smoke from the proposed project would be dispersed above the ground in the Wilson Creek drainage. The fine particulate concentrations are likely to be lower than what is predicted by VSMOKE-GIS since the proposed project area has a greater elevation than the private ownership.

The Appalachian RD anticipates burning up to about 2,500 acres spring 2006 in the South Toe River area and the Grandfather RD anticipates burning up to about 4,500 acres spring 2007 in the Curtis Creek area (Lost Bear Prescribed Burn – to the southwest). Two other prescribed burns on the Grandfather RD are expected in to be completed in 2006: 1) the Boyd Gap burn about 8 miles northeast of the Upper Creek area at 160 acres, and 2) the Bee Branch burn about 5 miles northeast of the Upper Creek area at 235 acres. The purposes for these burns are to reduce fuel accumulations and improve wildlife habitat. There would be potential for some smoke from the Boyd Gap and Bee Branch burn areas to mix with the Upper Creek burn, but adverse cumulative effects to air quality are expected to be reduced due to project design and proper implementation of burn plans. There is potential for some smoke from the Lost Bear burn to mix with the Upper Creek burn, but adverse cumulative effects are not expected to be major since the two areas are over 30 miles from each other and most of the effects are expected to be dissipated enough prior to potential mixing.

3.11 Management Indicator Species/Habitat Components

3.11.1 Introduction

An assessment of habitat changes linked to management indicator species (MIS) and habitat components is documented in this section based on the new species list that became effective Forest-wide on October 1, 2005. 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.

3.11.2 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) **Table 3-21:** This table displays the habitat components and associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is Amendment 17 to the Nantahala and Pisgah Land and Resource Management Plan effective October 1, 2005, and associated environmental assessment (EA) and project record.
2) **Table 3-22:** This table compares the effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each habitat component considered in the project-level analysis.
3) **Table 3-23:** 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 3-xx** and **3-xx** to explain how the project's effects to habitats affect Forest-wide population cumulative trends for the species considered.

Following these tables is a discussion of the direct, indirect, and cumulative effects for the selected species and habitats.

Table 3-21: Habitat Components, Associated MIS (per Amendment 17), and why Species/Habitat were Chosen or Eliminated from Analysis

Habitat Component	MIS	Analyzed Further/ Evaluation Criteria
Snags and dens	Pileated woodpecker	No/2
Downed woody debris	Ruffed grouse	Yes
Old forest communities	Black bear	No/1
Riparian/alluvial forests	Acadian flycatcher	Yes*
Early successional (0-10 years)	Rufous-sided towhee	Yes
Early successional (11-20 years)	Ruffed grouse	No/2
Large contiguous forest areas with low levels of human disturbance	Black bear	No/1
Large contiguous areas of mature deciduous forest area	Ovenbird	No/1
Hard mast producers	Black bear	Yes
Soft-mast producers	Ruffed grouse	Yes
Permanent grass/forb openings	White-tailed deer	Yes
Xeric yellow pine forests	Pine warbler	Yes
Coldwater streams	Wild brook trout, wild brown trout, wild rainbow trout, blacknose dace (lower trophic levels of streams)	No/2
Warmwater streams	Smallmouth bass	No/2
Coolwater streams	Smallmouth bass	No/2
Reservoirs	Largemouth bass	No/1
Rich coves	Ginseng	No/2
Northern hardwood forests	Ramps	No/1

Habitat Component	MIS	Analyzed Further/ Evaluation Criteria
High elevation fir-dominated forests	Fraser fir	No/1
Carolina hemlock forests	Carolina hemlock	No/2
Red spruce/fraser fir	n/a	No/1
Grassy and heath balds	n/a	No/1
White pine forests	n/a	No/1
Yellow pine mid-successional communities	n/a	No/2
Forested seep wetlands	n/a/	No/2
Bogs	n/a	No/1
Mountain ponds and ephemeral pools	n/a	No/1
Barrens and glades	n/a/	No/1
Shaded rock outcrops and cliffs	n/a	No/2
Open rock outcrops and cliffs	n/a	No/2
Caves	n/a	No/1
Invasive exotic plant species	n/a	Yes
Mixed pine/hardwood forests	n/a	Yes

1 Biological Community and its represented species are not known to occur within the activity areas; therefore, this biological community would not be affected by any of the alternatives. Given no effects to the community, the alternatives in this project would not cause changes to Forest-wide trends or changes in population trends of species associated with this community.

2 Biological Community is imbedded in the activity areas, 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.

* Component would not be affected by the proposal, but a future foreseeable action in Timbered Branch and Upper Creek would affect this component – see Acadian flycatcher discussion below. No alluvial forest component would be affected by the Upper Creek timber proposal.

n/a Habitat component does not have a specific MIS assigned to it, but would be analyzed below in this section if this component could be affected by the proposal.

Table 3-22: Habitat Component, Forest-wide Estimates, and Expected Changes Resulting from the Alternatives[1]

Habitat Component	Forest-wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Downed woody debris	High accumulation small wood: 18,000; Large wood: 386,000; Low accumulation (approximately 600,000)	No change	385 acres developed	385 acres developed
Riparian/alluvial forests	257,822 ac	No change	No change	No change
Early successional 0-10 years	26,800 ac (yr 2000) 2,040 ac (5 yr avg)	-192 acres aged beyond early successional	385 acres developed	385 acres developed

Habitat Component	Forest-wide Estimate	Estimated Changes		
		Alternative A	Alternative B	Alternative C
Hard mast producing community	High El Red oak: 40,600 ac Mesic Oak/H: 283,340 ac Dry Mesic Oak/H: 21,800 ac Chestnut Oak/H: 8,600 ac Upland hwd (other): 6,900 ac	None affected	291 acres harvested	291 acres harvested
Soft-mast producing community	13,144 ac early seral (yr 2000), highest potential on 5,650 ac	No change	385 acres developed	385 acres developed
Permanent grass/forb openings	3,000 ac	No change	10.5 acres developed	10.5 acres developed
Xeric Yellow Pine Forests	Xeric pine dominated: 29,000 ac.	None affected	0 acres harvested, 350 acres burned	0 acres harvested, 350 acres burned
Invasive Exotic Plant Species	2,684 miles of road construction <25 years	No change	0.25 miles of temporary road constructed	0.25 miles of temporary road constructed
Mixed pine/hardwood forests	52,521 ac	No change	31 acres harvested	31 acres harvested

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

Table 3-23: MIS species, Estimated Population Trend, and Habitat Component Indicated by the Species [1]

Species	Estimated Population Trend	Habitat Component
Black Bear	Increasing	Old forest communities, hard mast-producing species, contiguous areas with low disturbance
White Tailed Deer	Static to decreasing	Permanent grass-forb
Pileated Woodpecker	Increasing	Snags/dens
Ovenbird	Decreasing	Large contiguous areas of mature deciduous forest
Rufous-Sided (Eastern) Towhee	Decreasing	Early-successional (0-10)
Pine Warbler	Static	Xeric yellow-pine forests
Ruffed Grouse	Static	Early successional (11-20); woody debris, soft mast
Acadian Flycatcher	Increasing	Riparian
Wild Brook, Brown and Rainbow Trout,	Static	Coldwater streams
Largemouth Bass	Static	Reservoirs
Blacknose Dace	Static	Coldwater streams
Smallmouth Bass	Static	Coolwater, warmwater streams
Fraser Fir	Static	Fraser fir forests
Carolina Hemlock	Decreasing	Carolina hemlock bluff forests
Ginseng	Decreasing	Rich cove forests
Ramps	Static	Northern hardwoods

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

Downed Woody Debris (all sizes) – The ruffed grouse was chosen by Amendment 17 as representative of this habitat. The Forest ruffed grouse drumming surveys that cover Forest Service Roads 198 and 299 have shown a very small population in this area over the past four years. Ruffed grouse utilize large diameter debris and stumps for drumming. With Alternatives B and C there would be an increase in both large woody debris and stumps, providing suitable habitat for ruffed grouse drumming activities. As the forest ages with Alternative A there is an expected positive indirect effect of more downed woody debris. Therefore, no alternative would are expected to cause adverse direct, indirect, or cumulative effects to this species.

Riparian/alluvial forests – Amendment 17 to the Nantahala and Pisgah Forest Plan selected the Acadian flycatcher to represent this community type. It was determined by the 2005 MIS report that although this species is declining over its range, it is increasing over the Nantahala & Pisgah National Forests. This species nests in tree branches, often overhanging a stream. The Upper Creek proposal would not affect any riparian habitat. There are two future foreseeable actions that would affect this habitat, 1) the Upper Creek Watershed project relating to the September 2004 hurricanes and 2) the Timbered Branch channel restoration work that involves riparian areas within the Upper Creek AA. Although both projects may require cutting 3-5 trees, they would both improve riparian stability and habitat conditions over the long term. Due to the small areas affected by these proposals, there would be no measurable direct or indirect effects to this species habitat over the long term. Therefore there would be no measurable cumulative effects to Acadian flycatcher habitat over the long term. There would be no effect to the Forest-wide population by either foreseeable future project.

Early Successional Habitat (0-10 years) – The rufous-sided towhee (eastern towhee) was chosen by Amendment 17 as representative of this habitat. There is currently 2% of the AA in this habitat age class. Alternatives B and C would increase early successional habitat by 1.7%, which would maintain the availability of rufous-sided towhee habitat to the next planning period. No activities are planned within current early successional habitat. The 2005 Forest-wide MIS report found that the rufous-sided towhee population is declining range-wide and in western North Carolina. As early successional habitat has been reduced greatly on the National Forests in the past 10 years, this downward population trend is to be expected. Alternatives B and C would not directly effect the towhee and both would have positive indirect effects to the local population by increasing available habitat. Alternative A would have no adverse direct effect to the rufous-sided towhee and there would be adverse indirect effects to the local population habitat as the forests continue to age. Alternatives B and C would have positive cumulative effects by increasing available habitat over the next 20 years. Alternative A would have adverse cumulative effects as habitat ages over the next 20 years and no additional early-successional habitat is created. Populations across the Forests are likely to persist according to the 2005 Forest MIS report.

Hard Mast Producing Community – Black bear was selected by Amendment 17 as representative of this habitat. The Management Areas designated to provide suitable habitat for black bear include; 4A, 4C, 4D and MAs 1B and 3B where they are designated to provide travel corridors and foraging habitat. The proposed alternatives would continue to provide travel corridors and foraging habitat of both hard mast and soft mast. The vegetation manipulation in both

Alternatives B and C would harvest 1.1% of the hard mast habitat within the AAs, both high volume hard mast producing stands (oak/hickory and oak stands) and lower volume hard mast producing stands (cove hardwood/pine stands). This would provide increased soft mast over the harvested areas and retain hard mast production through project design features (residual tree marking and timber stand improvement or TSI). Project design features would ensure that most of the hard mast producing species that are present would remain post harvest. Hickory, white oak, and red oak, where they occur, are the priority species to leave within two-age harvest areas. Hard mast production declines at an average of 100 years—stands proposed for harvest range from 41–100 years of age. The Forest's 2001 MIS report found that all hard mast tree species, with the exception of shade tolerant red oak, are decreasing across the Forests. Stands ≥100 years and the regenerated forests are dominated by shade tolerant tree species. Proposed TSI activities are expected to maintain or increase hard mast component within the activity areas.

The 2005 MIS report found that black bear are likely to persist across the Forest with both suitable habitat and populations increasing. No alternatives are of sufficient size to alter the Forest population trend. There would be no adverse direct effect from implementation of any alternative. Alternative A would have no adverse indirect effect as the current hard mast production over the next ten years would not be affected. There would be an adverse cumulative effect of Alternative A in forty years to the local population as the hard mast stands age beyond maximum hard mast production. Alternatives B and C would have no adverse direct effect on black bear and would have minimal adverse indirect effect to 1.1 % of the hard mast stands by lowering hard mast production over the next forty years. These alternatives would have positive cumulative effect to the local population by regenerating hard mast community, allowing it to grow into higher hard mast production over the long term. No alternative is substantial enough to affect the increasing Forest-wide population trend.

Soft Mast Producing Habitat – The ruffed grouse was chosen by Amendment 17 as representative of this habitat. This species was recorded during the Forest grouse drumming surveys within the activity areas. The proposal would increase the soft mast habitat in regeneration areas and maintain soft mast throughout post-harvest treatments. However, either action alternative is not substantial enough to change the Forest population trend as reported in the 2005 Forest MIS report. Holly, black gum, and dogwood soft mast species would be retained during post-harvest treatments, ensuring soft mast is maintained at adequate levels across the AAs. Alternative A would not increase the soft mast habitat utilized by this species. Alternatives B and C would have no adverse direct effects to this species and positive indirect effects to the local population of ruffed grouse by increasing soft mast habitat over the next ten years. Alternative A would have no direct effects, adverse indirect effects, and adverse cumulative effects to local populations of ruffed grouse by not increasing soft mast habitat. Alternatives B and C would have no adverse direct effects, positive indirect effects, and positive cumulative effects to the low density local population by increasing the available habitat. No alternative is substantial enough to affect the Forest's population decline as reported in the 2005 MIS report.

Permanent Grass/forb Community – White-tailed deer was selected to represent this habitat by Amendment 17. The MA 3B wildlife standard is to provide at least 3% grass/forb habitat. Alternative C would increase available grass/forb the most, but it would remain below the Forest Plan desired condition of a minimum 3%. Together with the current grass/forb of 55.5 acres or 0.2%, Alternative C would produce approximately 11½ acres and increase the habitat over the analysis area to 0.29% grass/forb; well below Forest Plan recommendations. The 2005 MIS

report outlines the effects of management on white-tailed deer and found they are declining due to lack of vegetation management and western North Carolina's rapid increase in human population. No alternative would directly effect the local population. Alternative A would have an adverse indirect effect by not increasing available habitat for local populations. Alternatives B and C would have a positive indirect effect by increasing spatiality and availability of habitat for local populations. Alternative A would have adverse effects to the local population habitat. Alternatives B and C would have positive effects to the local population with the prescribed burn and increased grass/forb habitat. No alternatives in this proposal are of sufficient size to alter the Forest-wide population trend.

Xeric Yellow Pine – Amendment 17 to the Nantahala and Pisgah Forest Plan selected the pine warbler to represent this community type. The xeric yellow pine community is concentrated on the southern portion of these AAs, generally along ridge lines. This community was hit hard by the southern pine beetle (SPB) epidemic and the proposed fuel reduction burn in Alternatives B and C within this community would increase the amount and vigor of yellow pine regeneration. No regeneration harvest is proposed by any alternative in this community. The burn is not expected to affect live yellow pine as the flame height would be within prescription and the fire would not be hot enough to eliminate existing, live trees. The pine warbler is doing well range-wide, but is declining on the Pisgah and Nantahala National Forests. The decline is most likely due to the severe yellow pine mortality caused by the SPB infestation that occurred across the Forests from 1999 to 2003. Yellow pine is regenerating in these areas; therefore the pine warbler population is expected to recover. There would be no adverse direct effects to this species by any alternative. There would be positive indirect effects by the prescribed burn in Alternatives B and C. The cumulative effects of past and future actions (prescribed burning) of Alternatives B and C would benefit the recovery of this species' habitat. The habitat would improve over the long-term with Alternative A, but it would not produce similar, well stocked stands of yellow pine forest. Sustainable populations are predicted despite declines associated with the SPB epidemic.

Invasive Exotic Plant Species – 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, 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 107.3 miles per year. Alternative B and C would contribute 0.25 miles of temporary road construction or increase exotic plant species habitat by <1% of the yearly average. On the other hand, Alternative A 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 would not increase exotic plant species habitat (see discussion in selection concerning individual invasive exotic plant species in botanical report, project record).

Mixed pine/hardwood forests (successional stage and hard mast) – Amendment 17 did not assign an MIS to this habitat type. There are currently 4,309 acres of this habitat type within the AAs. Alternatives B and C propose to harvest 31 acres or less than 1% of this forest type.

Under the current Forest Plan, MAs 1B and 3B are designated to provide suitable habitat for white-tailed deer. Compartments with MA 1B or 3B are to be managed to maintain 70% hardwood management types, such as oak, except where pine management types currently exceed 30%. These AAs currently exhibit 60% hardwood management types and 40% pine management types. In addition, these MAs are to provide early successional habitat at a minimum of 5% and MA 3 is to provide at least 3% grass/forb habitat.

3.12 Threatened, Endangered, and Sensitive Species

3.12.1 Introduction

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

3.12.2 Determination of Effects

3.12.2.1 Threatened and Endangered Species

There would be no adverse direct, indirect, or cumulative effects to any T&E plant, aquatic, or wildlife species populations or their habitat by any alternative considered. Consultation with USDI Fish and Wildlife Service is not required.

3.12.2.2 Sensitive Species

The Eastern small-footed bat, *Myotis lebii,* is a Regional Forester's S species. With project design features outlined and the greatest amount of preferred rock habitat being located outside the activity area, the potential of negative direct impacts to individuals would be greatly reduced or less than 1% of the population. There would be a negative impact effect to less than 2% of the habitat within these AAs. In summary, the impacts would be minimal with adverse impacts of less than 1% of the local population being effected with the implementation of Alternative B, the minimal negative impact to the local habitat, and positive long term impact to its riparian habitat with planned future projects. The cumulative impact within the Forest Plan AAs on this species would be minimal and not affect population viability across the Nantahala and Pisgah National Forest—no alternative is likely to cause a trend toward federal listing.

The Regional Forester's S species, Diana Fritillary, *Speyeria diana*, is known to occur within the activity area. Alternatives B or C may impact individuals on 1% of suitable habitat and improve nectar species habitat on 385 acres over the short-term. Both the beneficial indirect habitat impacts (<1%) and the negative direct impacts (<1%) would be minimal across the Forest Plan AAs. Past projects, present projects, and historic fire history would result in minimal cumulative impacts to the species local population and is not likely to cause a trend to federal listing or a loss of viability locally or across the Nantahala and Pisgah National Forests populations.

This proposal would have negative direct impacts to individual Regional Forester's S species *Tsuga caroliniana.* The cumulative impact on *Tsuga caroliniana*, within the botanical analysis area is that of the Timbered Branch Timber Sale (mostly recovered), past fires (mostly recovered), and the proposed action, may impact individuals of *Tsuga caroliniana* but would

have no qualitative impact, upon the Forest or botanical analysis area, on the viability of *Tsuga caroliniana.*

Individual aquatic Regional Forester's S species *Ophiogomphus edmundo, Ophiogomphus howei,* and *Macromia margarita* may be directly impacted by the activities associated with the stream crossing at Carroll Creek and in Craig Creek; however, there would be no risk to aquatic population viability of these S species because the potential habitat affected is very limited. There would be no adverse cumulative impacts to these S species as a result of this project because habitat within Carroll Creek and Craig Creek may improve with project implementation There would be no adverse cumulative impacts to *Alasmidonta varicose* as a result of this project because this species occurs downstream of the activity area where no impacts are expected to occur from the Upper Creek Timber Sale. No risk to population viability of the aquatic S species (*Ophiogomphus edmundo, Ophiogomphus howei, Alasmidonta varicose, Macromia margarita*) would occur as a result of this project.

No other sensitive wildlife, botanical, or aquatic species has been determined to occur within the Forest Plan AAs and therefore would not be impacted by any alternative selected..

3.13 Other Areas of Concern

3.11.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.11.2 Alternatives B and C – 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. There are no other known foreseeable actions in the activity areas that could adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

CHAPTER 4 – PREPARERS AND PUBLIC INVOLVEMENT

The following individuals helped develop this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT

Scott Ashcraft - Archaeologist: B.S. Archaeology, 12 years with USFS
Beth Buchanan - Fire Ecologist: M.S. Ecology, 3 years with USFS
Sandy Burnet - Wildlife Biologist: B.S. Biology, 20 years with USFS
Eric Crews - Landscape Architect: B.L.A., 13 years with USFS
David Danley - Botanist: B.S. Plant Pathology & Botany, 16 years with USFS
Michael Hutchins - IDT Leader: B.S. Forest Management, 18 years with USFS
Bill Jackson - Air Quality Specialist: B.A. Biology, B.S. Forestry, 22 years with USFS
Lorie Stroup - Fisheries Biologist: B.S. Natural Resources, 8 years with USFS
Greg Van Orsow - Project Leader: B.S. Forest Management, 4 years with USFS

4.1.2 Other Forest Service Personnel Providing Input

Bonnie Amaral – Acting Grandfather District Ranger
John Blanton – Silviculturist, NFs North Carolina
Karen Compton – Acting Grandfather District Ranger
Miera Crawford – Grandfather District Ranger (has since transferred to NFs Alabama)
Gary Greer – Fire Management Officer, Grandfather RD
Dean Karlovich – Resource Assistant, Grandfather RD
Anthony Matthews – Ecosystems & Planning Staff Officer, NFs North Carolina
Ronnie Thomas – Forest Technician, Grandfather RD
Barbara Watring – Acting Grandfather District Ranger

4.2 Federal, State, and Local Agencies Providing Input

Brian Cole – USDI Fish and Wildlife Service
Ron Linville – North Carolina Wildlife Resources Commission
Sarah McRae – NC Department of Natural Resources

4.3 Others Providing Input

Bob Gale, Western North Carolina Alliance
Leonard Harwood
Steve Henson, Southern Appalachian Multiple-use Council
Hugh Irwin, Southern Appalachian Forest Coalition
Rob Messick
Bridget Nelson, Southern Appalachian Biodiversity Project
Ben Prater, Southern Appalachian Biodiversity Project

APPENDIX A – BIOLOGICAL EVALUATION

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BIOLOGICAL EVALUATION

UPPER CREEK TIMBER SALE

Avery, Burke, and Caldwell Counties, North Carolina
Grandfather Ranger District

Project Location & Description

The Upper Creek Timber Sale (Upper Creek Project) would occur within two Forest Plan Analysis Areas (AA). The 13,332 acre Upper Creek Analysis Area #57 (AA) comprised of compartments 90-98, 106 and 107; and the 10,154 acre Lower Wilson AA #59 comprised of compartments 62-67, 82, 85-89. The Upper Creek Project is within both AAs, which are approximately 23,486 acres in size and is located in Avery, Burke, and Caldwell Counties. These acres are approximate and derived from the Continuous Inventory of Stand Conditions (CISC) which sometimes lists slightly different acres than those in Geographic Information System (GIS).

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. A detailed description of the proposal and alternatives may be found in Chapter 1, section 1.3 of the Upper Creek Project Environmental Assessment (EA).

Proposal

1. Harvest approximately 385 acres using the two-age prescription
2. Construct about ¼ mile of temporary road, maintain existing roads
3. Wildlife planting: i.e. persimmons and/or native crabapple and wildlife improvement projects on 10.5 acres.
4. Prescribe burn 350 acres in compartment 90
5. Site preparation and release
6. Control invasive exotic plant species
7. Create a vernal pond
8. Anchor large woody debris along 1 mile of Timbered Branch
9. Designate old growth

Existing Condition

The biological AA for wildlife resources considered both of the Forest Plan AAs (#57 and #59).

The biological AA for botanical resources is defined as compartments 87, 89, 90, 92, 93, 94, 95, 96, 97, 98 and 107 of the Grandfather Ranger District in Burke and Caldwell Counties, North Carolina.

The biological AA for aquatic resources is activity area and AA waters in Forest Plan watersheds #57, #58 (Parks Creek), and #59 downstream of the proposal that could be affected by activities.

The Upper Creek Proposal Area is classified as a low elevation mountain region bordering piedmont. The aquatic resource of the biological analysis area is defined by several southeast drainages. The major streams are: Upper Creek, Timbered Branch, Carroll Creek, Parks Creek and a small portion of Wilson Creek. A succession of southeast trending, interlinking ridges is found between drains. The highest points of these ridges are about 3200 ft. on the north (Chestnut Mt., Little Chestnut Mt., Winding Stair Knob etc.) and east (Ripshin Ridge) 2870 ft. Brown Mt. (2,900 ft.) is about center of the analysis area. The drainage flows downward to about 1,200 feet to the south.

Wildlife Resources

Bird patch #37 was identified in the Forest Plan within these Forest Plan AAs however; this patch is outside of the activity area of vegetative manipulation. The Craig Creek Watershed proposal is within the bird patch and may require the cutting of a few trees to accommodate the equipment needed to re-locate the stream back into its original stream channel.

Table A-1. Age Class Representation of Forest Plan AA # 57 & 59

Age Class – Habitat Vegetation Component	Acres (CISC)	Percentage of AA	Existing
0-10 age – Early Successional	465	2%	0[1]
11-20 age – Early Successional	2,119	9%	-73 ac/ -0.3%
21-50 age – Mid Successional	1,605	7%	0
51-100 age – Mature Forest	18,483	78%	0
101- 140 age – Old Forest	796	4%	0
Grass/forb habitat	56[2]	0.2%	0
Open road - mi/mi^2	2	2.5%[3]	0

1 In 2005, 73 acres of 20 year age class early successional would move out of early successional habitat; and in 2006, an additional 119 acres of 20 year age class early successional habitat would move out of the early successional habitat

2 Acres in grass/forb habitat are considered inclusions within a forested stand as they are small, (=/- one acre) areas.

3 The Brown Mountain Off Road Vehicle Area (ORV) is within the analysis areas and is a concentrated area of approximately 3,000 acres with 34 miles of motorized trails. Excluding this area and miles of motorized trails, the open road density is 1.9 mi/mi^2.

Aquatic Resources

The aquatic resource analysis (AQUA) of proposed Upper Creek project on the Grandfather Ranger District considered compartments 87, 89, 90, 92, 93, 94, 95, and 107. This area includes three identified Forest Plan designated watersheds, 57 (Upper Creek), 58 (Parks Creek) and 59 (Wilson Creek). The analysis addresses activity area waters and AA waters. Activity area waters are defined as those in the area of potential site-specific impacts on aquatic habitat and populations. The AA encompasses waters downstream that potentially could be impacted by project activities, in addition to activity area waters.

Table A-2. Water Resources within the Area Analyzed

Stream Name (UT denotes an unnamed tributary)	Compartment-Stand	Miles in Activity Area	Miles in Analysis Area
Upper Creek	93, 94, 107	0.8	2.6
UT 1	94-01	0.11	0.11
UT 2	107-02	0.4	0.8
UT 3	107-02	0.2	0.2
UT 4	107-02	0.2	0.2
Timbered Branch	95, 87	2.2	2.2
UT 1	95-08	0	0.4
UT 2	95-08	0	0.5
Pearcey Creek	92-05	0.2	0.8
UT 1	92-05	0.6	0.8
UT 2	92-05	0.4	0.9
Carroll Creek	90-05,03	0.4	0.9
UT 1	90-03	0.4	0.4
UT 2	89-01	0.4	1.0
Craig Creek	Watershed project	288 feet	2.5 miles

Botanical Resources

The analysis area exhibits many typical plant communities of the low to mid elevation southern Appalachian mountains.

The Biological AA for botanical communities found the area is characterized by three common community types. These communities are: Pine-oak Heath Forest, Chestnut Oak Forest, and Acidic Cove Forest, and, to a much lesser extent, the Montane Oak-Hickory Forest. A Montane Alluvial Forest and Rocky Shore and Bar communities are associated with the low elevation areas directly adjacent to major stream but are best developed along Upper Creek and Timbered Branch. Small habitat areas such as small rock outcrops (particularly in Brown Mt.) and forested seeps and streams can be imbedded within these comminutes. Natural communities often grade together and definite boundaries usually difficult to see. However, there is a often a pattern to these comminutes on the landscape. Within the analysis area, the Acidic Cove Forest often occupies areas near streams, lower cove slopes and northern aspects. Higher cove slopes, south and western slopes are often dominated by the Chestnut Oak Forest. Pine Oak Heath Community is found on dryer Ridges and slopes. The Montane Oak-Hickory Forest, Montane Alluvial Forest and anthropogenic communities have the most diverse herbaceous component of the communities found within the analysis area. However, taken in whole, the analysis area has a very poor herbaceous diversity. All of the communities are very common community types and

have a relatively low probability of occurrences for Forest threatened, endangered, and Regional Forester's sensitive (TES) plant species (See Schafale and Weakley for a detailed description and discussion of these communities)—thus, making a general low potential for plant T&E, and S species to occur in the potential activity areas. The primary natural communities affected by this proposal are the Chestnut Oak Forest, Acidic Cove Forest, and the Pine-oak Heath Forest.

Past Impacts and Foreseeable Future Actions

The 1992 Timbered Branch timber sale would have aged to canopy closure and losing much of the increase in soft mast production within the harvested area. Scarlet oak acorn production begins at 20 years of age, whereas the remaining acorn producing species do not begin production until age 40. No changes to the integrity of Bird patch #37 are proposed with the Craig Creek watershed project.

The proposed Craig Creek Watershed project involves returning the creek to its original location, placing a "vane" in Upper Creek to restore the stream bank damaged by recent hurricane flooding and prevent future stream bank erosion, and placing 2-3 boulders at the campsite immediately above the low water bridge on Upper Creek. These projects may require the cutting of 3-5 trees to accommodate equipment access needs. The project to delineate the dispersed campsites along Timbered Branch and at the intersection of FSR 197 and FSR 286 is on-going. This project has resulted in less bare soil and vehicle traffic within the areas immediately adjacent to the creeks. The campsites being delineated and hardened, along with the toilet facility are outside of the immediate riparian corridor of Upper Creek. These recreation and soil and water resource projects would benefit wildlife and aquatic species within the analysis area by maintaining wildlife access to water sources and the integrity of the riparian areas. The storm recovery project of reconstructing the natural stream channel of Craig Creek and placing large woody debris in Timbered Branch would improve aquatic habitat and stabilization.

There have been approximately 3,500 acres of wildfires within these analysis areas since 1981 and approximately 300 acres of prescribed fire. This fire history has resulted on an average of 16 acres per year being burned over. Where these fires occurred, the shrub layer has been reduced and scattered tree mortality occurred. Wild fires and prescribe burns rarely enter riparian areas or are low intensity burns with low severity effects within this moist environment.

The southern pine beetle (SPB) epidemic within the past 5 years has resulted in large clumps and scattered yellow pine species mortality, especially where they occur along ridgetops on the south end of the Forest Plan Upper Creek AA. Natural regeneration is occurring, however, a prescribe burn in planned in the vicinity to reduce the dead and down debris which may be interfering with regeneration to a fully stocked stand.

Method of Evaluation

Potentially affected federally listed threatened and endangered (T&E) species and Regional Forester's sensitive (S) (August 7, 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) 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

The proposed units or activity area were surveyed by David M. Danley, Forest Botanist on June 21, 22, 26, 30, 2004, and July 1, 13, 14, 20, 2004. All proposed units were visited at least once during this time.

Lorie Stroup and Sheryl Bryan, USFS Fisheries Biologists, conducted aquatic habitat and aquatic insect surveys of the proposed aquatic project and analysis areas on July 13, 17, 2004, August 16, 2004, October 26, 2004, and December 8, 2004.

Bird points were conducted on June 7 and 8, 2004, by Dennis Helton, Grandfather Ranger District, and on June 8, 10, and 15, 2004, by Sandy Burnet, Grandfather Ranger District Wildlife Biologist. Habitat presence for snail and salamanders was conducted in the activity areas. Mist nets and anabat bat surveys were completed on July 20-22, 2004, by Sandy Burnet and Luke Decker, Forest Technician on the Grandfather Ranger District. Surveys were conducted to determine the habitat present, survey significant habitats, and species presence.

Historical Surveys

Botanical survey information was used from the Timbered Branch Timber Sale (1992) and botanical surveys conducted by Allan Smith in compartments 87, 94, 95 and 96. Other sources of information were: Steels Creek Watershed Analysis (Simon et. al., 2002) and Steels Creek Timber Sale Botanical Report (Danley, 2003).

Existing data for aquatic exists in two forms: general inventory and monitoring of Forest aquatic resources and data provided by cooperating resource agencies from aquatic resources on or flowing through the National Forest lands. 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.

Timbered Branch, Carroll Creek, and Upper Creek were included in the 1992-1995 Brook Trout Surveys conducted by the USFS and the NCWRC (AQUA, Table 4.3). Timbered Branch was

surveyed again in 2004 for the presence of brook trout during the cooperative effort with the NCWRC and Western Carolina University to genetically type all brook trout in North Carolina. The NC Department of Environment and Natural Resource's (NCDENR) Water Quality division monitored fish on a site of Upper Creek in both 1997 and 1999. The NCDENR division of water quality sampled Upper Creek in the summer of 1997 and spring, summer, and fall of 1999.

Surveys were completed by the resource biologists for the Craig Creek watershed activity area for the 2004 project of closing illegal vehicle use around the current location of the water flow. No T&E or S plant, salamander, or snail habitat were found and common butterfly species were found to be utilizing the stream bank vegetation for nectar and water.

Surveys were completed by resource biologists in 2002 of the prescribe burn area in the Brown Mountain ORV area for a burn that was not carried out, encompassing the majority of the proposed prescribe burn area.

Surveys were completed by Sandy Burnet and Dave Danley for the re-location of a trail within the Brown Mountain ORV area in 2000.

Species Evaluation

Species evaluated further may be found in the following table. Species not evaluated further are listed in Attachment A, along with the reason for elimination from further consideration.

Wildlife

A total of 16 wildlife T&E and S species are listed by the North Carolina Natural Heritage Program database as occurring within Avery, Burke, and Caldwell Counties. In addition, the US Fish and Wildlife Service and US Forest Service county species records were used. Fourteen species were dropped from further evaluation and the reason for elimination is found listed in Attachment A. There are no known T&E species or their habitats occur within these Forest Plan AAs. Snail and salamander surveys determined habitat was very poor with the exception of the eastern edge of stand 94-02. Common salamander and snail species were found during surveys; no S species were recorded. A new Caldwell County occurrence was recorded during bat surveys for the S species *Myotis leibii,* within the Timbered Branch riparian area.

Botanical

Of the 31 plant T&E and S species known to occur in Burke and Caldwell Counties NC, all but 8 species (see following table) were dropped from the list for further consideration and discussion for one of the following reasons: 1) lack of suitable habitat for the species in the activity area, 2) the species has a well-known distribution that does not include the activity area, or 3) based on field surveys of potential habitat, no habitat was seen in the activity areas. Habitats, community types and ranges of plant TES species are derived from information in *Classification of the Natural plant Communities of North Carolina*, the Natural Heritage Program's List of Rare Plant of North Carolina, or information obtained from other botanist. Based upon habitat information, six plant T&E, S species could occur in the AA, one species is known to occur within the botanical AA but not in the activity area, and one species is known to occur within the activity area (Regional Sensitive species *Tsuga caroliniana*). A list of TES plants that occur in Burke

and Caldwell Counties and why they were eliminated from further evaluation is found in Attachment A. A list of TES plants that potentially could occur in the project or activity areas is listed in the following two table and summarizes the list of TES plant species that are: likely to occur, known to occur, or potentially could occur in the botanical AA. *Tsuga caroliniana* is known to occur in compartment/stand; 89-1, 90-3, 92-5, 95-8, 95-40 and 96-14. *Tsuga caroliniana* is likely to occur in other activity areas.

Aquatic

Of the 5 aquatic species listed as occurring or potentially occurring in Burke and Caldwell Counties, 1 was dropped as a result of a likelihood of occurrence evaluation based on preferred habitat elements and field survey results. The remaining 4 are S species. Attachment A summarizes this process.

Threatened and Endangered Species (06/01) Evaluation

Table A-3. Potential Threatened or Endangered Species (2001)

Species	Type	Natural Community or Habitat	Occurrence
Hexastylis naniflora , birthwort	Vascular	Acidic Cove Forest	Not known to occur in botanical biological analysis area or activity area

No aquatic or wildlife T&E species or their habitat occurs within the activity areas.

No T&E plant species are known or expected to occur within the activity areas and with the negative results from surveys of the activity area, it is unlikely that non detected plant T&E species occur in the activity areas. Because there are no known populations of these plant species in or near the proposed activity areas, there are no known effects (direct, indirect, or cumulative) to these possible species.

Regional Forester's Sensitive Species (08/01) Evaluation

Table A-4. Regional Forester's Sensitive Species Evaluated (2001)

Species	Type	Natural Community or Habitat	Occurrence
Hexastylis rhombiformis, birthwort	Vascular Plant	Acidic Cove Forest.	Not known to occur in AA or activity area.
Helianthus glaucophyllus, smooth flowered sunflower	Vascular Plant	Anthropogenic, roadsides; Rich Cove Forests	Not known to occur in AA or activity area.
Juglans cinerea, Butternut	Vascular Plant	Acidic Cove Forest.	Known to occur in AA, not known to occur in activity area.
Monotropsis oderata, Indian pipe	Vascular Plant	Chestnut Oak Forest	Not known to occur in AA or activity area.
Shortia galaciffolia var.	Vascular Plant	Acidic Cove Forest.	Not known to occur in AA or

Species	Type	Natural Community or Habitat	Occurrence
brevistylis, Shortia			activity area.
Tsuga caroliniana, Carolina hemlock	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Known to occur in activity area. (stands 89-1, 90-3, 92-5, 95-8, 95-40, and 96-14)
Ophiogomphus edmundo, Edmund's snaketail	Dragonfly	Lotic	May occur in AA.
Ophiogomphus howei, Pygmy snaketail	Dragonfly	Lotic	May occur in AA.
Alasmidonta varicose, Brook floater	Mussel	Lotic- Clean and gravel substrates	Known to occur in Upper Creek
Macromia margarita, Mountain River Cruiser	Dragonfly	Lotic- depositional	May occur in the AA.
Myotis leibii, Eastern small-footed bat	Mammal	Winter – caves and mines Summer – hollow trees	Known to occur within the AA
Speyeria Diana, Diana Fritillary	Butterfly	Forages on nectar species within forest openings, most often near streams. Larval species forage on violet species within or near riparian areas with rhododendron	Known to occur within the activity area

Effects to Sensitive Species

Wildlife

Eastern Small-footed Bat

The following table summarizes possible effects to the Eastern small-footed bat due to the project proposal:

Table A-5. Summary of Effects to the Eastern Small-footed Bat

Eastern Small-footed bat	Proposed Action
Direct Effects	Less than 1% of local population
Indirect Effects	Less than 2% of habitat
Cumulative Effects	1-2% of local populations

If harvesting is carried out during October through March time frame, the Eastern Small-footed bat would be hibernating within caves, most prevalent within the northern portion of the Upper Creek drainage, more than a mile from the proposed activities. During late spring through early fall, this species may be found utilizing hollow trees and rock crevices. Rock crevices are most numerous within the northern portions of Upper Creek. The rock outcrop within stand 95-36

does not meet the needs of the bat. If the bat utilizes a hollow tree for roosting, the Nantahala & Pisgah National Forest standards require that 2 snags or den trees per acre is retained during stand regeneration (Amendment 5, page III-23). Dead trees should be >15" diameter where they occur and all den trees greater than 22" diameter are to be left (Amendment 5, page III-23). These forest standards would be implemented in any harvest activity. The project design specifies the species priority for residual tree marking to include white oak and hickory, where they occur. These species exhibit bark characteristics utilized by bats and other species for temporary cover. With the specifications and standards outlined and the greatest amount of preferred rock habitat being located outside the activity area, the potential of negative direct effects to individuals would be greatly reduced, less than 1% of individuals within the Forest Plan AA population With the standards and residual tree priority listed above, few, if any, summer roosting trees would be lost due to harvest of 1.7% of potential habitat across the Forest Plan AA with Alternative B. Negative indirect effects would occur to less than 2% of the current habitat available on the Forest Plan AA including past wild fires occurring outside the hibernating period. Therefore, direct or indirect effects to the local eastern small-footed bat population would be minimal.

Past and foreseeable future projects of restoring the riparian area along lower portions of Upper Creek and Timbered Branch where dispersed camping has resulted in bare soil would benefit the bats utilization of this riparian community. The majority of the areas fire history was during the hibernating period of this species and low intensity fires would not result in loss of suitable snags and dens. There are no direct, indirect, or cumulative effects to this species resulting from the past SPB epidemic and resulting mortality. The Craig Creek watershed project would restore the riparian area to its original condition and benefit all bat species utilization of the area over the long term.

Direct negative effects to individuals would be less than 1% of the local population, while indirect negative effects would occur on less than 2% of the habitat within the AA as a result of this activity. In summary, the cumulative effect within the Forest Plan AAs for this bat species would be a potential loss of less than 1% of the population, adverse indirect effects of less than 2% of the habitat, and future foreseeable activities would result in benefits to the species through restored habitat. Therefore, the overall cumulative effect would be minimal adverse direct and indirect effects to the local population and long term positive effects to habitat within these AAs. Implementation of this proposed action would not affect the population viability across the Nantahala and Pisgah National Forest and is not likely to cause a trend toward federal listing.

Diana Fritillary

The following table summarizes possible effects to the Diana fritillary butterfly due to the proposal:

Table A-6. Summary of Effects to the Diana Fritillary

Diana Fritillary	Proposed Action
Direct Effects	Potential loss of 1% of local population
Indirect Effects	Increase by 385 acres of habitat
Cumulative Effects	Minimal – not likely to cause a trend to federal listing or a loss of viability

There are several records of occurrence for the Diana Fritillary, *Speyeria diana,* in the activity area. This species is commonly seen utilizing the nectar species found along roadsides, streams, and linear grass/forb areas. Harvesting would improve habitat for these nectar species and the butterfly would flourish within 0-10 age class areas post-harvest where sunlight encourages flowering plant growth. Eggs and larvae are found on violets within riparian corridors where the forest floor within a forested setting where rhododendron are usually numerous. There are approximately 9,365 acres of suitable fritillary habitat across these Forest Plan AAs. If approximately 110 acres or 1% of suitable habitat are harvested, there would be an increase in nectar species habitat and availability over the next 10 years. If harvesting is carried out during the egg or larval season, individual eggs or larvae may be eliminated by equipment trampling of the violets present. With the proposed grass/forb habitat increase of 10.5 acres, nectar species habitat would increase from the present availability. Therefore, the proposed action, Alternative B, may impact 1% of the individuals within this local population. This alternative would have a positive indirect effect by improving nectar species habitat on 385 acres over the next 10 years.

Past and foreseeable future projects of restoring the riparian area and condition along lower portions of Upper Creek and Timbered Branch, where dispersed camping has resulted in bare soil, would benefit violet species growth and the fritillary's utilization of this riparian community. Historic fire, although generally outside the growing season, may have destroyed eggs laid on dead or dying violets. The fires generally occurred outside of riparian areas and at a rate of 16 acres per year. The SPB epidemic pine mortality, would improve the potential of flowering plant species over the affected area until regeneration reaches the closed canopy condition. The Craig Creek watershed project would have no effect on the Fritillary, nor would the stream structure work planned within Timbered Branch. Therefore, cumulative effects to the species local population would be minimal and is not likely to cause a trend toward federal listing or a loss of viability locally across the Nantahala and Pisgah National Forests populations.

Botanical

The known local populations of *Tsuga caroliniana* in the Botanical analysis area occur mostly along ridges and upper slopes primarily associated with Pine-Oak Heath Community. To a much more limited extent, *Tsuga caroliniana* can be found in Chestnut Oak Forests. *Tsuga caroliniana* is not an uncommon component species of xeric plant communities of the Catawba River escarpment (Newell, Danley) and the botanical AA. Hence, the population of *Tsuga caroliniana* is very large and scattered. There are more than 100 populations known across the forest and this species is not tracked by the NC Natural Heritage Program.

Tsuga caroliniana is known to occur in proposed activity areas in stands 89-1, 90-3, 92-5, 95-8, 95-40, and 96-14. Furthermore, any stand with Pine-oak Heath or Chestnut Oak Forest has a strong likelihood of *Tsuga caroliniana* to be present. Therefore, any alternative that contains one or more of these stands might have adverse direct impacts to individuals *Tsuga caroliniana* by logging (crushing i.e. mechanical damage).

There is no qualified data available concerning the indirect effects of logging on *Tsuga caroliniana*. However, judging by the recovery of *Tsuga caroliniana* by similar actions (logging) *Tsuga caroliniana* seems to repopulate disturbed sites (positive effect). This informal

observation is reinforced by noticing that *Tsuga caroliniana* often occurs along old skid roads and disturbed ridge tops. Since *Tsuga caroliniana* would have a viable population within the analysis area (in areas outside the activity area) and the habitat would at a lower successional state and would be restored to its current ecological state, it is logical to assume that recovery of *Tsuga caroliniana* would take place over time.

It is known that the Timbered Branch timber sale (1992) likely adversely impacted individuals of *Tsuga caroliniana*. However, the habitat supporting *Tsuga caroliniana* in those activity areas has had sufficient time to recover. Recent (less than 20 acres of *Tsuga caroliniana* habitat) and historic fires (unquantified) have likely impacted individuals of *Tsuga caroliniana.* Little is known about the effects of fire on communities with populations of *Tsuga caroliniana. Tsuga caroliniana* often occurs with fire tolerant species suggesting an importance of fire its ecology (Scafale) but populations studied at Bluff Mountain (North Carolina) suggest *Tsuga caroliniana* out-competes other vegetation such as oaks and invades areas that fire has been excluded from (Humphrey). On a Forest-wide scale, this proposal would have very little effect on *Tsuga caroliniana*. There are so many individuals known distributed over such a wide area across the Forest that this proposal would have little effect on the total numbers of *Tsuga caroliniana* individuals throughout the Forest. There is no known future action that would negatively affect *Tsuga caroliniana* within the botanical analysis area.

Therefore, the cumulative effect on *Tsuga caroliniana* within the botanical AA is that of the Timbered Branch Timber Sale (mostly recovered), past fires (mostly recovered), and the proposed action, may impact individuals of *Tsuga caroliniana* but would have no qualitative effect upon the Forest or botanical AA viability of *Tsuga caroliniana.*

Aquatic

Sensitive species *Ophiogomphus edmundo, Ophiogomphus howei, Alasmidonta varicosa* and *Macromia margarita* may occur within the activity area. The implementation of this project may impact or stress individuals of the aquatic sensitive insects *Ophiogomphus edmundo, Ophiogomphus howei,* and *Macromia margarita* if they exist within Carroll Creek, where the bridge crossing is located or in the man-made channel of Craig Creek. None of the aquatic macroinvertebrate S species listed above were found during field surveys in activity area streams. The habitat for these benthic macroinvertebrate species is common across their range. Individual *Ophiogomphus edmundo, Ophiogomphus howei,* and *Macromia margarita* may be directly impacted by the activities associated with the stream crossing at Carroll Creek and in Craig Creek; however, there would be no risk to aquatic population viability of these S species because the potential habitat affected is very limited. There would be no adverse cumulative effects to these S species as a result of this project. Cumulatively, habitat within Carroll Creek and Craig Creek may improve with project implementation. The stream crossing at Carroll Creek is an existing illegal ford for off-road vehicles (though access has been blocked by USFS on several occasions). By placing a bridge in this area, vehicles would not likely enter the stream, thus minimizing the risk of direct impacts to members of the S insect species as well as other aquatic organisms. The Craig Creek channel was man-made. By re-creating a more natural channel, habitat may improve with site rehabilitation for aquatic organisms.

There is no mussel habitat within Carroll Creek or Craig Creek therefore; *Alasmidonta varicosa*

would not be directly or indirectly affected by the implementation of this project. *Alasmidonta varicosa* are located in Upper Creek, below the activity area; however it is not expected that any adverse indirect impacts to Upper Creek would occur as a result of the implementation of either action alternative. There would be no cumulative impacts to *Alasmidonta varicosa* as a result of the Upper Creek Timber Sale.

Project Design Features

The following project design features are part of the proposal and would reduce potential for adverse effects to TES species:

- To reduce the possible effect of invasive exotic plant species to this proposal, all known populations of *Miscanthus sinensis*, *Paulownia tomentosa,* and *Ailanthus altissima* would be controlled prior to disturbance activities. *Miscanthus sinensis* was found along Forest Service Roads. All populations total less than five acres. Control of *Miscanthus sinensis, Paulownia tomentosa* and *Ailanthus altissima* is best done by the use of herbicide (Glyphosphate).
- It is recommended that native plants be utilized in wildlife improvement and roadside erosion control.
- Hemlock four inches to eight inches in diameter not affected by the hemlock wooly adelgid within stands 93-02, 94-02, and 94-01, would be retained during harvest and stand improvement activities to maintain winter roost habitat for many bird species, including ruffed grouse.
- During timber stand improvement, soft mast species of holly, black gum, and dogwood would be maintained to ensure continued production of food utilized by numerous bird species and mammals.
- Species priority for residual tree designation would be; white oak, red oak, and hickory, where present within harvest stands.
- Move upper unit boundary of stands 95-08 and 95-40 one tree-height below ridge. Maintain 25-30 basal area/ac to screen and blend-in harvest activities as seen from Trail 273.
- Harvest openings along open system roads in stands 90-03, 92-05A, and 92-05B should not exceed 500 linear feet.

Summary and Determination of Effects

There would be no adverse direct, indirect, or cumulative effects to any T&E plant, aquatic, or wildlife species populations or their habitat by any alternative considered. Consultation with USDI Fish and Wildlife Service is not required.

The Eastern small-footed bat, *Myotis lebii,* is a Regional Forester's S species. With project design features outlined and the greatest amount of preferred rock habitat being located outside the activity area, the potential of negative direct impacts to individuals would be greatly reduced or less than 1% of the population. There would be a negative impact effect to less than 2% of the habitat within these AAs. In summary, the impacts would be minimal with adverse impacts of less than 1% of the local population being effected with the implementation of Alternative B, the minimal negative impact to the local habitat, and positive long term impact to its riparian habitat

with planned future projects. The cumulative impact within the Forest Plan AAs on this species would be minimal and not affect population viability across the Nantahala and Pisgah National Forest—no alternative is likely to cause a trend toward federal listing.

The Regional Forester's S species, Diana Fritillary, *Speyeria diana*, is known to occur within the activity area. Alternatives B or C may impact individuals on 1% of suitable habitat and improve nectar species habitat on 385 acres over the short-term. Both the beneficial indirect habitat impacts (<1%) and the negative direct impacts (<1%) would be minimal across the Forest Plan AAs. Past projects, present projects, and historic fire history would result in minimal cumulative impacts to the species local population and is not likely to cause a trend to federal listing or a loss of viability locally or across the Nantahala and Pisgah National Forests populations.

This proposal would have adverse direct impacts to individual Regional Forester's S species *Tsuga caroliniana.* The cumulative impact on *Tsuga caroliniana* within the botanical AA; the Timbered Branch Timber Sale (mostly recovered), past fires (mostly recovered), and the proposed action; may impact individuals of *Tsuga caroliniana* but would have no qualitative impact, upon the Forest or botanical AA, on the viability of *Tsuga caroliniana.*

Individual aquatic Regional Forester's S species *Ophiogomphus edmundo, Ophiogomphus howei,* and *Macromia margarita* may be directly impacted by the activities associated with the stream crossing at Carroll Creek and in Craig Creek; however, there would be no risk to aquatic population viability of these S species because the potential habitat affected is very limited. There would be no adverse cumulative impacts to these S species as a result of this project because habitat within Carroll Creek and Craig Creek may improve with project implementation. There would be no adverse cumulative impacts to *Alasmidonta varicose* as a result of this project because this species occurs downstream of the activity areas where no impacts are expected to occur from the Upper Creek Timber Sale. No risk to population viability of the aquatic S species (*Ophiogomphus edmundo, Ophiogomphus howei, Alasmidonta varicose, Macromia margarita*) would occur as a result of this project.

No other sensitive wildlife, botanical, or aquatic species has been determined to occur within the Forest Plan AAs and therefore would not be impacted by any alternative selected.

List of Preparers

Prepared By: /s/ Sandy Burnet
Sandy Burnet – sburnet@fs.fed.us
Wildlife Biologist – Grandfather Ranger District
(828) 652-2144
Date: November 4, 2005

Lorie Stroup, Aquatic Analysis
Fisheries Biologist, Pisgah National Forest

Dave Danley, Botanical Analysis
Botanist, Pisgah National Forest

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Attachment A

Wildlife

Wildlife TES species found within Avery, Burke, and Caldwell County dropped from further consideration.

Species	Habitat	Type & Status	Reason for Elimination
Corynorhinus town. Virginianus, VA big-eared bat	Caves within forested habitat	Mammal, E	No known caves/mines within activity area.
Corynorhinus rafinesquii, Rafinesque's big-earred bat	Cave dwelling bat, Abandoned building preferred during the summer	Mammal, S	No occurrence record within analysis area .
Glaucomys sabrinus coloratus, Carolina northern flying squirrel	Mature spruce/fir & N. hardwoods, generally above 4000' elevation	Mammal, E	No spruce/fir or N. Hardwoods within activity area.
Clemmys muhlenbergii, Bog turtle	Marshy meadows, large seeps, and bogs	Reptile, T	No habitat within activity areas
Thryomanes bewickii altus, Appalachian Bewick's wren	Brush and fence rows in open country	Bird, S	No occurrence record within Forest Plan AA.
Micotus chrotorrhinus carolinensis, Southern rock vole	Rocky/boulder field within forest	Mammal, S	No occurrence records or habitat within county
Sorex palustris puntculatus, Southern water shrew	12-15' streams and banks with rhododendron in N. hardwood or spruce/fir forests	Mammal, S	No occurrence record in county and no habitat within activity area.
Pallifera hemphilli, Black mantleslug	Acidic & rich coves, spruce/fir forests	Invertebrate, S	None recorded from surveys of activity area
Ventridens coelaxis, Bidentate dome	High elevation wooded hill sides	Invertebrate, S	None recorded from surveys of activity area
Falco peregrinus, Peregrine falcon	High rock cliffs, usually near rivers or lakes	Bird, S	No occurrence record within analysis areas, no habitat within activity area.
Haliaeetus leucocephalus, Bald eagle	Mature trees near lakes	Bird, T	No habitat within activity area
Plethodon welleri, Weller's salamander	High elevation acidic forest	Amphibian, S	No occurrence record within analysis area, none recorded from surveys of activity area
Microhexura montivaga, Spruce-fir moss spider	Moss within spruce-fir forest	Invertebrate, E	No occurrence record or habitat within analysis areas
Speyeria idalia, Regal Fritilllary	Open, brushy fields	Invertebrate, S	No occurrence record or habitat within analysis areas

Botanical

Botanical TES Species of Burke & Caldwell County:

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)

Species	Form	Status	Habitat	Occurrence
Abies fraseri	Vascular	Sensitive	Spruce-Fir Forest	4
Aconitum reclinatum	Vascular	Sensitive	Rich Cove Forest	4
Bazzania nudicaulis	Liverwort	Sensitive	Spruce-Fir Forest, High	4
Calystegia catesbiana ssp.	Vascular	Sensitive	Rich Cove Forest, High	4
Cardamine clematitis	Vascular	Sensitive	Spruce-Fir Forest, High	4
Cephaloziella obtusilobula	Liverwort	Sensitive	High Elevation Rocky Summit,	4
Chelone cuthertii	Vascular	Sensitive	Southern Appalachian Bog	4
Drepanolejeunea applachiana	Liverwort	Sensitive	Acidic Cove Forest, Spray Cliff	4
Fothergilla major	Vascular	Sensitive	Pine-Oak Heath, Chestnut Oak	4
Geum geniculatum	Vascular	Sensitive	Rich Cove Forest, Grassy Bald,	4
Geum radiatum	Vascular	Threatened	Heath Bald, High Elevation	4
Helianthus glaucophyllus	Vascular	Sensitive	Rich Cove Forest,	3
Hexastylis naniflora	Vascular	Threatened	Acidic Cove Forest	3
Hexastylis rhombiformis	Vascular	Sensitive	Rich Cove Forest, Acidic Cove	3
Houstonia montana	Vascular	Endangered	Grassey Bald, High Elevation	4
Isoetes medeoloides	Vascular	Threatened	Unknown	4
Juglans cinera	Vascular	Sensitive	Rich Cove Forest	2
Liatris helleri	Vascular	Threatened	High Elevation Rocky Summit	4
Liatris turgida	Vascular	Sensitive	Pine-Oak Heath, Montane	4
Monotropsis odorata	Vascular	Sensitive	Chestnut Oak Forest	3
Parthenium auriculatum	Vascular	Sensitive	glades and openings over mafic	4
Plagiochila caduciloba	Liverwort	Sensitive	Acidic Cove Forest, Spray Cliff	4
Plagiochila echinata	Liverwort	Sensitive	Acidic Cove Forest, Montane	3
Plagiochila sullivantii var.	Liverwort	Sensitive	Spray Cliff	4
Plagiochila sullivantii var.	Liverwort	Sensitive	Spruce-Fir Forest	4
Porella wataugensis	Liverwort	Sensitive	Unknown	4
Rhododendron vaseyi	Vascular	Sensitive	Spruce-Fir Forest, Heath Bald,	4
Robinia hispida var fertilis	Vascular	Sensitive	Northern Hardwood Forest,	4
Shortia galaciffolia	Vascular	Sensitive	Northern Hardwood Forest,	3
Trillium rugellii	Vascular	Sensitive	Rich Cove Forest, Alluvial	4
Tsuga caroliniana	Vascular	Sensitive	Pine-Oak Heath, Chestnut Oak	1

Aquatic

Aquatic TES Species of Burke & Caldwell County (2002):

Rare Aquatic Species List - Burke and Caldwell Counties			Burke County	Caldwell County	
Common Name	**Scientific Name**	**Type**			**Likelyhood of Occurrence**
Threatened, Endangered, or Proposed Species					
spotfin chub	*Cyprinella monacha*	fish	X		Not Likely to Occur (1,5)
Regional Forester's Sensitive Species list)					
Edmund's snaketail	*Ophiogomphus edmundo*	dragonfly	X	X	May Occur (4)
pygmy snaketail	*Ophiogomphus howei*	dragonfly	X	X	May Occur (4)
brook floater	*Alasmidonta varicosa*	mussel	X	X	Does Occur (1)
mountain river cruiser	*Macromia margarita*	dragonfly		X	May Occur (4)
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 activity 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					

Attachment B: Definitions

Definitions for the Various Types of Likelihood of Occurrence

- Known to occur – those species of which there is documentation that the species exists within a specified area, or it was found in the area during surveys.
- Likely to occur – those species of which there is no documentation of the species occurring in a specified area but are expected to occur based on documentation of very similar habitat to known populations.
- May/could occur – the species probably occurs in a specified area in the broadest sense. Only very general habitat preferences and species distribution are used to determine if a species may occur. This does not imply their existence in an area, but that their general habitat description is found in the area, so therefore the species may occur.
- Not likely to occur – suitable habitat for a species may exist in a specified area, but there is other information known about the area and/or the species to determine that it is not likely to occur. These species are not included in the analysis.
- Does not occur – exhaustive surveys (existing and USFS) have not found the species in the project and/or analysis areas. These species are not included in the analysis.

APPENDIX B – AGE CLASS DISTRIBUTION

APPENDIX B – AGE-CLASS DISTRIBUTION

Forest vegetation within the Upper Creek project area consists mostly of upland hardwood species such as oaks, hickories, red maple, black gum, and black locust. White pine, pitch pine, shortleaf pine, table mountain pine, and Virginia pine occur in varying degrees throughout the area. Drainages are occupied mainly by yellow-poplar, white pine, and hemlock. Understory vegetation includes rhododendron, mountain laurel, and various other shrubs and herbs. By far, most overstory oaks are chestnut oak or scarlet oak.

Within the Upper Creek AA, approximately 75 percent of forested acres are 71 years old or older. Only 1 percent is in the 0-10 year age-class, and 10 percent is in the 11-20 year age-class. Within the Lower Wilson Creek AA, approximately 79 percent of forested acres are 71 years old or older. Only 2 percent is in the 0-10 year age-class, and 8 percent is in the 11-20 year age-class. Within the 8,237 acre project area, approximately 74 percent of forested acres are 71 years old or older. Only 1.5 percent is in the 0-10 year age-class, and 12 percent is in the 11-20 year age-class.

In many of the older stands, especially on upland sites, there are abundant dead standing and dead fallen trees, mostly yellow pines and scarlet oaks. The area has suffered through several outbreaks of southern pine beetle (most recently in 2000-2002) and drought (most recently 1998-2002), and many oaks exhibit symptoms of oak decline.

This age-class distribution is very unbalanced for MA 3B where sustainable timber harvest and provision of young forest is emphasized (Forest Plan, page III-71). Mortality losses would continue to increase as stands get older.

This analysis determines the minimum and maximum harvest levels for the activity area according to the Forest Plan. Both action alternatives would help to balance the age-class distribution to a greater degree. Alternatives B and C would result in bringing the 0-10 year age-class in the project area up to almost 6.5 percent in 2006. The resulting sum of 0-10 and 11-20 year age-classes would be approximately 18 percent. All stands proposed for harvest are from 74 to 99 years old.

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 (Forest Plan, pages III 29-31). Regulation is at three scales: the watershed or topographic level; the management area within the watershed or topographic area; and the compartments within the area. The following tables summarize the existing 0-10 year age-class and regeneration goals for these areas and for the Upper Creek project compartments within each analysis area. Uncut inclusions and non-forested areas are not considered as 0-10 year old regeneration.

Upper Creek Compartments 87, 89, 90, 92, 93, 94, 95, 107

For every AA with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the number of acres in each management area is multiplied by the maximum percent allowed and then summed to determine the amount of 0-10 year age-class allowed in the analysis area, or 1,212 acres in Upper Creek and 871 acres in Lower Wilson Creek.

For every management area with at least 250 acres in the AA, 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. In Upper Creek there is a maximum of 831 acres allowed in MAs 1B and 3B, 328 acres in MA 2A, and 53 acres in MAs 4A and 4D. In Lower Wilson Creek there is a maximum of 543 acres allowed in MAs 1B and 3B, 87 acres in MA 2A, and 241 acres in MAs 4A and 4D.

Table B-1: Forest Plan Allowed 0-10 Year Age-Class for Upper Creek AA

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	5,541	277	831	130	147	699
2A	3,282	164	328	15	149	313
4A & 4D	528	n/a	53	2	n/a	51
Other	4,024	-	-	-	-	-
Total	**13,375**	**441**	**1,212**	**147**	**296**	**1,063**

Summary: *In Upper Creek, harvest 147 to 699 acres in MA 1B and 3B and harvest 149 to 313 acres in MA 2A and harvest 0 to 51 acres in MAs 4A and 4D.*

Table B-2: Forest Plan Allowed 0-10 Year Age-Class for Lower Wilson Creek AA 512-W

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
1B, 3B	3,618	181	543	188	0	355
2A	870	44	87	0	44	87
4A & 4D	2,413	n/a	241	0	n/a	241
Other	3,291	-	-	-	-	-
Total	**10,192**	**225**	**871**	**188**	**44**	**683**

Summary: *In Lower Wilson Creek, harvest 0 to 355 acres in MA 1B and 3B and harvest 44 to 87 acres in MA 2A and harvest 0 to 241 acres in MAs 4A and 4D.*

For every compartment with at least 250 acres in MAs 1B, 2A, 3B, 4A, and/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 MAs 1B and 3B have the most, then the maximum allowed in the 0-10 year age-class is 15 percent of all acres in the compartment. If MAs 2A, 4A, or 4D have the most acres, then the maximum amount allowed in the 0–10 year age-class is 10 percent of all acres in the compartment. The following tables display the age-class by compartment and Forest Plan standards (harvest goals):

Table B-3: Lower Wilson Creek AA, Compartment 87, 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.
1B, 3B	246	32	95	30	2	65
2A	40					
4A & 4D	0					
Other	350					
Total	**636**	**32**	**95**	**30**	**2**	**65**

Summary: *In Compartment 87, harvest 2 to 65 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-4: Lower Wilson Creek AA, Compartment 89, 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.
1B, 3B	587	63	188	0	63	188
2A	552					
4A & 4D	0					
Other	115					
Total	**1,254**	**63**	**188**	**0**	**63**	**188**

Summary: *In Compartment 89, harvest 29 to 188 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-5: Upper Creek AA, Compartment 90, 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.
1B, 3B	393					
2A	1057	79	158	22	57	136
4A & 4D	0					
Other	126					
Total	**1,576**	**79**	**158**	**22**	**57**	**136**

Summary: *In Compartment 90, harvest 57 to 136 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-6: Upper Creek AA, Compartment 92, 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.
1B, 3B	884	63	188	0	63	188
2A	128					
4A & 4D	0					
Other	238					
Total	**1,250**	**63**	**188**	**0**	**63**	**188**

Summary: *In Compartment 92, harvest 63 to 188 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-7: Upper Creek AA, Compartment 93, 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.
1B, 3B	128					
2A	513	33	66	0	33	66
4A & 4D	0					
Other	17					
Total	**658**	**33**	**66**	**0**	**33**	**66**

Summary: *In Compartment 93, harvest 33 to 66 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-8: Upper Creek AA, Compartment 94, 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.
1B, 3B	354					

		0-10 YEAR AGE-CLASS			HARVEST GOALS	
Mgmt. Area	Forested Acres	Min. Desired	Max. Allowed	Existing 0-10 Yr.	Min.	Max.
2A	857	65	129	0	65	129
4A & 4D	0					
Other	80					
Total	**1,291**	**65**	**129**	**0**	**65**	**129**

Summary: *In Compartment 94, harvest 65 to 129 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-9: Upper Creek AA, Compartment 95, 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.
1B, 3B	643	54	161	75	0	86
2A	233					
4A & 4D	0					
Other	198					
Total	**1,074**	**54**	**161**	**75**	**0**	**86**

Summary: *In Compartment 95, harvest 0 to 86 acres in MAs 1A, 2A, 3B, 4A and 4D*

Table B-10: Upper Creek AA, Compartment 107, 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.
1B, 3B	384	25	75	0	25	75
2A	0					
4A & 4D	0					
Other	114					
Total	**498**	**25**	**75**	**0**	**25**	**75**

Summary: *In Compartment 107, harvest 25 to 75 acres in MAs 1A, 2A, 3B, 4A and 4D*

APPENDIX C – OLD GROWTH ANALYSIS

APPENDIX C – OLD GROWTH ANALYSIS

Forest Plan Direction for Old Growth

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III 26-28). The administrative watersheds affected by this project are 57 (Upper Creek), 58 (Parks Creek) and 59 (Wilson Creek). The requirements for this project are as follows: (1) utilize large patch 29; (2) select small patches, if needed, for Compartments 87, 89, 90, 92, 93, 94, 95, and 107; 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 29: 7,223 contiguous acres with 2,186 acres in the Upper Creek watershed and 5,037 acres in the Wilson Creek watershed. Distribution of old growth types are shown below:

Table C-1: Distribution of Old Growth Types

OG Code	OG Type	Acres	% of Patch
2	Hemlock-northern hardwoods	528	7
5	Mixed mesophytic forest	2,962	41
21	Dry-mesic oak forest	1,648	23
22	Dry & xeric oak forest	726	10
24	Xeric pine & pine-oak forest	186	3
25	Dry & dry-mesic oak-pine forest	935	13
35	Mixed mesophytic forest	238	3
Total		**7,223**	**100%**

The purpose of the **medium patches** is to serve as permanent reservoirs of biological diversity. Alternative C would designate the following areas (an estimated 475 acres) as medium patch (near Horsepen Creek) in compartments 86, 87, and 88.

Table C-2: Medium Old Growth Patch in the Lower Wilson Creek Watershed

Comp.	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
86	34	36	75	No	Oak/Hickory Forest
87	1	76	92	No	Oak/Hickory Forest
	2	25	79	No	Cove Forest
	3	23	79	No	Oak/Hickory Forest
	4	23	94	No	Oak/Hickory Forest
	5	11	154	No	Oak/Hickory Forest
	6	20	154	No	Oak/Hickory Forest
	7	21	79	No	Oak/Hickory Forest
	10	11	99	No	Oak/Hickory Forest
	16	20	18	No	Oak/Hickory Forest
	17	35	74	No	Cove Forest
	19	10	92	No	Oak/Hickory Forest
	20	25	79	No	Oak/Hickory Forest
	21	34	84	No	Oak/Hickory Forest
	23	5	79	No	Cove Forest

Comp.	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
	24	21	92	No	Oak/Hickory Forest
	25	8	79	No	Oak/Hickory Forest
	26	17	74	No	White Pine Forest
	27	8	74	No	Oak/Hickory Forest
	28	13	74	No	White Pine Forest
88	1	29	96	No	White Pine Forest

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. The following areas would be designated as small patches for long term retention to meet the Forest Plan standard:

Table C-3: Small Old Growth Patches in the Upper Creek and Lower Wilson Creek Watersheds

Comp.[1]	Min. Acres	Stand No.	Est. Acres	CISC Age in 2005	Initial Inv.?	Community Type
89	63	23 (partial)	10	89	No	Pine/Oak Forest
		10 (partial)	53	99	No	Oak Forest
90	79	6	36	67	No	Oak Forest
		7 (partial)	36	32	No	Yellow Pine Forest
		13 (partial)	8	75	No	Yellow Pine Forest
93	50	4 (partial)	33	88	No	Oak/Hickory Forest
		9	17	90	No	Pine/Oak Forest
95	54	17	30	16	No	Pine/Oak Forest
		18	35	87	No	Oak Forest
		33 (partial)	8	69	No	Oak/Hickory Forest
107	50	7	54	81	No	Oak Forest
		15 (partial)	2	87	No	Oak Forest

1 Compartments 87, 92, and 94 already contain small patch old growth and do not need additional small patches to meet Forest Plan standards

Initial Inventory of Old Growth

None of the treatments are proposed in areas included in the initial inventory of old growth, so there would be no impacts to those acres.

Forest Plan Direction for Forest Interior Birds

The Forest Plan contains specific directions for providing preferred habitat conditions for forest interior breeding birds in selected areas (see Forest Plan, page III-32 and Appendix F). Forest Interior Breeding Bird Habitat #37 is adjacent to the Upper Creek project area in compartments 82-86 and 101. Approximately 2,500+ acres of continuous forest canopy is provided there, and would not be affected by this proposal.

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

Regeneration methods were discussed at length in Appendix E of the FEIS for the Forest Plan, and on pages E-1 and E-2 Forest Plan, Amendment 5. Choices include shelterwood cutting and clearcutting (even-aged management system), two-age (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 shade intolerant species as occur in the Upper Creek and Lower Wilson Creek AAs. Thinning and sanitation cutting may also occur, but they are intermediate treatments not meant to 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 sale area 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. In compliance with recent direction, 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 slopes are gentle enough to allow ground skidding of timber (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 appropriate in very small stands, on slopes greater than 40 percent where cable logging is required, 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 required 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 **two-age** regeneration method is similar to shelterwood except that overstory removal is deferred indefinitely or until another two-age cut can be done. This perpetuates at least two distinct ages of timber growing on the same site. 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 whenever there are enough leave trees that would live to be a part of the stand for 50-100 years into the future. Two-age could be appropriate to meet objectives other than timber production, e.g. if continuous acorn production is needed within a stand, or 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 where insect or disease hazards are high and widespread.

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	Est. Acres	Vol./ac (MBF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
87-22	29	8.0	Med-High	Spotty	No	Good	WL
89-01	30	9.0	High	Spotty	No	Good	WL
90-03	39	9.0	High	Spotty	No	Good	WL, Vis
90-05	17	9.0	High	Spotty	No	Good	WL
92-05A	21	8.0	Med-High	Spotty	No	Good	WL
92-05B	40	8.0	Med-High	Spotty	No	Good	WL, Vis
92-05C	27	8.0	Med-High	Spotty	No	Good	WL, Vis
93-02	12	8.0	Med-High	Spotty	No	Good	WL
94-01	16	7.0	Med	Spotty	No	Good	WL
94-02	15	8.0	Med-High	Spotty	No	Good	WL
95-01	4	7.0	Med	Spotty	No	Good	WL
95-08	15	8.0	Med-High	Spotty	No	Good	WL, Vis
95-27	9	8.0	Med-High	Spotty	No	Good	WL
95-36	36	8.0	Med-High	Spotty	No	Good	WL
95-37	4	8.0	Med-High	Spotty	No	Good	WL
95-40	18	7.0	Med	Spotty	No	Good	WL, Vis
107-02	40	5.0	Low	No	No	Good	WL, I/D
107-11	13	8.0	Med-High	Spotty	No	Good	WL

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:	Yes	= Well distributed, long-lived, meet objectives;
	Spotty	= Available in clumps; not well distributed;
	No	= 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; (Conv)
	Wildlife	= Modify to provide needs for wildlife; (WL)
	Visual	= Modify to mitigate aesthetic concerns; (Vis)
	Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline. (I/D)

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

					Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C	Alt. B	Alt. C
Compt.-Stand	Acres	Forest Type	Age	Method Of Logging	Selection (groups <1 ac)		Shelter-wood BA[1] 30-50		Two-Age BA 20-30		Clearcut w/ Reserve Trees[2]	
87-22	29	Up. Hwd-WP	84	Skidder					Yes	Yes	Yes	Yes
89-01	30	Up. Hwd-WP	89	Skidder					Yes	Yes	Yes	Yes
90-03	39	Up. Hwd-WP	92	Skidder					Yes	Yes	Yes	Yes
90-05	17	Up. Hwd-WP	86	Skidder					Yes	Yes	Yes	Yes
92-05a	21	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
92-05b	40	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
92-05c	27	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
93-02	12	Up. Hwd-WP	89	Skidder					Yes	Yes	Yes	Yes
94-01	16	Up. Hwd-WP	99	Skidder					Yes	Yes	Yes	Yes
94-02	15	Up. Hwd-WP	99	Skidder					Yes	Yes	Yes	Yes
95-01	4	Up. Hwd-WP	89	Cable					Yes	Yes	Yes	Yes
95-08	15	Up. Hwd-WP	74	Cable					Yes	Yes	Yes	Yes
95-27	9	Up. Hwd-WP	87	Skidder					Yes	Yes	Yes	Yes
95-36	36	Up. Hwd	94	Cable					Yes	Yes	Yes	Yes
95-37	4	Up. Hwd	94	Cable					Yes	Yes	Yes	Yes
95-40	18	Up. Hwd-WP	79	Cable					Yes	Yes	Yes	Yes
107-02	40	Up. Hwd-Pine	92	Skidder					Yes			Yes
107-11	13	Up. Hwd-WP	95	Skidder					Yes	Yes	Yes	Yes

1 – Basal Area (BA)
2 – While clearcut with reserve trees may be an appropriate regeneration for each stand, only Stand 107-02 under Alternative C is proposed for this type of regeneration

Stands 95-01, 95-08, 95-36, 95-37, and 95-40

Since slopes are steeper than 40 percent in these stands, cable logging systems are needed to limit soil exposure. Topography precludes the use of selection cutting. Timber volume is too low in these stands to allow leaving enough merchantable trees as "overwood" to make a future cable removal cut operable, so shelterwood is not appropriate. There is adequate timber value in the stands to cover the increased cost of leaving and logging around a few

leave trees per acre; therefore, two-age harvest would be appropriate. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method. The added expense of two-age system is warranted by wildlife habitat needs in these stands.

Stand 107-02

This stand contains a component of Virginia pine and/or yellow pine, which is nearing or has reached pathological maturity. Southern pine beetles have infested this and surrounding stands, and have killed many trees (Chief's clearcutting circumstance #4). There are not enough available leave trees for a two-age or a shelterwood cut. Low timber quality and value would cause selection to be inoperable. Establishment of pine regeneration would require control of shade and competition, as Virginia pine and yellow pines are shade intolerant (Chief's circumstance #5). If shortleaf pine is the desired species, prescribed burning prior to planting would be needed (weather conditions permitting). Planting on a 12-foot by 12-foot spacing would be wide enough to allow concurrent development of oaks and other desirable hardwoods. Therefore, clearcut is the optimum and appropriate method of harvest for this stand. Hardwood inclusions, such as moist coves, would not be planted, but would be managed for hardwood regeneration. After 3 to 4 growing seasons, streamline release using herbicides would be used if needed to maintain adequate stocking of oak, pine and other desirable tree species.

All Remaining Stands

Remaining stands are located on relatively gentle slopes and all have good accessibility. However, available leave trees are not well distributed and/or stand sizes are relatively small. The small size and medium timber volume would make a future removal cut inoperable; therefore, shelterwood is not appropriate. The two-age method would be appropriate if small diameter trees are included as leave trees, and if good distribution of leave trees is not critical. In addition, many of these stands contain a significant component of mature scarlet oaks and leaving these trees in a shelterwood or thinning would result in heavy mortality losses due to wind throw, insect infestations, or disease. The added expense of the two-age system is warranted by wildlife habitat needs or aesthetic concerns in these stands.

There are pockets of other tree species, which have the capacity to increase in size and value. Where white pines are left in any partial cut, thick establishment of white pine natural regeneration would occur in openings. Most of the stands contain an overstory white pine component and this would result in a reduction of the hardwood component, which would affect mast production in the long run. Therefore, a two-age cut leaving mostly hardwoods would meet wildlife objectives better than thinning or shelterwood. Clearcutting would be appropriate for providing regeneration, but since the same objectives can be met with two-age, clearcutting is not the optimum method.

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

Removal, in a single cutting, of older trees to establish a new stand of trees in a fully exposed microclimate. All merchantable trees on an area are harvested, and remaining trees are cut or killed in site preparation. This method would be used only when no other method is feasible.

Shelterwood Cutting

Similar to clearcutting, except some overstory trees are temporarily left well distributed across an area to accomplish some objective. Usually 20-40 sq ft/acre of basal area is left. Depending on diameter, this could be between 10 and 50 trees per acre (fewer large trees are required to reach a given basal area). Normally, only healthy, windfirm trees are left as overwood. After a time, usually within 10 years, the overwood is removed by logging or by other means so that it does not impede development of the younger trees that were established after the shelterwood cut.

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 to Establish Regeneration and Maintain at Least 3 Ages in an Area

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.

Cutting to Anticipate Mortality and Improve the Growth and Vigor of the Remaining Trees without Regard for the Establishment of Regeneration

Free Thinning

Cutting trees that are diseased or damaged, suppressed by other trees, or that are crowding other trees. 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 timber stand improvement.

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 timber stand improvement.

Selection Thinning

Cutting the larger trees in an area 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 a financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the EA for the proposed timber sale and associated activities. Forest Service policy requires a financial efficiency analysis be prepared for timber sale proposals expected to exceed $100,000 in value (Forest Service Manual 2432.12).

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 calculated using the base prices from the Pisgah and Nantahala National Forests 1st Quarter Adjustment Sheet for Fiscal Year 2005 issued out of 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 2005 National Forests in North Carolina. Sale/contract preparation costs are approximately $9.60/CCF and timber harvest administration costs are approximately $4,000 per year of Sale (generally sale runs 3 years).
5. Reforestation and silvicultural treatment costs were taken from averages of actual contract costs on the Grandfather Ranger District plus an additional 25% to cover district preparation and administration costs.
6. Road construction is now estimated at $90,000/mile and road reconstruction was estimated at $30,000/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	3,112	$164,275
C	3,185	$164,675

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	600	$10.00	$6,000
Sale/Contract Preparation	CCF	3,112	$9.60	$29,875
Sale Administration	Year	3	$4,000	$12,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Reconstruction	Miles	0.25	$60,000	$15,000
Cable Yarding	MBF	615	$35	$21,525

Activity	Units	Number	Cost/Unit	Total Costs
Site Preparation – Herbicide	Acres	385	$75	$28,875
TOTAL				**$113,275**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$164,275	$113,275	$51,000	1.45
60	0.04	$6,571	$4,531	$2,040	1.45

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Silvicultural Exams	Acres	600	$10.00	$6,000
Sale/Contract Preparation	CCF	3,185	$9.60	$30,575
Sale Administration	Year	3	$4,000	$12,000
Road Engineering and Construction	Miles	0	$90,000	$0
Temp. Road Engineering and Reconstruction	Miles	0.25	$60,000	$15,000
Cable Yarding	MBF	615	$35	$21,525
Site Preparation – Herbicide	Acres	385	$75	$28,875
Prescribed Burning	Acres	25	$175	$4,375
Seedling Planting Stock	Thousand	16	$50	$800
Hand Plant Conifers	Acres	40	$75	$3,000
TOTAL				**$122,150**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$164,675	$122,150	$42,525	1.35
60	0.04	$6,587	$4,886	$1,701	1.35

Salability of Upper Creek Timber Sale

Salability is determined by accessibly of timber and current markets for timber. Upper Creek project area is mainly accessible from Forest Service Roads 982, 4101, and 299. Some temporary road construction is necessary to access some units; however road construction costs are estimated to be $15,000, well below the value of the timber to be removed, which is estimated to be as high as $164,675. The overall timber quality is medium-high within the proposed sale units. Market for this quality timber is good within western North Carolina. Recent timber sales sold on the Pisgah National Forest show revenues have been higher than estimated, there are no problems anticipated in selling the Upper Creek project timber sale units when offered.

APPENDIX F – PROJECT DESIGN FEATURES FOR PRESCRIBED FIRE & HERBICIDE USE

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

Prescribed Fire Project Design Features

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

Herbicide Application Project Design Features

1. Herbicides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only herbicide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on National Forest System lands are applied.

3. Public safety during such uses as viewing, hiking, berry picking, and fuelwood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after herbicide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted herbicide projects, is a certified pesticide applicator. Contract inspectors are trained in herbicide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the herbicide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. 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 herbicide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them
11. Application equipment, empty herbicide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
12. No herbicide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
13. During transport, herbicides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
14. Only the amount of herbicide needed for the day's use is brought to the site. At day's end, all leftover herbicide is returned to storage.
15. Herbicide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas
16. During use equipment to store, transport, mix, or apply herbicides is inspected daily for leaks.

UPPER CREEK PROJECT MAPS