



United States
Department of
Agriculture

Forest
Service

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

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File Code: 1950-1

Date: July 17, 2007

Dear Interested Public:

My staff has assembled an Environmental Assessment (EA) evaluating the Fatback Project on the Nantahala Ranger District, Nantahala National Forest. The project is located in Macon County. Three project alternatives have been developed and analyzed.

The Fatback EA, including project maps, has been placed on the National Forests in NC (NFsNC) website at <http://www.cs.unca.edu/nfsnc> in order to save mailing costs. If you would like a CD containing the document mailed to you, please call Joan Brown at the Nantahala RD office at 828-524-6441 x 426 to request it. I encourage your participation during this 30-day notice and comment period. Following the comment period, I will be publishing 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 I 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 Franklin Press*. 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-nantahala-wayah@fs.fed.us; or by regular mail to: Nantahala Ranger District, Attn: District Ranger, 90 Sloan Road, Franklin, NC 28734, or faxed to 828-369-6592.

Please contact Joan Brown, Interdisciplinary Team Leader at 828-524-6441 x 426 if you have questions concerning this proposal. Thank you for your continued interest in management of the National Forests in North Carolina.

Sincerely,

/s/Michael L. Wilkins
Michael L. Wilkins
District Ranger



**FATBACK PROJECT
NANTAHALA RANGER DISTRICT
JULY 2007**

Proposed Action: **Management activities in 5 Nantahala Ranger District compartments to provide for ecosystem restoration and Nantahala/Pisgah National Forest desired future conditions. Two-aged regeneration of 7 hardwood stands** totaling approximately 159 acres by commercial timber sale, followed by site preparation, natural regeneration, and new stand improvement after the first growing season; **thinning of 10 hardwood stands** totaling approximately 264 acres by commercial timber sale; **existing wildlife opening refurbishing** on all existing openings and creating a brushy buffer around them on approximately 26 acres; **maintenance of existing linear wildlife openings; preharvest vine control** with herbicides in six stands on approximately 112 acres; **vine control** with herbicides in previous harvest entry groups on approximately 103 acres; **oak preharvest midstory treatment** on approximately 160 acres; **timber stand improvement by crop tree release** in two stands on approximately 49 acres; **creation of new wildlife habitat** using various treatment methods; **0 miles of new road construction and 0 miles of road reconstruction**; several miles of **roadside thinning**; **invasive species elimination on existing roadsides**; and **supplemental planting of American Chestnut seedlings** as available in selected two-aged harvest units

Location of Action: Compartments 102, 110, 111, 121, 124
Nantahala Ranger District
Macon County, NC

Type of Statement: **Environmental Assessment**

Lead Agency: USDA Forest Service

Responsible Official: Mike Wilkins

Contact Person: U.S. Forest Service, Nantahala National Forest, Nantahala Ranger District , ATTN: Joan Brown
90 Sloan Road
Franklin, NC 28734

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1. PURPOSE OF AND NEED FOR ACTION

1.1. Introduction

1.1.1. OVERALL DESCRIPTION OF PROJECT

The proposed activities occur southwest of the town of Franklin in Macon County, North Carolina. Forest management activities are proposed in Compartments 102, 110, 111, 121, and 124. These lands are in the watersheds of Poplar Cove Creek, Rocky Cove, Lowery Creek, Allison Creek, Lee Creek, and Jones Creek. Forest types are predominantly upland and cove hardwoods, with some northern hardwoods, mixed hardwood-yellow pine stands, and mixed white pine-upland hardwood stands.

The compartments occur within Management Areas (MAs) 3B, 4A, 4C, 4D, and 13. Embedded within these MAs is MA 18 (riparian areas around perennial water bodies). Management areas 3B, 4A, and 4D are suitable for timber management. MAs 13, 14, and 4C are not suitable for timber management.

Access is provided by several U.S., state, and Forest Service (FS) roads. The FS roads are generally closed to public vehicular use. The Appalachian National Scenic Trail is located along or near the ridgeline at the top of Compartments 111 and 121 and the southern tip of Compartment 124.

1.1.2. DESCRIPTION OF THE PROPOSAL

The **proposed action** includes tree harvesting using conventional ground-based and skyline yarding systems, preharvest vine control, site preparation, natural regeneration, new stand improvement after the first growing season, crop tree release (timber stand improvement) treatments, roadside thinning, invasive species control, existing wildlife opening refurbishing, creation of new wildlife habitat, and understory planting of hybrid American chestnut trees in the proposed regeneration areas as available.

Specifics are as follows:

A. Treatments for the purposes of tree, stand, and plant habitat improvement, and for forest regeneration, sustainability, and provision of early successional habitat:

Regenerate a total of approximately 159 acres by commercial timber harvest using the two-aged regeneration method (Table 1.1.2.1). These stands are all upland or cove hardwood mature sawtimber stands, aged 70 years or greater. Regenerate by the two-aged method, leaving an average of approximately 15-20 square feet of residual basal area per acre. Select available den trees and vigorous growers from the codominant crown class as leave trees, favoring mast producers where available. Harvest stands 110-36 (about 16 acres), 111-20 (about 19 acres), 121-30 (about 25 acres), and 124-45 (about 37 acres) by conventional ground skidding logging systems. Harvest stands 111-30 (about 15 acres), 124-21 (about 31 acres), and 124-42 (about 16 acres) by skyline (cable) logging systems. Waterbar and seed skid trails, landings, and roads with an appropriate seed mixture following completion of logging activities. After harvesting, conduct site preparation for natural regeneration by chainsaw felling of residual nonmerchantable woody vegetation. Maintain the landings and roads as wildlife openings.

Thin a total of approximately 264 acres by commercial timber harvest in stands 111-19, 111-33, 111-36, 111-41, 121-21, 121-26, 121-27, 124-13, 124-43, and 124-44 (Table 1.1.2.1). Thin them to approximately 80 square feet of residual basal area per acre. Trees of all sizes are prioritized for removal in order to leave high-quality growing stock. Use conventional ground-based skidders to log all these stands.

Table 1.1.2.1

**Fatback Project Proposed Harvest
Treatments – Alternative B
(Preferred)**

**2-age
ground**

Comp-St.	Acres
110-36	16
111-20	19
121-30	25
124-45	<u>37</u>
	97

2-age cable

111-30	15
124-21	31
124-42	<u>16</u>
	62

Thin

111-19	10
111-33	16
111-36	6
111-41	56
121-21	52
121-26	13
121-27	<u>32</u>
124-13	<u>70</u>
124-43	5
124-44	<u>4</u>
	264

At least two growing seasons prior to harvesting stands 110-36, 111-20, 111-30, 121-30, 124-21, and 124-42, **cut individual grape and smoke vines** in these stands (about 114 acres), then spray the cut surfaces with triclopyr amine herbicide mixed 50/50 in water, or treat them with triclopyr ester/mineral oil in a backpack streamline spray. The vine control work is needed in order to prevent prolific growth from existing vines immediately after units are harvested. The objective is to reduce grapevine and smokevine competition to newly-regenerating trees, not to eliminate vines from the stands. In each stand, existing grape arbors will be left, up to ½ acre per 10 acres.

Conduct grape and smoke vine control in the groups harvested in the last entry by group selection with the same methodology described in this paragraph using triclopyr amine herbicide. Do this work in all existing groups in Compartments 110, 111, 121, and 124 (approximately 103 acres), and conduct manual release of planted black cherry and/or oak seedlings in the groups as needed.

After the first growing season, conduct timber stand improvement in all the newly-regenerated stands (about 159 acres) by controlling undesirable reproduction on stump sprouts (**stump sprout clumps only -no single stems**) of red maple, striped maple, silverbell, sourwood, dogwood, yellow

poplar, and blackgum) and individual grape and smoke vines as needed. Accomplish this work by backpack streamline spray application of triclopyr ester herbicide/mineral oil.

Conduct an oak preharvest midstory treatment on approximately 160 acres in stands 102-2 (20 acres), 110-25 (25 acres), 111-23 (30 acres), 121-6 (70 acres), and 124-7 (15 acres). Treatment would consist of: 1) injecting trees with a diameter at breast height (DBH) greater than or equal to 1.5 inches and less than or equal to 10 inches DBH with a 50% solution of triclopyr 3A and water; and 2) streamline treating woody stems taller than 4 feet with a DBH of less than 1.5 inches with triclopyr 4E. All stems except oaks, ash, black cherry, and hickory would be treated. The purpose of this treatment is to improve species composition of the existing stands while encouraging the growth of advanced oak reproduction and regeneration of other desirable species in the stands.

Conduct a crop tree release treatment (timber stand improvement) on about 49 acres in stands 124-11 (about 17 acres) and stand 124-14 (about 32 acres). These stands are high-value sapling stands of cove and upland hardwoods aged 14 years. Treatment would consist of chainsaw slashing of vegetation competing with selected crop trees. In addition, competing grape and smoke vines would be slashed and treated with a 20% triclopyr ester solution mixed in mineral oil.

As seedlings become available, conduct enrichment plantings with chestnut blight-resistant American chestnut seedlings in suitable areas of the proposed 2-aged regeneration stands. Prior to planting, conduct pre-harvest site preparation in the selected locations using an appropriate herbicide (triclopyr or glyphosate). After planting, conduct herbicide release at the planted locations as needed in each of several followup years. The planted sites would be evaluated by Wayah district personnel and American Chestnut Foundation members for chestnut blight resistance and seedling competitive performance.

B. Treatments for the purpose of wildlife habitat creation and/or improvement:

Conduct wildlife opening work on all existing openings. Work would consist of reseeding all existing (13) openings (totaling about 13 acres) with an appropriate wildlife seed mixture after discing or treating them with imazapic herbicide using a tractor sprayer. This is for the purpose of establishing grasses and forbs that are more beneficial to project area wildlife species than the existing cover.

Conduct existing wildlife opening manual slashing. Manually slash down and harvest all trees and vegetation in 100-foot-wide strips around all 13 existing wildlife openings in the project area for the purpose of creating new habitat for the golden-winged warbler, a North Carolina Watch List species. Leave one or two wooded strips approximately 30-50 feet wide as wildlife corridors into each opening. This treatment would create approximately 26 additional acres of early successional habitat in the project area.

Use herbicide (triclopyr ester) in a backpack spray application to kill young saplings in the skid roads/trails of proposed two-aged regeneration units (4 units on approximately 97 acres). Conduct this treatment after the proposed units are harvested and the new stands are about 4-8 years of age. This treatment would be for the purpose of maintaining some grass/forb habitat in these new stands for an extended period of 5-10 years.

Create 15 circular depressions approximately 50 feet in diameter to serve as vernal pools, which are used by bats and the spotted salamander, a project management indicator species (MIS). Some of these would be on log landings, and some in wildlife openings or on roadsides.

C. Treatments to improve existing forest roads in conjunction with the proposed treatments in sections A and B above:

Selectively thin vegetation on the roadsides on the existing FS roads in these compartments for 30 feet back from the roadbanks (FS Road #s 388, 389, 7281, 7281A-D, 415, and 415A-H). This would include removing smaller-diameter, poor-quality trees and also mature and/or damaged large trees, leaving a residual basal area of approximately 70-80 square feet per acre. The purpose of this thinning is to increase available sunlight to the roads, thus allowing them to remain drier, and to remove existing trees which are currently growing in the roads or roadbanks.

D. Treatments proposed for the control of invasive exotic species:

Remove invasive species (individual plants) such as multiflora rose, kudzu, and/or honeysuckle from existing compartment roads and/or roadsides as they occur. In addition, treat the invasive exotic species in the 7 stands to be regenerated (about 159 acres) with this treatment post-harvest (this would entail treating scattered individual plants at the same time the undesirable stump sprouts are treated) (Refer to Section A above). Use triclopyr or glyphosate in a backpack sprayer (ground application) to accomplish this work

In and around the edges of all existing wildlife openings, invasive exotic species not eliminated by the tractor spraying would be handsprayed with triclopyr (amine or ester formulation), using one or more applications as needed.

Design criteria for all proposed treatments: Follow Forest-wide and Management Areas 3B, 4A, 4C, and 4D, 13, and 14 general direction and standards as described on pages III-71 through III-76, pages III-77 through III-88, pages III-144-147, and pages III-148-165 of LRMP Amendment 5. In particular, **the following measures will be employed as part of this proposed action:**

Visual Resource Management: Proposed actions would meet the Partial Retention Visual Quality Objective (VQO) (LRMP Amendment 5 pages III-79-83) in the MA 4 parts of the project area. For the MA 3B portion, activities would meet the Modification VQO (LRMP Amend. 5, page III-72) in the general area and the Partial Retention VQO on sites visible from the Appalachian Trail.

Wildlife Management: The proposal would follow standards in LRMP Amendment 10 (USDA Forest Service, 2000) to minimize the risk of incidental take and conserve habitat for the Indiana Bat. It would comply with the terms and conditions listed in the U.S. Fish and Wildlife Service's Biological Opinion (B.O., April 2000). Retain as many snags and den trees as practicable. Designate and retain living residual trees in the vicinity of one third of all large (>12 inches dbh) snags with exfoliating bark to provide them with partial shade and some protection from windthrow. Limit openings in the upper canopy to single tree gaps within 30 feet each side of intermittent streams, with at least 75 feet distance between openings. Leave up to ten well-formed dogwood, serviceberry, and other soft-mast producers per acre during site preparation. To protect occupied habitat of one forest concern snail species, *Paravitrea umbilicaris* two acres in each of three stands (124/21, 110/36, and 124/45) will be thinned rather than regenerated. Retaining additional canopy cover in the vicinity of the collection sites will minimize potential adverse effects.

Soil and Water Management: Use brush barriers, silt fence, or hay bales to prevent visible sediment from entering streamcourses as needed. Revegetate all exposed cut and fill slopes within 30 days of initial disturbance. Revegetate and/or mulch disturbed soil at stream crossings the same day. Restrict operations to periods of dry weather. Comply with the LRMP standards and guidelines for road

construction/reconstruction, and the forest practices guidelines and standards in the North Carolina Forest Practices Guidelines Related to Water Quality (BMPs).

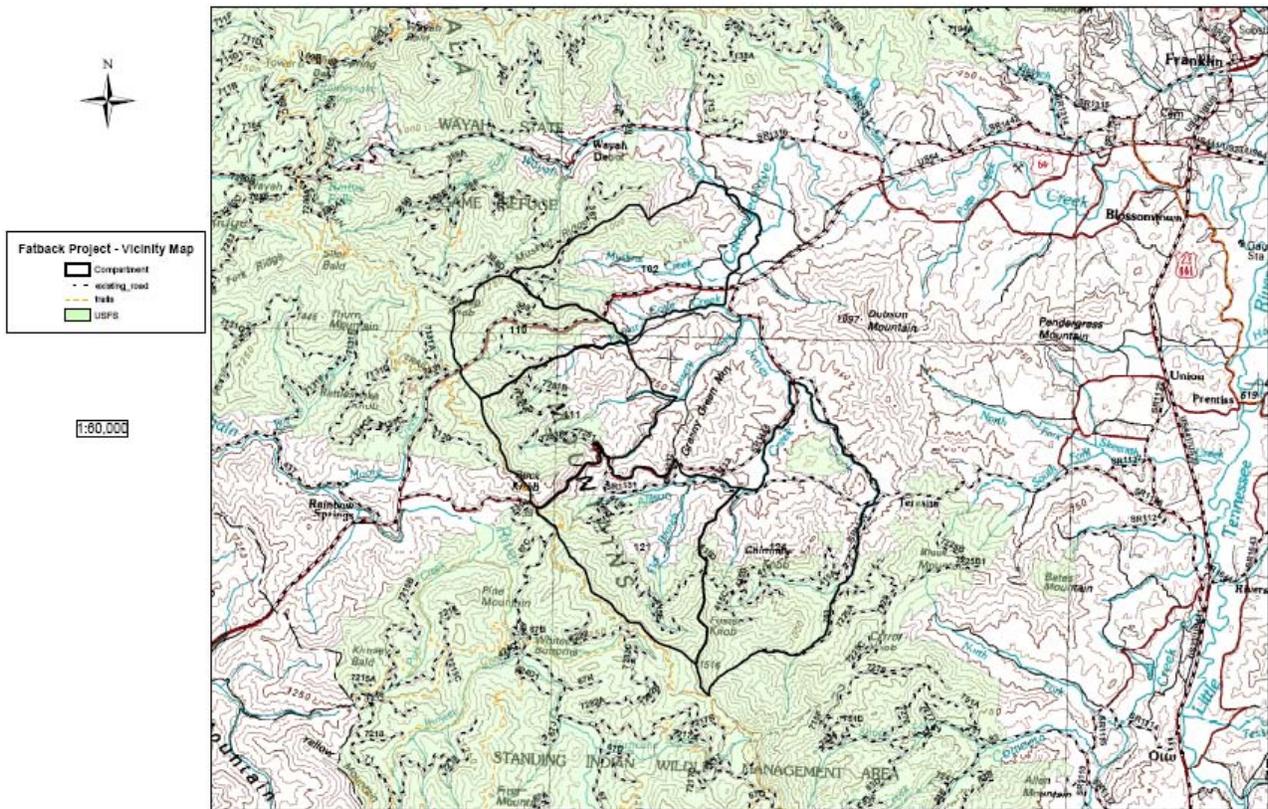
Herbicide Use: Apply herbicides according to labeling and site-specific analysis; all formulations and additives must be registered with EPA and approved for Forest Service use. Use application rates at or below those listed as typical rates in the Record of Decision for the Final Environmental Assessment on Vegetation Management in the Appalachian Mountains (ROD, FEIS-Veg. Mgmt.); use selective rather than broadcast applications. Forest Service supervisors and contract representatives must be certified pesticide applicators. Sign treated areas in accordance with FSH 7109.11.

Apply no herbicides within 100 feet of public or domestic water sources; those not having an aquatic label will not be applied within 30 feet of perennial or intermittent streams. Mix herbicides at the District work center and dispense into application equipment on National Forest land at least 100 feet from surface water.

Botanical habitat management: For conserving the habitat and stems of the uncommon yellowwood (*Cladrastis kentukea*) found in Compartments 121 and 124, timber markers will leave all yellowwoods as leave trees, according to a recommendation by the Nantahala NF botanist. In addition, all yellowwoods will be left uncut by site prep contractors after stand harvesting. In stand 124-21, ensure that the forest sensitive plant *Juglans cinerea* is avoided, as well as all occurrences of *Juglans nigra* in proposed activity units. In addition, the population of the Forest Concern species *Platanthera flava* var. *herbiola* in the Fatback analysis area will be avoided, and a 30-foot buffer zone will be placed around the population.

In addition to the above measures, apply all standards and guidelines for the appropriate MAs, as found in the LRMP, as amended. Also, apply all 99 mitigating measures found in the ROD, FEIS-Veg. Mgmt., and incorporated in the LRMP by Amendment #2 in July 1989, as needed.

1.1.3. VICINITY MAP



1.2. Project Objectives

1.2.1. PROJECT OBJECTIVES

The purpose of this project is to implement the direction set forth in the Land and Resource Management Plan (LRMP) 1986-2000 for the Nantahala/Pisgah National Forests (USDA March 1987) as amended (USDA March 1994), in a manner which moves compartment resources toward desired future conditions.

The compartments are divided into several different Management Areas (MAs). These include MAs 3B (approximately 3,833 acres), 4A (approximately 34 acres), 4C (approximately 73 acres), 4D (approximately 1,213 acres), 13 (approximately 34 acres), and 18 (interspersed among the other MAs). According to the LRMP, the desired conditions for these MAs are as follows:

MA 3B: A regulated forest which provides for a sustainable supply of timber and for the habitat needs of wildlife species, particularly wild turkeys, which benefit from a managed forest with limited motorized access (closed roads);

MA 4A: A scenic forest with limited motorized access (roads closed to vehicular use); emphasis is on wildlife species which prefer older forest conditions and limited human disturbance; timber harvest units are widely dispersed to provide a wide variety of tree ages and wildlife habitat.

MA 4C: A scenic forest with limited motorized access (roads closed to vehicular use); emphasis is on wildlife species which prefer older forest conditions and limited human disturbance; the land is unsuitable for timber production.

MA 4D: A scenic forest with limited motorized access (roads closed to vehicular use); emphasizes wildlife species which prefer older forest conditions, with small widely-dispersed openings throughout the MA. Early successional habitat is provided in conjunction with managing suitable timberland in this MA.

MA 13: Special interest areas that are managed to protect, and where appropriate, foster public use and enjoyment of unique scenic, geological, botanical, or zoological attributes. This land is not classified as suitable for timber management during the current LRMP planning period.

MA 18: primarily undisturbed riparian areas (adjacent to streams) with conditions strongly influenced by the accumulation of woody materials from mature trees, but with a diverse assemblage of species and stand structures.

This project is proposed in order to conduct needed forest silvicultural stand treatments in order to insure forest sustainability, to improve the quality of existing stands, to emphasize high-quality hardwood sawtimber production, and for forest restoration. This purpose is consistent with General Direction for MA 3B provided in the LRMP (LRMP, pg.III-75).

Another purpose of the project concerns habitat diversity. Nantahala/Pisgah NFs Forest-wide Direction in the LRMP concerning vegetation management states, "Assure a regular and sustained flow of habitats across the Forests through space and time for diversity and viability of plant and animal populations" (LRMP, pg. III-29). In addition, for botanical, wildlife, and fish resource management, "Use vegetative management practices, including commercial and noncommercial timber harvest, to accomplish fish and wildlife habitat objectives" (LRMP pg. III-24). The Fatback project is needed in order to continue this regular and sustained flow of habitats across the Forests. The project includes several wildlife habitat management activities. These activities are intended to either maintain/improve existing wildlife habitat or to create new habitat for a variety of game and nongame species.

Another management tool employed to achieve this flow of habitats is to disperse early successional habitat (forest stands aged 0-10 years) across the landscape (LRMP, page III-31). The desired condition is to maintain early successional habitat on at least 5%, not exceeding 15% of the landscape in Management Area 3B; maintain a maximum of 10% in MAs 2 and 4, on both a compartment and analysis area basis (LRMP Amendment 5, page III-31). Currently, there are 5 acres of early successional habitat (stands in the 0-10 year age class) in the project area.

Specific project objectives are:

- 1) Provide for a range of early successional habitat (from 192 acres to 700 acres) through timber regeneration harvesting and wildlife brushy openings, while producing a minimum of 1 million board feet (MMBF) of sawtimber for the local economy;
- 2) Maintain and/or enhance biological diversity by protecting population viability of rare species which occur in the compartments, by reproducing existing forest species, especially oaks for hard mast production, and yellow pines to perpetuate mixed hardwood-pine communities;

- 3) Create new grass/forb openings and create/enhance additional wildlife habitat where practical;
- 4) Improve habitat for the golden winged warbler where possible.

1.2.2. DECISION TO BE MADE

The decision to be made is whether or not to proceed with the proposed action. This decision will be based on resource objectives as articulated in the LRMP, and the project issues and environmental effects as analyzed in this EA.

1.3. Scoping

Scoping is defined by the National Environmental Policy Act (NEPA) as “an early and open process for determining the scope of issues to be addressed, and for identifying the issues related to a proposed action.” This project was scoped beginning in January of 2007. A project Scoping Record with maps and a proposed activity list was posted on the National Forests in NC internet website on January 19 in order for individuals and groups to comment on the project proposal. Responses to the Scoping Record included letters from Dan Pittillo, Michael P. Schafale - NC Natural Heritage Program, Renee Gledhill-Earley – NC Dept. of Cultural Resources, Ben Prater – Southern Appalachian Biodiversity Project (SABP), Randy Denman, Hugh Irwin – Southern Appalachian Forest Coalition, Chrys Baggett – NC Dept. of Administration/NC DENR, Josh Kelly, Bob Gale – Western North Carolina Alliance (WNCA), and Dave McHenry – NC Wildlife Resources Commission (NCWRC). In addition, the project has been listed in the NFsNC Schedule of Proposed Actions since October 2, 2006, which is distributed to several hundred individuals and groups throughout the United States.

1.4. Issues to be Addressed in the Analysis

Concerns/issues raised during public scoping revolved primarily around public desires for our properly caring for the existing resources, such as rare (Proposed, Endangered, Threatened or Sensitive species) and management indicator species (MIS), aquatic species, soil resources, old growth, water/riparian habitat, and scenery resources. Other issues raised were: 1) the need for invasive species management, and 2) a request that we address the lack of natural tree species diversity occurring in the analysis area after extensive logging was conducted in the early 1900s. These issues and others are addressed in the following analysis.

1.5. Issues Not Addressed in the Analysis

Issues which are not addressed in this analysis include “the adverse economic effects of commercial logging and the damage and loss of ecosystem service values associated with standing or otherwise intact forest ecosystems “ and the “opportunity costs of the logging program” (Forest Guardians, November 1998) because they are beyond the scope of this project.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

Based on the issues identified during scoping, three alternatives are identified for analysis. These are a no-action alternative and two action alternatives.

2.2. Alternatives Considered

2.2.1. ALTERNATIVE A

Alternative A is to take no action.

2.2.2. ALTERNATIVE B

Alternative B is the proposed action as described in section **1.1.2. DESCRIPTION OF THE PROPOSAL**.

2.2.3. ALTERNATIVE C

This alternative was designed to address the issue of two-aged timber management versus uneven-aged management by group selection.

Alternative C includes tree harvesting using conventional ground-based and skyline yarding systems, site preparation, natural regeneration, preharvest vine control, new stand improvement after the first growing season, crop tree release (timber stand improvement) treatments, roadside thinning, rare plant species habitat restoration, understory planting of hybrid American chestnut trees in the proposed regeneration areas, and invasive species control. Specifics are as follows:

A. Silvicultural treatments for the purposes of tree and stand improvement, and for forest regeneration, sustainability, and provision of early successional habitat:

Regenerate a total of approximately 118 acres by commercial timber harvest using the two-aged regeneration method (Table 1.1.2.2). These stands are all upland or cove hardwood mature sawtimber stands, aged 70 years or greater. Regenerate by the two-aged method, leaving an average of approximately 15-20 square feet of residual basal area per acre. Select available den trees and vigorous growers from the codominant crown class as leave trees, favoring mast producers where available. Harvest stands 111-20 (about 19 acres) and 124-45 (about 37 acres) by conventional ground skidding logging systems. Harvest stands 111-30 (about 15 acres), 124-21 (about 31 acres), and 124-42 (about 16 acres) by skyline (cable) logging systems. Waterbar and seed skid trails, landings, and roads with an appropriate seed mixture following completion of logging activities. After harvesting, conduct site preparation for natural regeneration by chainsaw felling of residual nonmerchantable woody vegetation. Maintain the landings and roads as wildlife openings.

Dedicate a total of 413 acres to uneven-aged management in three stands (stands 110-25 (92 acres), 111-11 (164 acres), and 121-6 (157 acres) and **regenerate the areas with small groups** (group selection) of approximately one acre each. Stand 110-25 would contain 11 groups (totaling 11 acres), stand 111-11 would have 19 groups (19 acres), and stand 121-6 would contain 18 groups (18 acres).

Thin a total of approximately 208 acres by commercial timber harvest in stands 111-19, 111-33, 111-36, 121-21, 121-26, 121-27, 124-13, 124-43, and 124-44 (Table 1.1.2.2). Thin them to approximately 80 square feet of residual basal area per acre. Trees of all sizes are prioritized for removal in order to leave high-quality growing stock. Use conventional ground-based skidders to log all these stands.

Table 1.1.2.2

Fatback Project Proposed Harvest

Treatments – Alternative C

Treatment Remarks

2-age

ground

Comp-St.	Acres
111-20	19
124-45	<u>37</u>
	56

2-age cable

111-30	15
124-21	31
124-42	<u>16</u>
	62

Group Selection

	92	
110-25	(gross)	11 group acres
	164	
111-11	(gross)	19 group acres
	157	
121-6	(gross)	18 group acres

Thin

111-19	10
111-33	16
111-36	6
121-21	52
121-26	13
121-27	<u>32</u>
124-13	<u>70</u>
124-43	5
124-44	<u>4</u>
	208

At least two growing seasons prior to harvesting stands 110-25, 111-11, 111-20, 111-30, 121-6, 124-21, and 124-42, **cut individual grape and smoke vines** in these stands (about 129 acres), then spray the cut surfaces with triclopyr amine herbicide mixed 50/50 in water, or treat them with triclopyr

ester/mineral oil in a backpack streamline spray. The vine control work is needed in order to prevent prolific growth from existing vines immediately after units are harvested. The objective is to reduce grapevine and smokevine competition to newly-regenerating trees, not to eliminate vines from the stands. In each stand, existing grape arbors will be left, up to ½ acre per 10 acres.

Conduct grape and smoke vine control in the groups harvested in the last entry by group selection with the same methodology described in this paragraph using triclopyr amine herbicide. Do this work in all existing groups in Compartments 110, 111, 121, and 124 (approximately 103 acres), and conduct manual release of planted black cherry and/or oak seedlings in the groups as needed.

After the first growing season, conduct timber stand improvement in all the newly-regenerated stands and groups (about 166 acres) by controlling undesirable reproduction on stump sprouts (**stump sprout clumps only -no single stems**) of red maple, striped maple, silverbell, sourwood, dogwood, yellow poplar, and blackgum) and individual grape and smoke vines as needed. Accomplish this work by backpack streamline spray application of triclopyr ester herbicide/mineral oil.

Conduct an oak preharvest midstory treatment on approximately 160 acres in stands 102-2 (20 acres), 110-25 (25 acres), 111-23 (30 acres), 121-6 (70 acres), and 124-7 (15 acres). Treatment would consist of: 1) injecting trees with a diameter at breast height (DBH) greater than or equal to 1.5 inches and less than or equal to 10 inches DBH with a 50% solution of triclopyr 3A and water; and 2) streamline treating woody stems taller than 4 feet with a DBH of less than 1.5 inches with triclopyr 4E. All stems except oaks, ash, black cherry, and hickory would be treated. The purpose of this treatment is to improve species composition of the existing stands while encouraging the growth of advanced oak reproduction and regeneration of other desirable species in the stands.

Conduct a crop tree release treatment (timber stand improvement) on about 49 acres in stands 124-11 (about 17 acres) and stand 124-14 (about 32 acres). These stands are high-value sapling stands of cove and upland hardwoods aged 14 years. Treatment would consist of chainsaw slashing of vegetation competing with selected crop trees. In addition, competing grape and smoke vines would be slashed and treated with a 20% triclopyr ester solution mixed in mineral oil.

As seedlings become available, conduct enrichment plantings with chestnut blight-resistant American chestnut seedlings in suitable areas of the proposed 2-aged regeneration stands. Prior to planting, conduct pre-harvest site preparation in the selected locations using an appropriate herbicide (triclopyr or glyphosate). After planting, conduct herbicide release at the planted locations as needed in each of several followup years. The planted sites would be evaluated by Wayah district personnel and American Chestnut Foundation members for chestnut blight resistance and seedling competitive performance.

B. Treatments for the purpose of wildlife habitat creation and/or improvement:

Conduct wildlife opening work on all existing openings. Work would consist of reseeding all existing (13) openings (totaling about 13 acres) with an appropriate wildlife seed mixture after discing or treating them with imazapic herbicide using a tractor sprayer. This is for the purpose of establishing grasses and forbs that are more beneficial to project area wildlife species than the existing cover.

Conduct existing wildlife opening manual slashing. Manually slash down and harvest all trees and vegetation in 100-foot-wide strips around all 13 existing wildlife openings in the project area for the purpose of creating new habitat for the golden-winged warbler, a North Carolina Watch List species. Leave one or two wooded strips approximately 30-50 feet wide as wildlife corridors into each opening.

This treatment would create approximately 26 additional acres of early successional habitat in the project area.

Use herbicide (triclopyr ester) in a backpack spray application to kill young saplings in the skid roads/trails of proposed regeneration units (2 units on approximately 56 acres). Conduct this treatment after the proposed units are harvested and the new stands are about 4-8 years of age. This treatment would be for the purpose of maintaining some grass/forb habitat in these new stands for an extended period of 5-10 years.

Create 15 circular depressions approximately 50 feet in diameter to serve as vernal pools, which are used by bats and the spotted salamander, a project management indicator species (MIS). Some of these would be on log landings, and some in wildlife openings or on roadsides.

C. Treatments to improve existing forest roads in conjunction with the proposed treatments in sections A and B above:

Selectively thin vegetation on the roadsides on the existing FS roads in these compartments for 30 feet back from the roadbanks (FS Road #s 388, 389, 7281, 7281A-D, 415, and 415A-H). This would include removing smaller-diameter, poor-quality trees and also mature and/or damaged large trees, leaving a residual basal area of approximately 70-80 square feet per acre. The purpose of this thinning is to increase available sunlight to the roads, thus allowing them to remain drier, and to remove existing trees which are currently growing in the roads or roadbanks.

D. Treatments proposed for the control of invasive exotic species:

Remove invasive species (individual plants) such as multiflora rose, kudzu, and/or honeysuckle from existing compartment roads and/or roadsides as they occur. In addition, treat the invasive exotic species in the 5 stands to be regenerated and the groups (about 166 acres) with this treatment post-harvest (this would entail treating scattered individual plants at the same time the undesirable stump sprouts are treated) (Refer to Section A above). Use triclopyr or glyphosate in a backpack sprayer (ground application) to accomplish this work

In and around the edges of all existing wildlife openings, invasive exotic species not eliminated by the tractor spraying would be handsprayed with triclopyr (amine or ester formulation), using one or more applications as needed.

Design criteria for all proposed treatments: Follow Forest-wide and Management Areas 3B, 4A, 4C, and 4D, 13, and 14 general direction and standards as described on pages III-71 through III-76, pages III-77 through III-88, pages III-144-147, and pages III-148-165 of LRMP Amendment 5. In particular, **the following measures will be employed as part of this proposed action:**

Visual Resource Management: Proposed actions would meet the Partial Retention Visual Quality Objective (VQO) (LRMP Amendment 5 pages III-79-83) in the MA 4 parts of the project area. For the MA 3B portion, activities would meet the Modification VQO (LRMP Amend. 5, page III-72) in the general area and the Partial Retention VQO on sites visible from the Appalachian Trail.

Wildlife Management: The proposal would follow standards in LRMP Amendment 10 (USDA Forest Service, 2000) to minimize the risk of incidental take and conserve habitat for the Indiana Bat. It would comply with the terms and conditions listed in the U.S. Fish and Wildlife Service's Biological Opinion (B.O., April 2000). Retain as many snags and den trees as practicable. Designate and retain living

residual trees in the vicinity of one third of all large (>12 inches dbh) snags with exfoliating bark to provide them with partial shade and some protection from windthrow. Limit openings in the upper canopy to single tree gaps within 30 feet each side of intermittent streams, with at least 75 feet distance between openings. Leave up to ten well-formed dogwood, serviceberry, and other soft-mast producers per acre during site preparation. To protect occupied habitat of one forest concern snail species, *Paravitrea umbilicaris* two acres in each of two stands (124/21 and 124/45) will be thinned rather than regenerated. In stand 110-25, no groups will be placed at the snail collection site. Retaining additional canopy cover in the vicinity of the collection sites will minimize potential adverse effects.

Soil and Water Management: Use brush barriers, silt fence, or hay bales to prevent visible sediment from entering streamcourses as needed. Revegetate all exposed cut and fill slopes within 30 days of initial disturbance. Revegetate and/or mulch disturbed soil at stream crossings the same day. Restrict operations to periods of dry weather. Comply with the LRMP standards and guidelines for road construction/reconstruction, and the forest practices guidelines and standards in the North Carolina Forest Practices Guidelines Related to Water Quality (BMPs).

Herbicide Use: Apply herbicides according to labeling and site-specific analysis; all formulations and additives must be registered with EPA and approved for Forest Service use. Use application rates at or below those listed as typical rates in the Record of Decision for the Final Environmental Assessment on Vegetation Management in the Appalachian Mountains (ROD, FEIS-Veg. Mgmt.); use selective rather than broadcast applications. Forest Service supervisors and contract representatives must be certified pesticide applicators. Sign treated areas in accordance with FSH 7109.11.

Apply no herbicides within 100 feet of public or domestic water sources; those not having an aquatic label will not be applied within 30 feet of perennial or intermittent streams. Mix herbicides at the District work center and dispense into application equipment on National Forest land at least 100 feet from surface water.

Botanical habitat management: For conserving the habitat and stems of the uncommon yellowwood (*Cladrastis kentukea*) found in Compartments 121 and 124, timber markers will leave all yellowwoods as leave trees. In addition, all yellowwoods will be left uncut by site prep contractors after stand harvesting. In stand 124-21, ensure that the forest sensitive plant *Juglans cinerea* is avoided, as well as all occurrences of *Juglans nigra* in proposed activity units. In addition, the population of the Forest Concern species *Platanthera flava* var. *herbiola* in the Fatback analysis area will be avoided, and a 30-foot buffer zone will be placed around the population.

In addition to the above measures, apply all standards and guidelines for the appropriate MAs, as found in the LRMP, as amended. Also, apply all 99 mitigating measures found in the ROD, FEIS-Veg. Mgmt., and incorporated in the LRMP by Amendment #2 in July 1989, as needed.

2.3. Alternatives Not Considered in Detail

An alternative was considered in which no herbicide would be used. Instead of using herbicide to conduct timber stand improvement (TSI), manual slashing would be used to accomplish the management objectives. However, the manual treatment was not considered in further detail because treatment with herbicide is known to be the most effective tool for these TSI treatments and only requires one application. Manual slashing, on the other hand, requires repeated treatments and does not kill the targeted vegetation. Also, an alternative without herbicide use would eliminate the treatment of nonnative invasive species. As with TSI work, manual treatment of these exotic species is simply not practical or cost-effective as a control measure. An alternative with manual TSI work and invasive

species control would not meet the purpose and need for the project. For these reasons, this alternative was not considered in further detail.

3. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1. Introduction

This section forms the scientific and analytic basis for comparison of alternatives. The environmental effects described here include both beneficial and detrimental effects. Environmental effects include appropriate ecological, aesthetic, historical, cultural, economic, social, and human health-related effects, which directly, indirectly, or cumulatively result from the proposed action. The environmental effects discussion will focus on the issues identified for this project (refer to “Issues to be Addressed in the Analysis”, section 1.4.). Environmental effects are analyzed using references from scientific literature and reports, which are incorporated as an integral part of this environmental assessment.

3.2. Selection of Biological Communities, Special Habitats, and MIS

Management Indicator Species (MIS) serve as the system to monitor Forest plan implementation and effects on diversity and population viability of all native and desirable non-native plants and animals. At the project scale, MIS are used to focus the effects of proposed activities on habitat types (Table 2.1). When these effects are evaluated within a forest wide context, it is determined whether or not any trends for MIS would change. An assessment of habitat changes linked to management indicator species (MIS) is documented in this section. The assessment provides an evaluation of project level activities, the change in habitat used by MIS, and the likely contribution to forest wide trends.

The amount of habitat changed by the project is checked for consistency with the Forest Plan and the recent trends in activities. If any inconsistencies are uncovered, then further investigation should be made to determine effects on MIS. However, if the project activities are consistent with recent trends, then effects of habitat changes to MIS should remain constant.

- 1) **Table 3.2.1** shows each species and the habitats they are indicating. Also, an estimate of their population trend is shown. More information about MIS habitats and population trends is contained in the unpublished report available at the Forest Supervisor’s Office, **Management Indicator Species Habitat and Population Trends**.
- 2) **Tables 3.2.2** and **3.2.3** reverse the previous table by showing the biological communities and special habitats examined in the Forest Plan (LRMP EIS, III-48 to III-52) and the associated MIS.

Table 3.2.1. MIS species, estimated population trend, and biological community or special habitat indicated by the species.

Species	Estimate			
Black Bear	Increase	Old Forest Communities	Hard mast-producing species	Contiguous areas with low disturbance
White Tailed Deer	Stable	Early-successional (0-10)	Hard mast- producing species	
Pileated Woodpecker	Increase	Old Forest Communities	Snags and dens (>22 dbh)	Downed woody debris – all sizes
Ovenbird	Decrease	Large Contiguous Forest Areas		
Rufous-Sided	Decrease	Early-successional (0-10)	Early successional (11-	

(Eastern) Towhee			20)	
Pine Warbler	Stable	Yellow pine mid-successional forests		
Ruffed Grouse	Stable	Early successional (0-10)	Early successional (11-20)	Downed woody debris
Acadian flycatcher	Increase	Riparian		
Brook, Brown and Rainbow Trout	Stable	Coldwater streams		
Largemouth Bass	Stable	Reservoirs		
Blacknose Dace	Stable	Coldwater streams		
Smallmouth Bass	Stable	Warmwater streams		
Fraser Fir	Decrease	Fraser Fir Forests		
Carolina Hemlock	Increase	Carolina hemlock bluff forests		
Ginseng	Decrease	Cove Forests		
Ramps	Stable	Northern hardwoods		

Table 3.2.2. Biological communities and associated MIS (using LRMP EIS, Table III-8).

Biological Community	MIS	Analyzed Further/ Evaluation Criteria*
Fir dominated high elevation forests	Fraser fir	No/1
Northern hardwood forests	Ramps	No/1
Carolina hemlock bluff forests	Carolina hemlock	No/1
Rich Cove forests	Ginseng	Yes
Xeric yellow pine forests	Pine warbler	No/1
Reservoirs	Largemouth bass	No/1
Riparian forests	Acadian flycatcher	No/2
Coldwater streams	Brook, brown, and rainbow trout; blacknose dace	Yes
Warmwater streams	Smallmouth bass	No/1

*1 Biological community does not occur in the activity areas and will not be affected by any of the alternatives. Given no effects to the community, the alternatives will not cause changes to forest-wide trends or changes in population trends of species associated with this community.

*2 Biological Community and its represented species will be protected in accordance with LRMP standards and guidelines (riparian areas will be mapped); therefore, this community will not be affected by any of the alternatives. Given no effects to the community, this project will not cause changes to forest-wide trends or changes in population trends of species associated with this community.

Table 3.2.3. Special Habitats and associated MIS (using LRMP EIS, Table III-9).

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Old Forest Communities (100+ years old)	Black bear	Yes
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	Yes
Early successional (11-20)	Ruffed grouse	Yes
Soft mast producing species	Ruffed grouse	Yes
Hard mast-producing species (>40 yrs)	Black bear	Yes
Large contiguous areas with low levels of human disturbance	Black bear	No/2
Large contiguous areas of mature deciduous forest	Ovenbird	No/1
Permanent grass/forb openings	White-tailed deer	Yes
Downed woody debris	Ruffed Grouse	Yes
Snags	Pileated woodpecker	No/2

*1 Special Habitat does not occur in the activity areas and will not be affected by any of the alternatives. Given no effects to the habitat, this project will not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

*2 Special Habitat and its represented species will be protected in accordance with LRMP standards and guidelines (open road density will not change, snags and den trees will be retained); therefore, this special habitat will not be affected by any of the alternatives. Given no effects to the habitat, this project will not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

3.3. Botanical MIS and Special Habitat Evaluation

Boundaries of Analysis area

Only botanical resources within, or adjacent to, the activity area were analyzed in detail. Botanical resources in these areas include rich cove forest (biological community) and ginseng (MIS; see also MIS Tables 3.2.1 through 3.2.3 above for selection criteria). No special habitat components were located in the activity area, and therefore will not be considered further. For cumulative effects, effects to botanical resources were compared to the total amount of the resources in the entry area compartments.

Rich Cove Forest - Community analysis has traditionally focused on attributes of forests above the species level, such as tropic structure, food webs and energy flow (e. g., Odum, 1971, Dodson, *et al.* 1998; effects to species in rich cove forests will be addressed during the analysis for management indicator species). Because impacts to community attributes are unlikely to extend beyond the harvest activities, analyses for direct and indirect effects will be confined to the activity area. Effects to community attributes can be expected to persist for approximately 40 years following regeneration harvest. This time period is consistent with the minimal time period necessary for understory herbs to recover to pre-treatment levels (Rankin and Tramer, 2002, Harrelson and Matlack, 2006; Table 3.3-1).

Ginseng - Ginseng grows in cove forests characterized by closed canopies and open understories. Two-age harvest alters this habitat directly by increasing light and decreasing humidity at the forest floor (USFS, 2001, pg. 822). These changes tend to eliminate the smaller, but not the larger, plants in the

activity area. The regenerating forest may also directly impact ginseng by creating a dense thicket of stump sprouts that may competitively exclude ginseng later in the successional development of the forest. These effects would be confined to the activity areas, would be partially offset by the herbicide treatment of undesirable stump sprouts, but would probably persist for 20 years (Table 3.3.1). After 20 years, the regenerating forest should be sufficiently open to alleviate impacts to the surviving ginseng plants.

In addition to the direct effects, reducing the number of flowering ginseng plants in the activity area may also indirectly affect the pollination dynamics of the species, a distance generally estimated at one mile for understory forest herbs (NatureServe, 2006). These indirect effects would also be expected to persist for approximately 20 years following harvest, the same time period as direct effects.

Table 3.3.1. Summary of boundaries for botanical analysis area for effects, trends and viability assessments, in time and space, for botanical resources in the Fatback Project.

Resource Category	Resource Undergoing Further Analysis	Boundaries for Analysis area		
		Direct and Indirect Effects		Trend Analysis
		Spatial	Temporal	
Communities	Rich Cove Forests	Activity area undergoing regeneration harvest	40 yr before/after regeneration harvest to restore open forest conditions	Forest Level
Habitat Component	None present in activity area	Not Applicable	Not Applicable	Not Applicable
Management Indicator Species	Ginseng	Activity area undergoing regeneration harvest for direct effects; one mile pollination radius for indirect effects	20 yr before/after regeneration harvest to escape effects of early-successional forest	Forest Level

Effects of Alternatives on Communities

(1) Rich Cove Forests

Direct and Indirect Effects - Both regeneration harvests and thinning treatments reduce the amount of canopy cover and basal area in cove forests by removing canopy trees. Regeneration harvests would diminish the community attributes associated with late-successional rich cove forest in the activity area for approximately 40 years, the time period necessary to re-establish the canopy and understory characteristics associated with later-successional cove forests. Thinning treatments would remove a few trees from the community, but would also retain a relatively unbroken canopy. Compared to regeneration harvests, thinning treatments would produce minimal direct and indirect effects to community attributes, and therefore will not be considered further.

Group selection scatters units throughout the harvest area at regular intervals over the timber cycle, producing a disproportionate amount of edge habitat, and, for the purposes of community analysis, effectively impacts the entire unit as a regeneration harvest. Because group selection re-enters the stand

every 15 – 20 years throughout the timber cycle, direct and indirect effects of timber management would persist indefinitely.

Both regeneration and group selection harvests would reduce the population sizes of understory species, such as ginseng, by initially increasing transpiration stress, and secondarily increasing canopy shade. Regeneration units (regenerating again to rich cove forest) would become areas of early successional habitat for wildlife species for 20 years.

Rich cove communities are the dominant forest types in all regeneration and group selection units except Stand 111-20. Rich cove forests affected by the Fatback Project total 420 acres under Alternative B, and 744 acres under Alternative C. Compared to Alternative B, Alternative C will directly impact 324 additional acres of rich cove forest.

Effects of Past, Ongoing and Foreseeable Actions - Due to harvest activities associated with the Poplar Cove, Ash Flats, and Flatwoods Timber and Wildlife Projects, large portions of the analysis area have undergone group selection in the past 15 years, encompassing 105 acres in Compartment 110, 180 acres in Compartment 111, 198 acres in Compartment 121, and an estimated 150 acres in Compartment 124, for a total of 633 acres. Portions of the analysis area have also undergone continuing road repairs associated with hurricane damage. Because these repairs have been largely confined to existing roads, this activity has produced negligent impacts to rich cove forests, and will not be considered further.

Except for the 150 acres in Compartment 124, all of the areas in the entry area previously affected by group selection have been proposed for group selection under Alternative C. Alternative B, however, proposes no group selection. As a result, the difference between acres affected by past and proposed effects varies by proposal (Table 3.3.2).

Table 3.3.2. Acres of past and proposed group selection activities in the Fatback botanical analysis area.

Compartment		Acres of Group Selection for Cumulative Effects			
Number	Acres previously affected by group selection	Alternative B		Alternative C	
		Acres proposed	Difference between past/ proposed acres	Acres proposed	Difference between past/ proposed acres
C-110	105	0	105	92	13
C-111	180	0	180	164	16
C-121	198	0	198	157	41
C-124	150	0	150	0	150
Total	633 acres	0 acres	633 acres	413 acres	220 acres

In addition to the direct and indirect effects of the Fatback Project, approximately 150 acres of private land near Foster Ridge has been harvested in the past 15 years. Reconstructing the area using the landform and leave trees, the harvest most likely impacted rich cove forest, and must be considered for cumulative effects. The activity areas contain no other ongoing or foreseeable USFS or private projects that would potentially impact cove forests.

Cumulative Effects - The cumulative effect of regeneration and group-selection management, primarily decreases in the canopy cover and basal area of overstory trees, and loss of biomass and diversity in understory plants, would total 913 acres of rich cove forest under Alternative B, and 880 acres of rich cove forest under Alternative C, or approximately 34 – 36% of the rich cove forests in the analysis area [all USFS lands in Compartments 102, 110, 111, 121 and 124, a total of 2548 acres; Table 3.3.3].

Table 3.3.3. Acres of rich cove forest cumulatively impacted by the Fatback project.

Treatment	Acres of Rich Cove Impacted	
	Alternative B	Alternative C
Proposed Two-Age Regeneration	130	97
Proposed Group Selection	0	413
Past Activities on USFS Lands*	633	220
Past Activities on Private Lands	150	150
Ongoing USFS and Private Activities	0	0
Cumulative Effect [Total]	913	880

*From Table 3.3-2, calculated as the difference between acres of past group selection and proposed group selection, and therefore not accounted under the current proposal.

The trend for rich cove forest on the Nantahala and Pisgah National Forests is stable over approximately 110,000 acres (USFS, 2001, pg. 50). The cumulative effects in the activity area represent a reduction of 1.1% of these cove forests across the national forests, persisting for a 40 year period. As a result, the Fatback project is unlikely to substantially alter the current trend for cove forests.

Effects of Alternatives on Management Indicator Species

Management Indicator Species (MIS) are used as proxies to examine the impact of management activities on all species in a given community type. Ginseng plants, for example, are used to examine the impacts to the species associated with rich cove forests.

(1) Ginseng

Direct and Indirect Effects - Due to the dense shading produced by regenerating forests, the regeneration and group-selection harvests proposed under Alternatives B and C for cove forests will directly affect ginseng plants growing in the activity area by reducing the number of plants for at least 20 years, especially in the smaller size classes (Table 3.3.4). Larger plants are more likely to survive the harvests, although they may enter a dormant period for a few years following treatment. In addition, indirect effects to neighboring ginseng plants, estimated using a one mile radius around the activity area, may affect ginseng plants on approximately 3322 acres additional acres of cove forests over a 40 yr period. These indirect effects may include both reductions in the gene pool as well as reductions in the gene flow among neighboring plants, potentially resulting in more inbreeding, decreased seed set, and less vigorous seedlings.

The proposed thinning in rich cove forests should open the stands, improving conditions for understory herbs such as ginseng. As a result, the thinning may offset some of the direct, negative effects expected in the regeneration and group selection units. This effect can be expected to be confined to the activity area, and persist for the life of the treatment.

Effects of Past, Ongoing and Foreseeable Actions - Past actions on USFS and private lands in the analysis area have diminished the number of plants on 783 acres under Alternative B, and 370 acres under Alternative C (Table 3.3.3). For both alternatives, past actions may have also diminished gene flow, and increased genetic isolation, on approximately 3322 acres of rich cove forests containing ginseng plants. The analysis area contain no ongoing or foreseeable USFS or private projects that would impact ginseng.

Cumulative Effects - The cumulative effect of regeneration and group-selection management, primarily decreases in the number of plants in the activity area, and decreases in genetic flow among neighboring plants, may effect approximately 4235 acres of ginseng plants under Alternative B, and 4202 acres under Alternative C, for a period of 20 years.

The trend for ginseng is decreasing, primarily due to direct harvest for commercial sale (USFS, pg. 818). Ginseng is most commonly associated with cove forests, totaling 280,000 acres across the Pisgah and Nantahala National Forests (USFS, 2001; pg. 23). The cumulative effects in the analysis area, approximately 4200 acres of direct and indirect effects over a 20 year period, represent a total impact of <2.0% of these cove forests. As a result, the Fatback Project is unlikely to substantially alter the current trend for ginseng across the forest (Table 3.3.4).

Table 3.3.4. Summary of project effects of each alternative on the evaluated management indicator species.

Management Indicator Species	Summary of Project Effects		
	Alternative A	Alternative B	Alternative C
Ginseng (<i>Panax quinquefolium</i>)	None affected	Decreased populations on 130 acres of regeneration and group selection harvest for 20 yr; decreased gene flow on an additional 3322 acres	Decreased populations on 510 acres of regeneration and group selection harvest for 20 yr; decreased gene flow on an additional 3322 acres

3.4. Terrestrial Wildlife MIS and Special Habitat Evaluation

Species Evaluated and Rationale

The proposed project is a timber sale and associated wildlife habitat improvement work in Macon County. Activities are proposed for Compartments 102, 110, 111, 121, and 124.

All management indicator species whose habitat is potentially affected by project activities were evaluated (see Tables 3.2.1 through 3.2.3 in section 3.2 above). This includes the black bear, white-tailed deer, rufous-sided (eastern) towhee, and ruffed grouse. Information about forest-wide MIS habitats and population trends is contained in the Forest MIS report, “**Management Indicator Species Habitat and Population Trends**”, which is available for review by contacting the District Office.

Table 3.4.1. Known and potential management indicator species evaluated for this project

Black bear (<i>Ursus americanus</i>)	Mammal	Hard mast, soft mast, dens	May occur
White-tailed deer (<i>Odocoileus virginianus</i>)	Mammal	Hard mast, browse, grass/clover	May occur
Rufous-sided (Eastern) towhee (<i>Pipilo erythrophthalmus</i>)	Bird	Early-successional (0-10)	Likely to occur
Ruffed grouse (<i>Bonasa umbellatus</i>)	Bird	Early-successional (11-20), soft mast, downed woody debris	Likely to occur

Effects of Alternatives on Special Habitats associated with Management Indicator Species

Most of the project activities are in management area 3B (MA 3B), where forest-wide direction is to provide habitat conditions for species such as white-tailed deer, eastern wild turkey, and ruffed grouse. Standards for MA 3B are to provide at least 5%, but no more than 15% in early successional habitat, and a minimum of 3% in permanent grass-forb openings.

Regeneration activities would result in some new habitat for early-successional associates and less habitat for mature forest associates. The creation of new regeneration areas would provide some suitable habitat for neotropical migratory birds of management concern, such as the chestnut-sided warbler and the golden-winged warbler. These areas would also provide soft mast for use by bear, deer, turkey, and other species.

(1) Early successional communities (0-10 yr.)

Overall, the analysis areas have very limited amounts of early successional habitat and younger age classes. Openings are needed to provide age-class diversity in these areas and improve habitat quality for wildlife. Species that would benefit from the creation of openings include black bear, eastern wild turkey, white-tailed deer, and ruffed grouse, which find tender browse, fruit and hiding cover in dense young stands. Neotropical migratory birds such as chestnut-sided and golden-winged warblers also breed in these regeneration openings. There are few young stands of upland hardwoods and almost no young stands of cove hardwoods. Regenerating cove stands would benefit the area and have less effect on hard mast production. Regenerating upland hardwood stands would provide for future hard mast production.

Direct and Indirect Effects - Alternative A would result in the continued lack of early successional habitat in four of the five compartments. Alternatives B and C would result in the creation of new early successional habitat in five compartments. Slightly more habitat would be created in Alternative C, but in all cases it would be small amounts. Table 3.2 displays the acres of this habitat created by alternative. The early successional habitat created would be beneficial to many species of wildlife. Herbicide treatments, crop tree release and construction of wildlife ponds would not affect this habitat.

Table 3.4.2. Effects of each alternative on early successional habitat (0-10 years old) created

	<u>Total acres</u>	<u>Alt A</u> (0-10)	<u>Alt B</u> (0-10)	<u>Alt C</u> (0-10)
Compartment 102	724	0	2 (<1%)	2 (<1%)
Compartment 110	879	0	18 (12%)	12 (1%)
Compartment 111	778	0	40 (5%)	55 (7%)
Compartment 121	1248	0	31 (2%)	29 (12%)
Compartment 124	1444	0	94 (7%)	94 (7%)

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat across four of the five compartments. These areas are no longer

in the 0-10 year age class. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the proposed action plus the existing road corridor would result in cumulative effects of <1%, 2%, 5%, 2%, and 7% in early successional habitat in Compartments 102, 110, 111, 121, and 124 (see Table 3.2 above). In Alternative C, cumulative effects would result in <1%, 1%, 7%, 2%, and 7% in early successional habitat in these compartments.

Forest-wide Trends - The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will reduce this trend by creating new habitat.

(2) Mid successional communities (11-20 yr.)

Direct and Indirect Effects - Alternative A would result in a loss of the existing 11-20 year old mid-successional habitat in the near future. Alternatives B and C would result in an increase in this special habitat. This 11-20 year old mid-successional habitat would not be created immediately, but would age into this special habitat in 10 years, resulting in 185 acres in Alternative B, and 192 acres in Alternative C. Preharvest grapevine control and vine control in groups would reduce soft mast production on 215 acres. Other herbicide treatments, crop tree release and construction of wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - By the time the early successional habitat created by this project ages into this habitat in 2017, the existing habitat (now 11-20 years old) would no longer be in this age class. Since the only acres that will be in the 11-20 year age class at that time will be the acres created by this project, there would be no cumulative effect from past activities. Cumulative effects would be the same as the direct and indirect effects.

Forest-wide Trends - The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will reduce this trend by creating new habitat.

(3) Soft mast-producing species

Direct and Indirect Effects - Alternative A would result in a loss of soft mast-producing species in the near future. Soft mast-producing species are primarily associated with forest communities less than 20 years old. The project will create approximately 185 acres in Alternative B and 192 acres in Alternative C of brushy areas as a result of two-age harvests. This will result in less than 10% of each compartment in soft-mast producing species under all action alternatives (Table 3.4.2). Preharvest grapevine control and vine control in groups would reduce soft mast production on 215 acres. Other herbicide treatments, crop tree release and construction of wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old and still considered soft mast-producing species) across four of the five compartments. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in soft mast producing species of about 91 acres. There are no known other ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the acres of soft mast producing species created by the proposed action, plus the past timber sale, plus the existing road corridor would result in cumulative effects of 5%, 3%, 5%, 8%, and 10% in soft-mast producing species in Compartments 102, 110, 111, 121, and 124, respectively (see Table 3.3 above). In Alternative C, cumulative effects would result in 5%, 2%, 7%, 7%, and 10%, respectively, in soft-mast producing species in these compartments.

Forest-wide Trends - The recent forest-wide trend is increasing, due to past timber harvesting. The proposed project will help offset the future downward trend caused by the recent reduction in harvesting.

(4) Hard mast-producing species

Direct and Indirect Effects - Alternative A would result in no change in hard mast-producing species in the near future. Hard mast-producing species are associated with mature forest communities greater than 40 years old. All of the proposed two-age units are in hard mast-producing forest types and are greater than 40 years old. As a result, the project will cut approximately 185 acres of these species under Alternative B and 192 acres under Alternative C. This is less than 10% of each compartment under all action alternatives. This harvest will be offset to some degree by the maturation of other forest communities into the 40+-year age class. Oak preharvest midstory treatment and crop tree release are designed to increase future hard mast production and do not reduce current hard mast producing species. Other herbicide treatments and construction of wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects - Past timber sales in these compartments resulted in the regeneration of 349 acres of hard mast-producing species as shown in Alternative A of Table 3.4.3. This action temporarily eliminated hard mast production on these acres. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - The acres removed from hard mast production due to the proposed project plus the acres removed due to past regeneration harvesting will result in a cumulative loss of 1607 acres under Alternative B and 1614 acres under Alternative C, of hard mast-producing species. Table 3.4.3 displays the cumulative acres of this habitat lost in each compartment by alternative.

Table 3.4.3. Cumulative effects of each alternative on acres of hard mast producing species (40+ years old) regenerated

	<u>Total acres</u>	<u>Alt A</u> (0-10)	<u>Alt B</u> (0-10)	<u>Alt C</u> (0-10)
Compartment 102	724	70 (10%)	72 (10%)	72 (10%)
Compartment 110	879	148 (17%)	166 (19%)	160 (18%)
Compartment 111	778	371 (48%)	411 (53%)	426 (55%)
Compartment 121	1248	480 (38%)	511 (41%)	509 (41%)
Compartment 124	1444	353 (24%)	447 (31%)	447 (31%)

Forest-wide Trends - The forest-wide trend is increasing, due to the aging of young stands. The proposed project will not affect this trend.

(5) Permanent grass/forb openings

Direct and Indirect Effects - In Alternatives A, B, and C, grass/forb habitat would remain at current levels. Herbicide sapling control on cutting unit skid trails would not create permanent grass/forb habitat. Construction of wildlife ponds would affect less than an acre of grass-forb habitat. Other herbicide treatments and crop tree release would not affect this habitat.

Effects of Past, Ongoing and Future Projects – Past activities have created 34 acres of grass/forb habitat in these compartments. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - Cumulative effects would be the same as the direct and indirect effects.

Forest-wide Trends - The forest-wide trend is slightly increasing, as additional habitat is created. The proposed project will not change this trend.

(6) Down woody material

Direct and Indirect Effects - Alternative A would result in no change in down woody material in the near future. Down material will increase in the two-age harvest units, as a result of woody material left from harvesting operations. This includes a total of 185 acres under Alternative B and 192 acres under Alternative C. Herbicide treatments, crop tree release and wildlife ponds would not affect the habitat because these actions would not create down wood or leave down wood in the areas treated by these specific actions.

Effects of Past, Ongoing and Future Projects - The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. This material has mostly decomposed by this time, so the effect would have dissipated in the years since management activities occurred. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - Cumulative effects would be the same as the direct and indirect effects.

Forest-wide Trends - The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will not affect this trend.

Table 3.4.4 Summary of project effects on special habitats, by alternative

Special Habitats	Alternative A	Alternative B	Alternative C
Early successional communities (0-10 yr)	Absent	185 acres created	192 acres created
Early successional communities (11-20 yr)	Absent	185 acres created after 10 years post-harvest.	192 acres created after 10 years post-harvest
Soft mast-producing species (< 20 yr)	Decline due to aging of existing communities	185 acres created by two-age harvest.	192 acres created.
Hard mast-producing species (> 40 yr)	Increase due to aging of existing communities	185 acre reduction	192 acre reduction
Permanent grass/forb openings	No change	No change	No change

Down woody material	None affected	Increase on 185 acres	Increase on 192 acres
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Effects of Alternatives on Management Indicator Species

(1) Ruffed Grouse is strongly associated with mid-successional (5 to 20 years) forest habitats characterized by thick, shrubby growth. Ruffed grouse often uses downed woody debris of various sizes for drumming. The creation of new regeneration areas and brushy openings would provide new early successional habitats to replace the stands that are maturing into young pole timber stands. The availability of grass/forb habitat on seeded roads improves the quality of the existing habitat. The creation of brushy borders around the existing wildlife openings would particularly benefit grouse. This species utilizes a variety of habitats both inside and outside the boundaries of the activity areas, so cumulative effects analysis is bounded by an area encompassing all the habitats that an individual may utilize throughout the year. Due to the small home range of this species, effects to the habitat are analyzed for each individual compartment and shown in Table 3.4.2.

Direct and Indirect Effects - Effects of the alternatives on ruffed grouse were estimated according to the change in mid-successional (5 to 20 years) forest (Sec. 3.4 (2)). Alternative A would result in the continued lack of this habitat in the near future. Alternatives B and C would result in an increase in this special habitat, resulting in 185 acres in Alternative B and 192 acres in Alternative C. No more than 10% of each compartment would be in this habitat. Herbicide treatments, crop tree release and construction of wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no known other ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the proposed action plus the road corridor would result in cumulative effects of <1%, 12%, 5%, 2%, and 7% in mid successional habitat in Compartments 102, 110, 111, 121, and 124 (see Table 3.4.2 above). In Alternative C, cumulative effects would result in <1%, 12%, 7%, 2%, and 7% in early successional habitat in these compartments.

Forest-wide Trends - Across the Forest, habitat for this species has increased recently as previously cut stands entered the suitable age classes. With the decreasing level of timber harvest in recent years, habitat for this species will be greatly reduced in the near future. There are few young stands available to replace existing habitat. The proposed project will reduce this trend by creating new habitat.

(2) White-tailed Deer is associated with both early successional habitat and hard-mast production. The species uses the stems and leaves of woody and herbaceous green plants, fungi and fruits. Deer require hard mast for reproductive success and subsequent fawn survival. Grass/forb plantings can help to buffer the effects of a poor mast crop. The creation of new regeneration areas and brushy openings would provide new early successional habitats to replace the stands that are maturing into young pole timber stands. This species utilizes a variety of habitats both inside and outside the boundaries of the activity areas, so cumulative effects analysis is bounded by an area encompassing all the habitats that an individual may utilize throughout the year. Due to the small home range of this species, effects to the habitat are analyzed for each individual compartment and shown in Tables 3.4.2 and 3.4.3.

Direct and Indirect Effects - Effects of the alternatives on white-tailed deer were estimated to be beneficial for the action alternatives that create new early successional habitat, grass/forb habitat and soft mast producing species, and adverse for the no action alternative, which will result in a less diverse landscape. The amount of early successional habitat created is 10% or less of each compartment under each alternative. Alternative B creates more of these habitats, but has more of an adverse effect on hard mast production than Alternative C (Table 3.4.3).

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – The cumulative effects on habitats in the individual compartments are described above. The effects on grass/forb habitat would be the same as the direct and indirect effects. The compartments will have no more than 12% in early successional habitat, no more than 10% in soft mast producing species and will still have at least 47% of their acres in hard mast production under Alternatives B and C. Compartments 111 and 121 are currently only 52% and 62% in hard mast producing forest types and age classes, respectively. This is primarily due to a large amount of acreage in yellow poplar, which doesn't provide hard mast. Cumulatively, Compartments 111 and 121 will only have 47% and 59% of their acres in hard mast production, respectively, under **Alternative B** and 45% and 59% in **Alternative C**. This may result in a localized adverse effect on white-tailed deer in these two compartments due to a reduction in the food supply. Therefore, the effects of the alternatives on white-tailed deer were estimated to be mixed for Alternatives B and C (Table 3.4.4).

Forest-wide Trends - Across the Forest, white-tailed deer populations are stable to slightly increasing (Table 3.2.1). While hard mast capability has increased in recent years, the amount of early successional habitat has declined. Grass/forb planting have probably not increased significantly. Within the range of deer densities and over story conditions that exist on public lands in the Southern Appalachians, timber harvesting is not likely to significantly improve the nutritional quality of the winter diet of deer. The proposed project will not affect the increasing trend in the species populations because the trend is unrelated to changes in the habitat.

(3) Black Bear requires large areas free from disturbances of motorized vehicles, frequent human activity, and intensive timber harvesting. Bears in much of the eastern United States depend on hard mast for the energy needed for reproduction and hibernation. A bears' home range will increase as the amount of area in regeneration increases, resulting in greater rates of mortality. This species utilizes a variety of habitat types and benefits from a diverse forest landscape. The creation of new regeneration areas and brushy openings would provide new early successional habitats to replace the stands that are maturing into young pole timber stands. Although some brushy areas are created from the loss of mature pine trees due to the southern pine beetle, and some habitat may be created from prescribed burns and wildfire, this probably does not compensate for the lack of active management. This species utilizes a variety of habitats both inside and outside the boundaries of the activity areas, so cumulative effects analysis is bounded by an area encompassing all the habitats that an individual may utilize throughout the year. Due to the large home range of this species, just two analysis areas were used for black bear. The northern area is Compartments 101, 102, 109, 110, and 111, which totals 4,703 acres and the southern area is Compartments 120, 121, 124, 125, 136, which totals 6,136 acres.

Direct and Indirect Effects - Effects of the alternatives on black bear were estimated to be beneficial for the action alternatives that create new early successional habitat and soft mast producing species, and adverse for the no action alternative, which will result in a less diverse landscape. The amount of early successional habitat created is less than 2% of each analysis area (60/4703 acres and 125/6136 acres)

under Alternative B and (69/4703 acres and 123/6136 acres) under Alternative C. Alternative B creates more of these habitats, but has more of an adverse effect on hard mast production than Alternative C.

Effects of Past, Ongoing and Future Projects – The last few timber sales resulted in 16 acres of early successional habitat (0-10 years old) and 130 acres aged 11-20 in the northern analysis area and 206 acres aged 11-20 in the southern analysis area. The road corridor across Winding Stairs Gap in Compartment 110 in the northern analysis area is maintained in early successional habitat of about 91 acres. There are no known other ongoing or future projects that would affect this habitat.

Cumulative Effects - The cumulative effects on early successional habitat in Alternative B will result in 167 acres in the northern analysis area and 125 acres in the southern analysis area (the same as the direct and indirect effects). This is less than 4% of these analysis areas. Alternative C will also be less than 4% of these analysis areas. The cumulative effects on soft mast producing species will result in 297 acres in the northern analysis area and 331 acres in the southern analysis area in Alternative B and 306 acres and 329 acres in Alternative C, which is less than 7% of the analysis areas under each alternative. The cumulative effect on soft mast producing species would be the same as the direct and indirect effects. Cumulatively, the analysis areas would still have 83% (3895 of 4703) and 76% (4689 of 6136) of their acres in hard mast production under Alternative B and slightly less under Alternative C. Therefore, the effects of the alternatives on black bear were estimated to be beneficial for the action alternatives and adverse for the no action alternative (Table 3.4.4).

Forest-wide Trends - Across the Forest, black bear populations have increased due to factors other than habitat management, probably due to the benefits of the state black bear sanctuary system (Table 3.2.1). As young bears migrate from these protected areas, they increasingly occupy habitats with little or no hunting pressure, allowing the population to increase further. Habitat for this species has declined in recent years with the decreasing amount of regeneration activities. The proposed project will reduce this trend by creating new habitat.

(4) Eastern towhee is associated with early successional habitats (0-10 yr). Habitat for this species has declined in recent years with the decreasing amount of regeneration activities. Although some brushy areas are created from the loss of mature pine trees due to the southern pine beetle, and some habitat may be created from prescribed burns and wildfire, this does not compensate for the lack of active management. This species utilizes a variety of habitats both inside and outside the boundaries of the activity areas, so cumulative effects analysis is bounded by an area encompassing all the habitats that an individual may utilize throughout the year. Due to the small home range of this species, effects to the habitat are analyzed for each individual compartment and shown in Table 4.3.2.

Direct and Indirect Effects - Effects of the alternatives on eastern towhee were estimated according to the change in early-successional (0 to 10 years) forest (Sec. 3.4.1.). Alternative A would result in a loss of this habitat in the near future. Alternatives B, and C would result in an increase in this special habitat, resulting in 185 acres in Alternative B and 192 acres in Alternative C. No more than 10% of each compartment would be in this habitat. Herbicide treatments, crop tree release and wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the proposed action plus the road corridor would result in cumulative effects of <1%, 12%, 5%, 2%, and 7% in early successional habitat in Compartments 102,

110, 111, 121, and 124 (see Table 4.3.2 above). In Alternative C, cumulative effects would result in <1%, 12%, 7%, 2%, and 7% in early successional habitat in these compartments.

Forest-wide Trends - Across the Forest, eastern towhee populations are in decline (Table 3.2.1). With the decreasing level of timber harvest, habitat for this species has been greatly reduced. There are few young stands available to replace existing habitat. Habitat will probably be maintained for the near future at this lower level. The proposed project will reduce this trend by creating new habitat.

Summary of Cumulative Effects on Management Indicator Species

Species that are closely associated with early successional habitats (ruffed grouse, eastern towhee) will decline under the no action alternative and benefit from the action alternatives. The benefit will be greater under Alternative B than under Alternative C. Species that need a diversity of habitats (white-tailed deer, black bear) will also benefit from the action alternatives since they provide part of their habitat requirements.

Table 3.4.5. Indirect and cumulative affects of each alternative on the evaluated management indicator species

Species	Alt. A	CE	Alt. B	CE	Alt. C	CE
Ruffed grouse	Decrease	Decrease	+185 a.	+276 a.	+192 a.	+283 a.
White-tailed deer	Adverse	Adverse	Beneficial	Beneficial	Beneficial	Beneficial
Black bear	Adverse	Adverse	Beneficial	Beneficial	Beneficial	Beneficial
Eastern towhee	Decrease	Decrease	+185 a.	+276 a.	+192 a.	+283 a.

*CE is the cumulative effect of the proposed action, plus the previous timber sales. Past projects’ effects are reflected in the current existing conditions (specifically, the amount of early successional habitat) as described in Section 3.1.1. Species that use mature forests are expected to increase under Alternative A, while species that use young forests decrease. Alternative A is expected to generally have adverse effects on species with broader home ranges, that utilize a diversity of habitat types, while Alternatives B and C would generally be beneficial.

3.5. Aquatic MIS and Community Evaluation

Boundaries of Aquatic Communities and MIS

This analysis addresses project area waters and analysis area waters associated with the Fatback Timber Project. Project area waters are defined as those in the area of potential site-specific impacts (Direct and Indirect Effects) on aquatic habitat and populations, and do not necessary overlap effects to botanical and wildlife resources. In addition to project area waters, the analysis area encompasses waters downstream that potentially could be impacted by project activities when considered within the watershed context (Cumulative Effects). The aquatic analysis areas for the Fatback Project consist of the following watersheds: Poplar Cove Creek downstream to its confluence with Jones Creek; Cloer Branch downstream to its confluence with Lowery Branch; Anderson Branch downstream to its confluence with Lowery Branch; Lowery Branch to its confluence with Jones Creek; Allison Creek to its confluence with Jones Creek; Ash Flat Branch to its confluence with Allison Creek; Carpenters Branch to its confluence with Allison Branch; Lee Creek to its confluence with Jones Creek; and Jones Creek to its confluence with Poplar Cove Creek.

Existing Conditions for Aquatic Communities and MIS

Cartoogechaye Creek, Jones Creek, Lee Creek, Allison Creek, Ash Flat Branch, Thompson Prong, Carpenters Branch, Lowery Creek, Cloer Branch, Anderson Branch, and Poplar Cove Creek are classified by the North Carolina Department of Environment and Natural Resources (NCDENR) as class WS-III; Tr Waters. Class WS-III waters are protected as water supplies which are generally in moderately to highly developed watersheds and are suitable for all Class C uses. Class C waters are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Tr waters are suitable for natural trout propagation and maintenance of stocked trout.

The analysis area is characterized as containing habitat for coldwater fish species. Analysis area waters also provide extensive habitat for macroinvertebrates. Streams within the Fatback Project aquatic analysis area typically have substrates consisting mainly of cobble and gravels (see Aquatic Attachment 3). Analysis area streams are currently supporting the designated uses described by North Carolina Department of Environment and Natural Resources (NCDENR 2005).

Cartoogechaye Creek was included in the NCDENR, Division of Water Quality Basinwide Assessment Report (NCDENR, 2005). This site received a Good rating. An additional site on Jones Creek (above SR 1146) was surveyed in 2004. The habitat was ranked “somewhat low” due to sedimentation from private land development but the aquatic insect community rated excellent (NCDENR, 2005).

Communities and MIS Evaluated

The aquatic analysis area contains one aquatic community, coldwater streams. Special habitat components are not associated with any aquatic resources, and therefore will not be analyzed further.

Only aquatic MIS potentially affected by the proposed project are fully evaluated. Poplar Cove Creek, Cloer Branch, Allison Creek, Ash Flat Branch, Lee Creek, and Jones Creek provide habitat for rainbow trout, brown trout, and blacknose dace. As a result, wild rainbow trout, wild brown trout, and blacknose dace were selected for further analysis. Brook trout were not selected as MIS because there are no recent records of this species occurring in the project area. The effects of this project would dissipate prior to reaching the point where any streams become suitable for coolwater or warmwater species. No coolwater species, warmwater species, or reservoir species will be analyzed further because there are no suitable habitats for these species within the aquatic analysis area.

Management activities most likely to affect rainbow trout, brown trout, or blacknose dace habitat would be changes in water quality. Therefore, the number of stream miles or acreage of lakes receiving sediment inputs typically serve as indicators for analysis of the effects of each alternative.

Effects of Alternatives on Communities

(1) Coldwater Streams

MIS associated with the coldwater streams community includes the rainbow trout (*Oncorhynchus mykiss*), brown trout (*Salmo trutta*), and blacknose dace (*Rhinichthys atratulus*). Approximately 36 miles of coldwater streams occur within the analysis area.

Direct and Indirect Effects

Alternative A: Alternative A, the no-action alternative, would produce no direct, indirect, or cumulative effects to coldwater streams because there would be no ground disturbing activities proposed for this alternative.

Alternative B: The proposed activities for this project have been disclosed within Chapter 1 of this document. Most of the proposed activities will have no effects on any aquatic resources because these activities would be located outside of the riparian areas or effects would be avoided by implementation of the project design features and BMP's (see Chapter 1). No road construction or road reconstruction is proposed for this project therefore, there would be no effects upon the analysis area waters from this type of activity. Installation of culverts would cause a slight increase in sediment within the project area streams.

A small quantity of sediments may enter UT 1 Allison Creek during culvert installation; however, these effects would not be measurable approximately 75 feet below the crossing. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter UT 1 Allison Creek. Effects from the culvert installation would be immeasurable at the confluence with the Allison Creek because the culvert installation would occur approximately 0.1 mile from the mouth of Allison Creek. Additional culverts may be installed within analysis area waters as needed. The effects of these culverts would be the same as described for the culvert installations within UT 1 Allison Creek.

Sedimentation from the culvert installations may reduce the quality of the coldwater streams habitats within the UT 1 of Allison Creek by partially filling pools. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years). These effects would affect approximately 0.03 mile of the 32 miles (0.09%) of coldwater streams within the aquatic analysis area.

In accordance with the Vegetation Management Final Environmental Impact Statement (VM-FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of triclopyr can be lethal at concentrations of 91 ppm (VM-FEIS). Concentrations of glyphosate at 24 ppm can be lethal to some aquatic organisms (VM-FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations \leq 0.0072 ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in approximately 65 days (VM-FEIS). The 30 foot buffers would prevent the Estimated Environmental Concentrations of glyphosate or triclopyr from reaching the LC₅₀ (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM-FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (33 feet) resulted in concentrations of \leq 0.0072 ppm. These concentrations are too low to produce the lethal or sublethal effects described above. Project area streams would be protected by a 30 foot buffer (minimum) which would prevent the concentrations of these herbicides from accumulating within the project area streams in measurable quantities. There

would be no effects to coldwater streams community because the amount of herbicides in project area waters would be immeasurable.

Riparian vegetation: Stream temperatures in analysis area waters would not be affected by timber harvest because harvest would not occur within the riparian zones of any streams, which have been mapped by the IDT. These no-harvest areas would protect stream temperatures and prevent sedimentation. Shoreline vegetation would not be cut; therefore, there would be no reduction in potential large woody debris recruitment.

Alternative C: The effects of this alternative would be the same as the effects described for Alternative B because the only difference would be the timber harvest methods for some of the units. The group selection harvest areas proposed for this alternative would have no effects to the aquatic resources because the groups would be located outside of riparian areas. Alternative C would affect approximately 0.09% of the coldwater streams within the aquatic analysis area for the same reasons described for Alternative B.

Effects of Past, Ongoing and Future Projects – Previous activities within the Fatback Project area include timber harvest and road construction (Poplar Cove Sale, Ash Flats Sale, Flatwoods Sale, and Jones Creek sale). A portion of private lands within the Carpenter Branch watershed have been logged. There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects were minimized by application of erosion and sedimentation control measures (e.g. silt fence, sediment traps, seeding, and mulch). Specifically, the effects of these actions would have included sedimentation from the ground disturbing activities (road construction, reconstruction, and culvert installations). All of these effects, however, would have exhibited short-term impacts on aquatic resources, and would have dissipated in the time since management activities occurred in the Fatback analysis area. As a result, there are no present effects to aquatic resources in the Fatback analysis area as a result of past actions. As a result of the length of time since completion of these actions, any effects to the aquatic resources are reflected in the current affected environment.

Approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). These culvert installations will cause a slight increase in sediment within the streams but this effect will dissipate as it moves downstream and following the next bankfull flow event. These crossings will also improve aquatic passage for the coldwater stream organisms. There are no other ongoing activities occurring on federal lands within the Fatback Project aquatic analysis area. Private lands in the aquatic analysis area are primarily characterized by developed farmland and residential. There may be sedimentation from private lands within the watershed but these effects would not be cumulative with the effects of the Fatback Project because there would be no effects of the proposed timber management. There are no other ongoing activities on private lands affecting the Fatback Project area waters.

There are no reasonably foreseeable future actions proposed for the Fatback Project area on federal lands; therefore, there would be no known effects from future actions. There are no known future actions planned on private lands that would affect the Fatback Project area waters.

Cumulative Effects

Alternative A: This alternative would not affect the coldwater streams community because no road construction, road reconstruction, or culvert installations would occur within the aquatic analysis areas for this project.

Alternative B and Alternative C: The cumulative effects of the Fatback Project would include the effects of culvert installations for this project and the culvert installations for the Hurricane Damage Repairs. Alternative B and Alternative C may impact approximately 0.09% of the coldwater streams communities until the next bankfull flow event but this impact would not affect the forest-wide trends for the coldwater communities because the effects of culvert installations would have short term effects and would be limited to short sections of the project area streams (see discussion in the Direct and Indirect Effects Section above). Implementation of any of the alternatives would not affect the forest-wide trends of the coldwater streams community (Table 3.5.1)

Table 3.5.1. Trend analysis for each alternative on the evaluated communities

Community	Effect		
	Alternative A	Alternative B	Alternative C
Coldwater Streams	No impact	No impact	No impact

Effects of Alternatives on Management Indicator Species

(1) Rainbow trout, brown trout, and blacknose dace

Direct and Indirect Effects

Alternative A: Alternative A, the no-action alternative, would produce no direct, indirect, or cumulative effects to the aquatic MIS because there would be no ground disturbing activities proposed for this alternative.

Alternative B: There would be no direct or indirect effects to the aquatic MIS from the Fatback Project because no road construction or reconstruction is proposed and the timber harvest activities (including skid trail construction and herbicide treatments) would not be located within riparian areas.

Furthermore, the culvert installations proposed for this project would be located within tributaries that do not provide habitat for any fish species and the effects of the culvert installations would dissipate prior to reaching any stream providing fish habitat. Implementation of this project would not change the current forest wide trend for rainbow trout, brown trout, or blacknose dace. The current forest wide trends for rainbow trout, brown trout, and blacknose dace are stable and implementation of this alternative would not affect these population trends because the project design features would prevent visible sediment from entering any stream with fish populations.

Alternative C: This alternative would have no direct or indirect effects to area MIS because the only difference in proposed actions (from Alternative B) would be a change in harvest techniques within some of the units. The group selection harvest areas proposed for this alternative would have no effects to the aquatic resources because the groups would be located outside of riparian areas. This alternative would have no effects on the aquatic MIS for the same reasons discussed for Alternative B.

Effects of Past, Ongoing, and Future Actions -The effects of past, ongoing, and future actions on the aquatic resources have been disclosed in the Biological Communities discussion above and would be the same for the aquatic MIS.

Cumulative Effects

Alternative A, Alternative B, and Alternative C: In the absence of direct and indirect effects from the proposed actions, there would be no cumulative effects to the aquatic MIS. Implementation of any of the alternatives would not change the forest-wide trends for any of the aquatic MIS (Table 3.5.2).

Table 3.5.2. Results of trend analysis of each alternative on the evaluated management indicator species

Species	Effect		
	Alternative A	Alternative B	Alternative C
Rainbow trout	No change	No change	No change
Brown trout	No change	No change	No change
Blacknose dace	No change	No change	No change

3.6. Summary of Effects to All MIS, Communities, and Special Habitats

Table 3.6.1. Biological communities and special habitats, and estimated change in each alternative

Biological Community	Alternative A	Alternative B	Alternative C
Fraser fir forests	None affected.	None affected.	None affected.
Northern hardwood forests	None affected.	0 acres affected	0 acres affected
Carolina hemlock bluff forests	None affected.	None affected.	None affected.
Rich cove forests	None affected.	130 acres affected (Sec. 2.3)	510 acres affected (Sec.2.3)
Yellow pine successional communities	None affected.	None affected.	None affected.
Reservoirs	None affected.	None affected.	None affected.
Riparian forests	None affected.	None affected.	None affected.
Cold water streams	0.0 miles affected. (Sec. 2.2)	0.03 miles affected. (Sec. 2.2)	0.03 miles affected. (Sec. 2.2)
Warm water streams	None affected.	None affected.	None affected.
Special Habitats	Alternative A	Alternative B	Alternative C
Old forest communities (100+ years old)	None affected.	0 acres affected (Sec. 2.3)	0 acres affected (Sec. 2.3)
Early successional communities (0-10 yr)	Absent.	185 acres created (Sec. 2.3)	192 acres created (Sec. 2.3)
Early successional communities (11-20 yr)	None affected.	185 acres created (later) (Sec. 2.3)	192 acres created (later) (Sec. 2.3)
Soft mast-producing species	None affected.	185 acres created (Sec. 2.3)	192 acres created (Sec. 2.3)
Hard mast-producing species (>40 yr)	None affected.	185 acres affected (Sec. 2.3)	192 acres affected (Sec. 2.3)
Contiguous areas with low disturbance (< 1 mi. open road / 4 sq. miles)	No change.	No change.	No change.
Large contiguous forest	None affected.	None affected.	None affected.
Permanent grass/forb openings	No change.	No change.	No change.

Snags and dens (>22” dbh)	Retained.	Retained.	Retained.
Down woody material	None affected.	185 acres affected (Sec. 2.3)	192 acres affected (Sec. 2.3)

- a) Cove forests – The forest-wide trend is increasing, due relatively more upland stands than cove stands being regenerated in recent years. Cumulatively, the proposed project will not affect this trend.
- b) Cold-water streams – The forest-wide trend is increasing quality, due to efforts at erosion control and the reduction in new road construction. The proposed project will not affect this trend.
- c) Old forest communities – The forest-wide trend is increasing, due to the maturation of forest communities. The proposed project will not affect this trend.
- d) Early successional communities (0-10 yr) – The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will reduce this trend by creating new habitat.
- e) Early successional communities (11-20 yr) – The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will reduce this trend by creating new habitat.
- f) Soft mast-producing species – The recent forest-wide trend is increasing, due to past timber harvesting. The proposed project will help offset the future downward trend caused by the recent reduction in harvesting.
- g) Hard mast-producing species (>40 yr) – The forest-wide trend is increasing, due to the aging of young stands. The proposed project will not affect this trend.
- h) Permanent grass/forb openings – The forest-wide trend is slightly increasing, as additional habitat is created. The proposed project will not significantly change this trend.
- i) Down woody material – The forest-wide trend is decreasing, due to the reduction in levels of timber harvesting. The proposed project will not affect this trend.

Evaluation

Most of the biological communities and special habitats in the project area are not affected by management activities proposed by the preferred alternative. What changes that are anticipated to occur, and discussed above, are consistent with the Nantahala and Pisgah Forest Plan. Most of the projected habitat changes are needed to accomplish the multiple-use goals of the Plan. The cumulative effect of the implementation of this project, along with other similar projects, would change habitats in amounts close to/consistent with forest-wide averages of the recent past. Therefore, population trends of MIS related to habitat changes on the Forest would continue as cited in the most recent update of the MIS assessment.

3.7. Proposed, Endangered, and Threatened Species (PETs)

3.7.1. Botanical PET Species

Boundaries of Botanical Analysis Areas

Spatial - Because plants are rooted species that must be present in the activity areas to undergo effects, the analysis area for endangered and threatened species was confined to the expected impact zone surrounding the activity areas of the project. The expected impact zone may be larger than the activity

area because impacts such as increased sunlight and decreased humidity may extend beyond the areas undergoing active management. These effects can be estimated to extend into the surrounding forest a distance equal to half the height of the canopy, or about 40 – 50 feet beyond the boundaries of the activity areas.

Temporal: - Past effects for endangered and threatened species are dependent upon both the activity as well as the life history characteristics of the individual species. For example, species characteristic of disturbed, open habitats, would be expected to respond positively to activities such as road construction. Species characteristic of mature forest communities, however, would be expected to respond negatively to the same activities. Because each plant species has a unique life history, the temporal response to management activities must be evaluated on a species-by-species basis.

Species Evaluated and Rationale

All endangered and threatened plant species listed by the U. S. Fish and Wildlife Service for the Nantahala National Forest were considered for this analysis (Botanical Attachment 1). No candidate plant species occur on the Nantahala National Forest, and therefore were not considered further.

Previous Survey Information

The Biotics Database was queried for endangered and threatened plant species growing in the activity areas. It contained no records for any endangered and threatened plant species in the activity areas.

New Surveys or Inventories Conducted

Field surveys for endangered and threatened plant species were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982). No endangered or threatened plant species were located during the field survey (Table 3.7.1.1).

Table 3.7.1.1: Summary of endangered and threatened plant species undergoing effects analysis for the Fatback Project (see Botanical Attachment 1 for a complete list of species evaluated)

Status	Species	Habitat	Reason for Effects Analysis
Endangered	None	Not applicable	Not applicable
Threatened	None	Not applicable	Not applicable

Effects of Alternatives on Botanical Species

Because no endangered or threatened plant species were located in the activity areas, there should be no direct, indirect or cumulative effects to any endangered or threatened plant species. Consultation with the U. S. Fish and Wildlife Service is not necessary for botanical resources.

3.7.2. Terrestrial Wildlife PET Species

Species Evaluated and Rationale

Proposed, endangered, and threatened (PET) species considered in this analysis are those currently listed by the U.S. Fish and Wildlife Service. All terrestrial animal species that might occur on the Nantahala National Forest were considered. Potentially affected species were identified from information on habitat relationships, element occurrence records of PET animals as maintained by the North Carolina Natural Heritage Program and field data on the project activity areas. Species with only incidental, migrant or historic occurrences in Cherokee County were not considered further. All but one of these species (the Indiana Bat) was dropped from further consideration due to a lack of suitable habitat in the area (Wildlife Attachment 1).

Table 3.7.2.1. Known and potential proposed, endangered, and threatened species evaluated

Species	Type	Habitat description	Likelihood of occurrence
Indiana bat (<i>Myotis sodalis</i>)	Mammal	Roosts in caves and hollow trees	May occur

The need for surveys for individual PET species was considered in light of direction found at FSM 2672.43, Supplement No. R8-2600-2002-2. This species could occur in the project activity areas.

Effects of Alternatives by Species

(1) Indiana Bat (*Myotis sodalis*)

On July 25, 1999, two Indiana bats were captured in a mist-net located in the upper Santeetlah Creek drainage in Graham County, North Carolina. Monitoring of the roost tree documented use by 28 bats. Given the species communal roosting habits, it is probable that all 28 bats were Indiana bats. Most of the cave sites and cave-like habitats available in western North Carolina do not provide suitable conditions for significant wintering habitat for Indiana bats. Thus, North Carolina was not considered likely to provide either significant wintering habitat or maternal roosting habitat. The capture of a reproductively active female Indiana bat in Graham County provided new information on the status and distribution of this species in North Carolina. At present, this is the southernmost known Indiana bat maternity colony. It is possible that other Indiana bat maternity colonies occur on the Forest, as well as individual roosting males. Potentially suitable summer roosting and foraging habitat does exist within the area.

Direct and Indirect Effects - Direct effects of disturbance and/or mortality from tree felling may occur between April 15 and October 15 if a tree that a bat is roosting in is cut. This is limited to this 6-month period because the bats are hibernating in caves the remainder of the year. Indirect effects may also occur to potential Indiana bat roosting and foraging habitat. To reduce the likelihood of direct effects to Indiana bats and indirect effects to Indiana bat habitat, this project would comply with the Terms and Conditions in the Biological Opinion of the U. S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests.

This includes retention of standing trees with more than 25% exfoliating bark, shellbark, shagbark and bitternut hickories, snags, hollow, den, and cavity trees, trees in buffer zones along intermittent and perennial streams, and shade trees adjacent to some of the large snags. These measures would be implemented when the stands are marked for sale.

This project may impact a maximum of 192 acres of suitable habitat by 2-age regeneration and group selection. Based on the small number of currently suitable or potential roost trees that would be affected, effects on the bat population would be unlikely, and would not reach the scale where an adverse affect or actual take occurs. The sequence of events that would result in a tree being cut down in which a bat is roosting is unlikely; therefore, direct effects to Indiana bats should not occur.

Removing a small number of trees would not make the area unsuitable as summer habitat for Indiana bats. Indiana bats are known to use highly altered and fragmented landscapes. They may respond positively to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, as long as sufficient mature forest and numbers of quality roost trees are provided. Given the amount of tree cutting, the area would still provide vast numbers of roost trees and potentially suitable habitat for Indiana bats.

Effects of Past, Ongoing and Future Projects - The Indiana bat model includes all identified past activities and ongoing activities within two miles of the proposed harvest units, as well as the proposed actions. The units of the Ray Branch Timber Sale are just outside of this area to the north. There are no known proposed future activities.

Cumulative Effects - Each time the model calculates the habitat suitability index; the combined effect on Indiana bat habitat in the analysis area is determined. **The Indiana bat habitat suitability index was calculated using the maximum tree-cutting alternative (Alternative B). This resulted in a less than 2% change from the baseline.** The Forest Plan limits cumulative effects to less than a 5% change from the baseline (Amendment 10 of LRMP). Because there is only a very minor loss of potential Indiana bat habitat in the area impacted, the proposed action would not affect the availability of Indiana bat habitat in the area.

Determination of Effect - This project **is not likely to adversely affect** the Indiana bat. The project will have no effect on any other federally proposed or listed terrestrial animal species. Consultation with the U.S. Fish and Wildlife Service **is required**.

Table 3.7.2.2. Determination of effect of each alternative on the evaluated proposed, endangered, and threatened species

Species	<u>Alternative A</u>	<u>Alternative B</u>	<u>Alternative C</u>
Indiana bat	No effect	Not likely to adversely affect	Not likely to adversely affect

3.7.3. Aquatic PET Species

Boundaries of Aquatic Analysis Areas

The aquatic analysis areas for the Fatback Project consist of the following watersheds: Poplar Cove Creek downstream to its confluence with Jones Creek; Cloer Branch downstream to its confluence with Lowery Branch; Anderson Branch downstream to its confluence with Lowery Branch; Lowery Branch to its confluence with Jones Creek; Allison Creek to its confluence with Jones Creek; Ash Flat Branch to its confluence with Allison Creek; Carpenters Branch to its confluence with Allison Branch; Lee Creek to its confluence with Jones Creek; and Jones Creek to its confluence with Poplar Cove Creek.

Existing Conditions

Cartoogechaye Creek, Jones Creek, Lee Creek, Allison Creek, Ash Flat Branch, Thompson Prong, Carpenters Branch, Lowery Creek, Cloer Branch, Anderson Branch, and Poplar Cove Creek are classified by the North Carolina Department of Environment and Natural Resources (NCDENR) as class WS-III; Tr Waters.

Cartoogechaye Creek was included in the NCDENR, Division of Water Quality Basinwide Assessment Report (NCDENR, 2005). This site received a Good rating. An additional site on Jones Creek (above SR 1146) was surveyed in 2004. The habitat was ranked “somewhat low” due to sedimentation from private land development but the aquatic insect community rated excellent (NCDENR, 2005).

Species Evaluated and Rationale

Three aquatic PET species are either known to occur or may occur on the Nantahala National Forest (Aquatic Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of PET species in Macon County. Three aquatic PET species remained after this initial filter. These species were then filtered using their habitat information and the availability of these habitats within the aquatic analysis area (Aquatic Attachment 1a). Based upon the results of this filtering process no proposed, endangered, or threatened species were evaluated for this analysis (Table 3.7.3.1.). Species that do not have suitable habitat within the project area were eliminated from further analysis.

Previous Survey Information

No aquatic PET species have been found during previous surveys within the aquatic analysis area.

Table 3.7.3.1: Known and potential endangered, threatened and sensitive aquatic species in Macon County evaluated for the Fatback Project (see also Aquatic Attachment 1).

Species	Type	Habitat	Occurrence
Federally Listed Threatened and Endangered Species			
None			

New Surveys or Inventories Conducted

No additional aquatic surveys for PET species were conducted for this project. Existing data were used in this analysis because previous surveys for federally threatened and endangered aquatic species have been conducted and the Fatback Project would be implemented to prevent visible sediment from entering analysis area streams.

Effects of Alternatives on Aquatic Species

Direct and Indirect Effects - Alternative A, Alternative B, and Alternative C: No aquatic PET species occur within the aquatic analysis area; therefore, there would be no direct or indirect effects to any proposed, endangered, or threatened aquatic species or their habitats from implementing any of the alternatives.

Effects of Past, Ongoing and Foreseeable Actions - Previous activities within the Fatback Project area include timber harvest and road construction (Poplar Cove Sale, Ash Flats Sale, Flatwoods Sale, and Jones Creek sale). A portion of private lands within the Carpenter Branch watershed has been logged.

There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects were minimized by application of erosion and sedimentation control measures (e.g. silt fence, sediment traps, seeding, and mulch). Specifically, the effects of these actions would have included sedimentation from the ground disturbing activities (road construction, reconstruction, and culvert installations). All of these effects, however, would have exhibited short-term impacts on aquatic resources, and would have dissipated in the time since management activities occurred in the Fatback analysis area. As a result, there are no present effects to aquatic resources in the Fatback analysis area as a result of past actions. As a result of the length of time since completion of these actions, any effects to the aquatic resources are reflected in the current affected environment.

Approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). These culvert installations will cause a slight increase in sediment within the streams but this effect will dissipate as it moves downstream and following the next bankfull flow event. These crossings will also improve aquatic passage for the sensitive aquatic species, *Cambarus georgiae*. There are no other ongoing activities occurring on federal lands within the Fatback Project aquatic analysis area. Private lands in the aquatic analysis area are primarily characterized by developed farmland and residential. There may be sedimentation from private lands within the watershed but these effects would not be cumulative with the effects of the Fatback Project because there would be no effects of the proposed timber management. There are no other ongoing activities on private lands affecting the Fatback Project area waters.

There are no reasonably foreseeable future actions proposed for the Fatback Project area on federal lands; therefore, there would be no known effects from future actions. There are no known future actions planned on private lands that would affect the Fatback Project area waters.

Cumulative Effects - Alternative A, Alternative B, and Alternative C: There would be no cumulative effects to any aquatic PET species resulting from implementation of the Fatback Project because there would be no direct or indirect effects of the Fatback Project on any aquatic PET species because there are no aquatic PET species within the aquatic analysis area.

Determination of Effect - The Fatback Timber Project would have no effects to any aquatic proposed, endangered, or threatened species because the project design features would prevent visible sediment and herbicides from entering analysis area streams and no aquatic PET species occur within the aquatic analysis area. Consultation with the U.S. Fish and Wildlife Service is not required.

Table 3.7.3.2: Determination of effect of each alternative on the evaluated endangered, and threatened aquatic species

Species	Alternative A	Alternative B	Alternative C
Federally Threatened and Endangered Species			
No effects			

EFFECTS DETERMINATION FOR ALL PET SPECIES

This project **is not likely to adversely affect** the Indiana bat (*Myotis sodalis*) because it will meet Forest Plan standards for the protection of the Indiana bat. The project will have no effect on any other federally proposed or listed species.

CONSULTATION HISTORY

Consultation with the U.S. Fish and Wildlife Service **is required** and has not been completed.

3.8. Region 8 Sensitive Species

3.8.1. Botanical Sensitive Species

Boundaries of Botanical Analysis Area

Spatial - Because plants are rooted species that must be present in the activity areas to undergo effects, the analysis area for sensitive species was confined to the expected impact zone surrounding the activity areas of the project. The expected impact zone may be larger than the activity area because impacts such as increased sunlight and decreased humidity may extend beyond the areas undergoing active management. These effects can be estimated to extend into the surrounding forest a distance equal to half the height of the canopy, or about 40 – 50 feet beyond the boundaries of the activity areas.

Temporal - Past effects for sensitive plant species are dependent upon both the activity as well as the life history characteristics of the individual species. For example, species characteristic of disturbed, open habitats, would be expected to respond positively to activities such as road construction. Species characteristic of mature forest communities, however, would be expected to respond negatively to the same activities. Because each plant species has a unique life history, the temporal response to management activities must be evaluated on a species-by-species basis.

Species Evaluated and Rationale

All sensitive species listed by the Regional Forester (USFS, 2001) were also considered for this analysis.

Previous Survey Information

The Biotics Database was queried for sensitive plant species growing in the activity areas. The Biotics Database contained records for the sensitive species mountain catchfly, *Silene ovata*, and waterfan, *Hydrothyria venosa*, within one mile of the activity areas. Because mountain catchfly grows in rich cove forests, a common forest community in the activity areas, it will be assumed to be present, and undergo further analysis for direct and indirect effects. Waterfan is an aquatic species restricted to mountain streams, a habitat that could potentially be impacted by road maintenance at stream crossings. As a result, waterfan, should it occur in the botanical analysis area, could be directly or indirectly impacted by the project, and therefore the species will undergo further analysis.

New Surveys or Inventories Conducted

Field surveys for sensitive plant species were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982).

One sensitive species was located during the field surveys: one individual of *Juglans cinerea*, the butternut, was located in Stand 124-21, on Foster Ridge (Table 3.8.1.1). No other sensitive plant species were located during the survey.

Table 3.8.1.1: Summary of sensitive plant species undergoing effects analysis for the Fatback Project (see Botanical Attachment B1 for a complete list of species evaluated)

Status	Species	Habitat	Reason for Effects Analysis
Sensitive	<i>Hydrothyria venosa</i>	Steams	Assumed to be present due to local records and suitable habitat near activity areas.
Sensitive	<i>Juglans cinerea</i>	Rich Cove Forest, Oak Hickory Forest	Located during the field survey at one location in an activity area.
Sensitive	<i>Silene ovata</i>	Rich Cove Forest, Mesic Oak-Hickory, Roadside	Assumed to be present due to local records and suitable habitat in the activity areas.

Effects of Alternatives on Botanical Sensitive Species

(1) Waterfan (*Hydrothyria venosa*)

The BCD contains over 70 records for *Hydrothyria venosa* in western North Carolina, primarily on the Pisgah and Nantahala National Forests. *Hydrothyria* grows in mountain streams.

Direct and Indirect Effects - Alternatives B and C may involve road and culvert work at several stream crossings, some of which may be upstream of *Hydrothyria* plants. Sediment from the work could affect *Hydrothyria* plants directly by inundating the plants or scouring them from the substrate. These effects are unlikely to extend more than 75 feet from the activity areas, and persist for 1 – 2 days, as determined in the aquatic analysis for sedimentation. In addition, sediment desposited in streams may potentially effect *Hydrothyria* populations indirectly, by inundating and scouring plants during storm flows, until the sediments are washed from the stream by the next high flow event, which occur, on average, approximately every 1.5 years (Jason Farmer, personal communication). No *Hydrothyria* plants, however, were located within 75 feet of an activity area during the field surveys. As a result, there should be no direct or indirect effects to any *Hydrothyria venosa* plants.

Impacts of Past, Ongoing and Foreseeable Actions - At least one past action on the Nantahala National Forest has potentially impacted populations of *Hydrothyria* during the past 1.5 years, the time period that impacts from current management practices can be expected to persist (Table 3.8.1.2). The Fatback entry area also contains one ongoing project, Road Projects Due to Storm Damage, that may impact populations of *Hydrothyria*. The Fatback entry area contains no foreseeable USFS or private actions that may impact *Hydrothyria* plants.

Table 3.8.1.2: Past and ongoing projects on the Nantahala National Forest that may impact populations of *Hydrothyria venosa*.

District	Project	Year	Determination of Effect
Highlands	Road Projects Due to Storm Damage	2005	<i>May impact individuals but no trend towards federal listing</i>
Wayah	Road Projects Due to Storm Damage	Ongoing	<i>May impact individuals but no trend towards federal listing</i>

Cumulative Effects - Because the action alternatives would produce no direct or indirect effects to populations of *Hydrothyria venosa*, the project will have no cumulative effects to the species.

(2) Butternut (*Juglans cinerea*)

Once fairly common throughout its range, the species is imperiled by the butternut canker, a disease that eventually kills the tree. The North Carolina Heritage Program currently does not track the species. As a result, the Biological Conservation Database contains no records for the species, and the conservation status of the species on the Nantahala National Forest is uncertain. In the Fatback area, *Juglans cinerea* was located at one site, in Stand 124-21, on Foster Ridge.

Direct and Indirect Effects - Although the tree grows in an activity area, all walnut trees would be excluded from timber activities. As a result, the tree would not undergo any direct effects. Because walnut trees are canopy trees that would be expected to grow best in full sunlight, opening the canopy with a regeneration harvest may indirectly improve the habitat for the species. These indirect effects are unlikely to extend beyond the activity areas, and would be expected to persist for approximately 10 years following regeneration harvest, the time necessary to re-establish a regenerating forest canopy.

Impacts of Past, Ongoing and Foreseeable Actions - No past actions on the Nantahala National Forest have impacted populations of *Juglans cinerea* since 1998, and the national forest contains no ongoing USFS projects that would potentially impact populations of *Juglans cinerea*. One past action on private land, a harvest activity on approximately 150 acres, south of Compartment 124 in the Carpenter Branch drainage, may have impacted an undetermined number of butternut trees. Two future activities on the Nantahala National Forest, the Welsh Timber and Wildlife Project on the Wayah RD and the Stecoah Gap Timber and Wildlife Project on the Cheaoh RD, may produce indirect, positive effects to the species by opening the forest, encouraging the growth of any *Juglans cinerea* trees growing in the stands. The activity areas contain no other ongoing or future activities on public or private land that may impact populations of *Juglans cinerea*.

Cumulative Effects - Because it would produce only indirect positive effects, the Fatback project would produce a positive cumulative effect to populations of *Juglans cinerea* on the Nantahala National Forest.

(3) Mountain Catchfly (*Silene ovata*)

The Biological Conservation Database contains 43 records for *Silene ovata* in western North Carolina, including eleven on the Nantahala National Forest. The species often grows in rich cove forests and forest edges at higher elevations. No populations of *Silene ovata* were located in the activity areas during the field surveys. Because of the proximity of existing records and the presence of suitable habitat in the activity units, however, the species was assumed to be present in the analysis areas.

Direct and Indirect Effects - Alternatives B and C would both regenerate rich cove forests, the primary habitat for *Silene ovata*. Regeneration activities may impact *Silene* plants directly through direct mortality from heavy equipment and skidding actions, or through changes to the forest habitat. These habitat changes include increases in sunlight and temperature, and decreases in soil moisture, all of which would increase the transpiration stress on the plants. Regeneration activities may also impact *Silene* plants indirectly, by changing the habitat from open forest to a dense stand of regenerating saplings. These regenerating stands often create thick shade, which can lower herbaceous diversity in the stands. Regeneration harvests may also impact the breeding characteristics of understory plants by removing breeding individuals from the local population.

Because impacts to rich cove species are unlikely to extend beyond the harvest activities, direct and indirect effects would be confined to the activity areas. Effects to rich cove species, such as *Silene*, can be expected to persist for approximately 40 years following regeneration harvest, the minimal time necessary for understory herbs to recover to pre-treatment levels (see Biological Evaluation). For the purposes of this analysis, the group selection harvests proposed in Alternative C will be considered regeneration harvests because, over the timber cycle, group harvests produce the same open conditions as two-age, regeneration harvests.

Alternatives B and C would also thin rich cove forests. Because thinning requires less intensive procedures, and retains relatively high amounts of canopy cover compared to regeneration harvests, thinning is unlikely to directly or indirectly impact *Silene ovata* plants, and may improve the habitat for the species by increasing sunlight and nutrients for understory plants.

Alternative B would impact 130 acres of rich cove forest potentially containing populations of *Silene ovata* through two-age regeneration harvests, while Alternative C would impact 510 acres of rich cove forest through two-age regeneration harvests and group selection harvests.

Impacts of Past, Ongoing and Foreseeable Actions - According to previous NEPA analyses, two past actions on the Nantahala National Forest may have impacted populations of *Silene ovata* since 1997 (Table 2.2-3). These two actions, both prescribed burns, may have positively affected populations by opening the forest community, increasing light to the herbaceous layer.

Table 3.8.1.3: Past projects on the Nantahala National Forest impacting populations of *Silene ovata*

District	Project	Year	Determination of Effect
Highlands	Locust Gap Burn	2003	Possible positive indirect effects
Highlands	Coward Bald Burn	2000	Possible positive indirect effects

One future activity on the Nantahala National Forest, the Welsh Timber and Wildlife Project on the Wayah RD, may produce direct, negative effects to a roadside population of the species through road maintenance. The activity areas contain no other ongoing or future activities on public or private land that may impact populations of *Silene ovata*.

Cumulative Effects - Although no populations were located in the activity areas, Alternatives B and C may impact populations of *Silene ovata*, should they occur in the regeneration and group selection units, primarily through direct mortality from harvest activities and habitat change, and indirect mortality through forest regeneration. Past, ongoing and future actions on the Nantahala National Forest may have negatively impacted one population of *Silene ovata* and positively impacted two populations. Because western North Carolina contains at least 43 undisturbed populations of *Silene*, however, the Fatback project is unlikely to cumulatively affect the viability of the species across the national forest.

Determination of Effect - Regeneration harvests may impact individuals of the sensitive species *Silene ovata*, should they occur in the activity areas, but the project is unlikely to result in a trend towards federal listing or a loss of viability for the species, because the national forest contains a relatively high number of undisturbed populations. Regeneration harvests may also indirectly improve habitat for the sensitive species *Juglans cinerea*, by opening the forest canopy over the trees. Because no other sensitive plant species were located in the activity areas, there should be no direct, indirect or cumulative effects to any other sensitive plant species (Table 3.8.1.4).

Table 3.8.1.4: Determination of effect of each alternative on the evaluated sensitive plant species

USFS Status	Species	Alternative A	Alternative B	Alternative C
Sensitive	<i>Juglans cinerea</i>	No impact.	May produce indirect, positive effects	May produce indirect, positive effects
Sensitive	<i>Silene ovata</i>	No impact.	May impact individuals*	May impact individuals*
Sensitive	<i>Hydrothyria venosa</i>	No impact.	No impact	No impact

*May impact individuals, but unlikely to cause a trend towards federal listing or a loss of viability across the national forest.

3.8.2. Terrestrial Wildlife Sensitive Species

Species Evaluated and Rationale

Sensitive species considered in this analysis are those identified by the Regional Forester for which population viability is a concern (August, 2001). The objective is to manage habitats for all existing native and desired nonnative species in order to maintain at least viable populations of such species (FSM 2670.12). Adverse effects must not create trends towards federal listing. All sensitive terrestrial animal species that might occur on the Nantahala National Forest were considered (Wildlife Attachment 3). Potentially affected species were identified from information on habitat relationships, element occurrence records of sensitive animals as maintained by the North Carolina Natural Heritage Program and field data on the project activity areas. Species with only incidental, migrant or historic occurrences in Macon County were not considered further. All but eight of these were excluded from further analysis due to lack of suitable habitat in the activity areas, or being outside the known range of the species (Wildlife Attachment 1). No species were known to occur in the project activity areas prior to the surveys undertaken for this project.

Table 3.8.2.1. Known and potential sensitive species evaluated for this project

Northern bush katydid (<i>Scudderia septentrionalis</i>)	Insect	Treetops at edges of broadleaved forest	May occur
Rock-loving grasshopper (<i>Trimerotropis saxatilis</i>)	Insect	Lichen covered rock outcrops	May occur
Frosted elfin (<i>Callophrys irus</i>)	Butterfly	Open woods and borders, in dry situations	May occur
Diana fritillary butterfly (<i>Speyeria diana</i>)	Butterfly	Deciduous and pine woodlands	May occur
Glossy supercoil (<i>Paravitrea placentula</i>)	Snail	Leaf litter on wooded hillsides and ravines	May occur
S. appalachian salamander (<i>Plethodon teyahalee</i>)	Amphib.	Moist forests at all elevations	May occur
Eastern small-footed bat (<i>Myotis leibii</i>)	Mammal	Roosts in hollow trees in summer	May occur
Southern water shrew (<i>Sorex palustris puntulatus</i>)	Mammal	Small streams 12-15' wide above 3000'	May occur

New Surveys or Inventories Conducted

The project activity areas were evaluated as suitable habitat for sensitive species. Proposed activity areas were surveyed for the presence of special habitats (such as wetlands, boulder fields, caves or mines) that could be adversely affected by project activities. No special habitats were located.

The terrestrial snail fauna was sampled in each area proposed for 2-age regeneration harvesting in June of 2006 to determine the possible occurrence of the glossy supercoil. These sites were surveyed because canopy removal could adversely affect the habitat of this species. Dan Dourson, an experienced field biologist from Stanton, Kentucky, collected the animals and identified them.

Species For Which Inventories Not Conducted and Justification

The need for surveys for individual PETS species was considered in light of direction found at FSM 2672.43, Supplement No. R8-2600-2002-2. Inventories were not conducted for the katydid, grasshopper, two butterflies, the southern Appalachian salamander, the eastern small-footed bat or the southern water shrew. These seven species were considered as potentially occurring within the project activity areas. Habitat is not limited across the Forest, so information on the number and location of individuals in this particular area would not change the assessment of effects to viability of the population.

Effects of Alternatives by Species

(1) Northern bush katydid (*Scudderia septentrionalis*)

Direct and Indirect Effects - This species utilizes treetops at the edges of broadleaved forest. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. The habitat may be impacted positively by the creation of new forest edges around seven regeneration units and thirteen wildlife openings in Alternative B, and five regeneration units, 47 group selection units and thirteen wildlife openings in Alternative C. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat created through past regeneration harvesting is no longer present as these stands have matured. There are no known ongoing or future projects what would create this habitat.

Cumulative Effects - The cumulative effects would be the same as the direct and indirect effects.

Determination of Effect - Forest-wide this species has probably benefited from past forest management, which created new forest edge to offset the concurrent maturation of other forest stands. This project may impact individuals of this species, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(2) Rock-loving grasshopper (*Trimerotropis saxatilis*)

Direct and Indirect Effects - This species utilizes lichen-covered rock outcrops. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been lost in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – Cumulative effects would be a slight increase in habitat lost due to road improvement work for Alternative B and none for Alternative C.

Determination of Effect - Forest-wide this species has lost habitat due to wildlife opening construction and road construction/reconstruction. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(3) Frosted elfin (*Callophrys irus*)

Direct and Indirect Effects - This species is a butterfly, which occurs in open woods and borders in dry situations. Alternative A would have no effect. Tree felling operations, could impact individuals through direct crushing. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been lost in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – Cumulative effects would be a slight increase in habitat lost due to road improvement work for Alternative B and none for Alternative C.

Determination of Effect - Forest-wide this species has lost habitat due to wildlife opening construction and road construction/reconstruction. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(4) Diana fritillary butterfly (*Speyeria diana*)

Direct and Indirect Effects - This species occurs in different forest types, but seems to prefer roadsides through cove forests. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. A small amount of habitat may be created by road improvement work for Alternative B, but not for Alternative C. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been created in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – Cumulative effects would be a slight increase in habitat due to road improvement work for Alternative B, but not for Alternative C.

Determination of Effect - Forest-wide this species has probably benefited from past forest management, which created new forest roadside habitat. This project may impact individuals of this species, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(5) Glossy supercoil (*Paravitrea placentula*)

No glossy supercoils were located in project activity areas; therefore, there will be no direct or indirect effects to this species. Since there are no direct or indirect effects, there will be no cumulative effects.

(6) Southern Appalachian salamander (*Plethodon teyahalee*)

Direct and Indirect Effects - This species is found in moist forests in the southwestern mountains at all elevations. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. Habitat may be lost by road improvement work, regeneration activities and brushy openings, which include 185 acres in Alternative B, and 192 acres in Alternative C. Habitat will be temporarily decreased where insolation increases from the removal of canopy trees. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat has been lost in the past due to road construction activities and past regeneration activities, which reduced habitat on 158 acres in the past 20 years. Stands older than 20 years have probably achieved canopy cover and reformation of the litter layer sufficient to support salamander populations. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - Habitat would exist throughout the area, except in the past and proposed regeneration areas and the road corridor, which total 434 acres in Alternative B and 441 acres in Alternative C, which are less than 10% of the 5 compartments. Much suitable habitat would remain. This cumulative effect will soon decrease, as many of these acres are close to 20 years old now and will shortly age into the condition of suitable habitat.

Determination of Effect - This species is thought to be fairly common across Graham, Swain, Cherokee, Clay and Macon counties. Dr. Richard Highton's collection at the Smithsonian lists 1007 records for this species from 10 counties in North Carolina, at elevations from 1160 feet to 6000 feet. This includes 267 records on the Nantahala National Forest, distributed across the same 10 counties and four ranger districts. Since the species is widely distributed, potentially occupying nearly a half million acres of National Forest land, current management is unlikely to affect the availability of suitable habitat.

Forest-wide this species has lost habitat due to wildlife opening construction road construction/reconstruction and regeneration activities. The concurrent maturation of younger stands into suitable habitat has offset this loss because forest plan standards that limit the amount of regeneration allowed in any compartment, management area and analysis area prevent cumulative effects to this species in a given area. Since the species is widely distributed, potentially occupying nearly a half million acres of National Forest land, current management practices are unlikely to affect the availability of suitable habitat. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(7) Eastern small-footed bat (*Myotis leibii*)

This species is thought to roost in hemlock forests, rock crevices, caves, mines, bridges or buildings, and uses other habitats for feeding. Little is known regarding summer nursery sites and summer foraging or roosting habitat. Suitable maternity habitat may be lacking across the Forest, if otherwise appropriate sites are not exposed to the sun.

Direct and Indirect Effects - Alternative A would result in a loss of foraging habitat as existing openings mature. In the action alternatives tree felling operations could impact individuals through direct crushing. Creating openings in the canopy could improve feeding habitat for forest bats, which are attracted to the insects supported by grassy/brushy habitat areas. No special roosting habitats, such as hemlock forests, rock crevices, caves, mines, bridges or buildings will be adversely affected. Habitat could be created by regeneration activities and brushy openings, which include 185 acres in Alternative B, and 292 acres in Alternative C, which are about 3% of the 5 compartments. Road construction and reconstruction should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat has been created in the past due to regeneration activities on 158 acres in the past 20 years. These acres have matured and are no longer desirable feeding habitat. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - The proposed action plus the existing road corridor would result cumulative effects of 276 acres in Alternative B and 283 acres in Alternative C. This is about 5% of the 5 compartments.

Determination of Effect - This species has been collected from most counties in western North Carolina, although it is rarely trapped during mist-netting surveys. The species has probably benefited from past forest management, which created new forest openings to offset the concurrent maturation of other forest stands. This project may impact individuals of this species, but benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(8) Southern water shrew (*Sorex palustris punctulatus*)

Direct and Indirect Effects - This species is known to occur on small first order streams up to 12-15' wide, with rhododendron cover across Macon, Swain and Clay counties. Alternative A would have no effect. Culvert replacement across suitable streams could adversely affect individuals through direct crushing and effect habitat through direct loss and sedimentation. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat. Under Alternatives B and C, two culverts will be replaced; however there will be minimal direct loss of habitat, and the sedimentation effects would not be measurable approximately 75 feet below each crossing. There will be a temporary increase in suspended sediments, but the effects should diminish as the stream crossings and new stream banks are re-vegetated.

Effects of Past, Ongoing and Future Projects - The existing condition of the aquatic resources is the result of all past effects. Roads were constructed and at least 25 culverts were installed in suitable streams for these projects. The effects of these culvert installations would have included direct loss of habitat of about 30 feet and sedimentation of approximately 75 feet of stream at each crossing. The

sedimentation effects, however, would have exhibited short-term impacts and would have dissipated in the time since management activities occurred in the analysis area.

In addition, approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). This will result in minimal direct loss of habitat. These culvert installations will cause a slight increase in sediment within the streams, but this effect will dissipate as it moves downstream and following the next bankfull flow event. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – The cumulative effects would include the effects of constructing stream crossings for this and past projects, and culvert installations for this project and the hurricane damage repairs. Cumulative direct loss of habitat is limited to the existing 25 stream crossings. Sedimentation effects from Alternatives B and C include the 23 culverts being replaced for storm damage repairs (2004 hurricane damage) and the two culverts being replaced for this project. This impact would have short term effects, and would be limited to short sections of project area streams, affecting approximately 75 feet at each site, and will dissipate as it moves downstream and following the next bankfull flow event.

Determination of Effect - This species has been recorded from nine sites on the Nantahala, most of these being recent records from Macon County from Dr. Joshua Laerm and his students surveying small mammal populations. The species is thought to be widespread, but occurs in low densities and is difficult to capture. Alternative B may impact individuals of this species and adversely affect the habitat. The adverse effects would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

Table 3.8.2.2. Determination of effect of each alternative on the evaluated sensitive species

Species	Alternative A	Alternative B	Alternative C
Northern bush katydid	No impacts	May impact*	May impact
Rock-loving grasshopper	No impacts	May impact	May impact
Frosted elfin	No impacts	May impact	May impact
Diana fritillary butterfly	No impacts	May impact	May impact
Glossy supercoil	No impacts	No impacts	No impacts
Southern Appalachian salamander	No impacts	May impact	May impact
Eastern small-footed bat	No impacts	May impact	May impact
Southern water shrew	No impacts	May impact	No impacts

*May impact individuals but is not likely to cause a trend to federal listing or a loss of viability across the Forest

The project may impact individuals of the northern bush katydid (*Scudderia septentrionalis*), rock-loving grasshopper (*Trimerotropis saxatilis*), frosted elfin (*Callophrys irus*), Diana fritillary butterfly (*Speyeria diana*), southern Appalachian salamander (*Plethodon teyahalee*), eastern small-footed bat (*Myotis leibii*), and the southern water shrew (*Sorex palustris puntulatus*), but will not impact their viability across the Forest. This project will not impact any other sensitive species. No cumulative effects on species viability across the Forest will result from this project.

3.8.3. Aquatic Sensitive Species

Species Evaluated and Rationale

Twelve aquatic sensitive species are either known to occur or may occur on the Nantahala National Forest (Aquatic Attachment 1a). The North Carolina Natural Heritage Database was queried for occurrences of sensitive species in Macon County. Seven sensitive aquatic species remained after this initial filter. These seven species were then filtered using their habitat information and the availability of these habitats within the aquatic analysis area. Based upon the results of this filtering process one sensitive aquatic species was evaluated in this analysis (Table 3.8.3.1). This species was analyzed for this project because it is either known to occur within the project area or suitable habitat exists for the species. Species that do not have suitable habitat within the project area were eliminated from further analysis (Aquatic Attachment 1b).

Previous Survey Information

Previous surveys for sensitive aquatic species have been conducted within the Fatback aquatic analysis areas. These surveys consist of mussel surveys by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the North Carolina Wildlife Resources Commission (NCWRC). Electrofishing surveys have also been conducted in analysis area waters by the NCWRC and the USFS. Aquatic insects have been monitored by the NCDENR at fixed locations within the aquatic analysis area (NCDENR, 2005). Previous surveys within the aquatic analysis area indicate that *Cambarus georgiae* is known to occur within the Cartoogechaye Creek watershed (Butler 2002; page 28).

Table 3.8.3.1: Known and potential sensitive aquatic species in Macon County evaluated for the Fatback Project (see also Aquatic Attachment 1)

Species	Type	Habitat	Occurrence
2001 Region 8 Regional Forester's Sensitive Species List			
<i>Cambarus georgiae</i>	Crustacean	Streams in Little Tennessee River watershed, Macon County	May occur in analysis area*

*May occur means 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.

Direct and Indirect Effects

Alternative A: Alternative A, the no-action alternative, would produce no direct, indirect, or cumulative effects to the aquatic sensitive species because there would be no ground disturbing activities proposed for this alternative.

Alternative B: The proposed wildlife opening rehabilitation, log landings, skid trail and skid road construction, and routine road maintenance would have no effects on any aquatic resources because these activities would be located outside of the riparian areas. In addition, any disturbed ground would be seeded to prevent erosion. Skid trails would not be located near any water sources and the trails would not require construction of a cut and fill slope; therefore, there would be very little ground disturbance that could produce sediment. Skid roads would avoid riparian areas and manage runoff with water bars. Following timber harvest, skid trails and skid roads would be seeded and closed to prevent visible sediment from entering any streams. The routine road maintenance would involve minor road

surface repair, placement of gravel, and reseeded. These actions are unlikely to increase measurable sedimentation because the work would be done during dry periods and the disturbed soil would be either hardened with gravel or seeded to control erosion.

Most of the proposed activities will have no effects on any aquatic resources because these activities would be located outside of the riparian areas and effects of timber management would be avoided by implementation of the project design features and BMP's. No road construction or road reconstruction is proposed for this project; therefore, this project would have no effects upon the analysis area waters. Culvert installations within the project area streams would cause a slight increase in sediment within the stream channels.

In general, the duration of the effect of sedimentation depends upon stream type (stream energy available to move particles) and storm runoff magnitude and frequency. The effect could move downstream although it would dissipate the further removed it is from the source. Higher gradient stream channels may have these sediments scoured (i.e. flushed from the substrate and deposited in low velocity areas) and the effect would be dissipated throughout the stream channel.

A small quantity of sediments may enter UT 1 Allison Creek during culvert installation; however, these effects would not be measurable approximately 75 feet below the crossing. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter UT 1 Allison Creek. Effects from the culvert installation would be immeasurable at the confluence with the Allison Creek because the culvert installation would occur approximately 0.1 mile from the mouth of Allison Creek. Additional culverts may be installed within analysis area waters as needed. The effects of these culverts would be the same as described for the culvert installations within UT 1 Allison Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the sensitive species, *Cambarus georgiae*, within the UT 1 of Allison Creek by partially filling pools. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

In accordance with the Vegetation Management Final Environmental Impact Statement (VM-FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of triclopyr can be lethal at concentrations of 91 ppm (VM-FEIS). Concentrations of glyphosate at 24 ppm can be lethal to some aquatic organisms (VM-FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations ≤ 0.0072 ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in approximately 65 days (VM-FEIS). The 30 foot buffers would prevent the Estimated Environmental Concentrations of glyphosate or triclopyr from reaching the LC₅₀ (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM-FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (33 feet) resulted in concentrations of ≤ 0.0072 ppm. These concentrations are too low to produce the lethal or sublethal effects described above. Project area streams would be protected by a 30 foot buffer (minimum) which would prevent the concentrations of

these herbicides from accumulating within the project area streams in measurable quantities. There would be no effects to the aquatic sensitive species because the amount of herbicides in project area waters would be immeasurable.

The proposed activities within the aquatic analysis area may impact individuals of the aquatic sensitive species during culvert installations and within approximately 75 feet of stream below each crossing but these impacts would not cause a trend to federal listing because the small amount of sediment entering project area streams would be scoured from the channel during the next bankfull flow event.

Alternative C: The effect of this alternative would be the same as the effects described for Alternative B because there would be no new road construction or reconstruction. The group selection harvest areas proposed for this alternative would have no effects to the aquatic resources because the groups would be located outside of riparian areas. The effects of culvert installations would be the same as in Alternative B. Alternative C may impact individuals of the aquatic sensitive species during culvert installations and within 75 feet of stream below each crossing but these impacts would not cause a trend to federal listing because the small amount of sediment entering project area streams would be scoured from the channel during the next bankfull flow event.

Impacts of Past, Ongoing and Foreseeable Actions - Previous, ongoing, and foreseeable future activities within the Fatback Project area have been described in the PET discussion (Section 3.7.3) and would be the same for the aquatic sensitive species.

Cumulative Effects - The cumulative effects of the Fatback Project would include the effects of culvert installations for this project and the culvert installations for the Hurricane Damage Repairs. Implementation of Alternative A would have no impacts on any aquatic sensitive species because there would be no road construction, reconstruction, or culvert installations. Alternative B and Alternative C may impact individuals of the aquatic sensitive species, *Cambarus georgiae*, but would not cause a trend to federal listing or a loss of viability of the species because the effects of culvert installations would have short term effects and would be limited to short sections of the project area streams.

Determination of Effect - The sensitive species *Cambarus georgiae* may occur within the aquatic analysis area. This project may impact individuals of the sensitive aquatic species but is not likely to cause a trend to federal listing or a loss of viability of the above species because habitats for this species are common across its range and project design features would minimize impacts to this species by preventing visible sediment from entering the aquatic analysis area streams in measurable quantities.

Table 3.8.3.2: Determination of effect of each alternative on the evaluated sensitive aquatic species

Species	Alternative A	Alternative B	Alternative C
2001 Region 8 Regional Forester’s Sensitive Species List			
<i>Cambarus georgiae</i>	No impact	May impact*	May impact*

*May impact individuals but would not cause a trend to federal listing or a loss of viability.

EFFECTS DETERMINATION FOR ALL SENSITIVE SPECIES

The project may impact individuals of *Cambarus georgiae*, *Silene ovata*, *Juglans cinerea*, the northern bush katydid (*Scudderia septentrionalis*), rock-loving grasshopper (*Trimerotropis saxatilis*), frosted elfin (*Callophrys irus*), Diana fritillary butterfly (*Speyeria diana*), southern Appalachian salamander (*Plethodon teyahalee*), eastern small-footed bat (*Myotis leibii*), and the southern water shrew (*Sorex*

palustris puntulatus), but will not impact their viability across the Forest. This project will not impact any other sensitive species. No cumulative effects on species viability across the Forest will result from this project.

3.9. Forest Concern (FC) Species Evaluation

3.9.1. Botanical FC Species

Boundaries of Botanical analysis area

Spatial - Because plants are rooted species that must be present in the activity area to suffer effects, analysis area for direct, indirect, past and cumulative effects to forest concern species were confined to areas undergoing USFS management activities. Forest concern species are analyzed for viability at the forest level.

Temporal - Past effects for forest concern species are dependent upon both the activity as well as the life history characteristics of the individual species. For example, species characteristic of disturbed, open habitats, and would be expected to respond positively to activities such as road construction. Species characteristic of mature forest communities, however, would be expected to respond negatively to the same activities.

Botanical Species Evaluated and Rationale

All forest concern species listed by the National Forests in North Carolina for the Nantahala and Pisgah National Forests were considered for this analysis (USFS, 2002; Botanical Attachment 2). Only forest concern species located inside the activity area during the field surveys, or with previous collection data inside the activity area, were analyzed in detail.

Previous Survey Information

The Biotics Database (BD) was queried for forest concern plant species growing in the activity area. It contained records for the forest concern species Blue Ridge bindweed (*Calystegia catesbiana* ssp. *sericata*) and American columbo (*Frasera caroliniensis*) within one mile of the activity area. Both were subsequently located during field surveys, and will be analyzed for direct and indirect effects (Table 3.9.1.1).

New Surveys or Inventories Conducted

Field surveys for forest concern plant species were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982).

Five forest concern species were located during the field surveys: one population, comprised of at least six subpopulations, of Blue Ridge bindweed (*Calystegia catesbiana* ssp. *sericata*), growing along roadsides throughout the analysis area, one small population of American columbo (*Frasera caroliniensis*) in the Jones Creek portion of Compartment 124, one large population of green wood orchid (*Platanthera flava* var. *herbiola*) in the Jones Creek portion of Compartment 124, two small populations of purple sedge (*Carex purpurifera*) in the Cloer Branch portion of Compartment 111, and one small population of widely scattered Cumberland azaleas (*Rhododendron cumberlandense*) in the

Rocky Cove portion of Compartment 111. All of these species were located either inside or near activity units, and will be analyzed for effects (Table 3.9.1.2). No other forest concern species were located during the field surveys, and therefore will not be analyzed further.

Table 3.9.1.2: Summary of forest concern species undergoing effects analysis for the Fatback Project. See Attachment 2 for a complete listing of forest concern plant species evaluated for the project

Species	Habitat	Reason for Effects Analysis
<i>Calystegia catesbiana</i> ssp. <i>sericata</i>	Roadside and Edge Habitats	Located during field surveys on forest roads leading to activity area
<i>Carex purpurifera</i>	Rich Cove Forest, Montane Alluvial Forest	Located during field surveys inside activity area
<i>Frasera caroliniensis</i>	Mesic Oak-Hickory Forest	Located during field surveys inside an activity area
<i>Rhododendron cumberlandense</i>	Grassy Bald, Heath Bald	Located during field surveys inside, or adjacent to, activity area
<i>Platanthera flava</i> var. <i>herbiola</i>	High Elevation Seep, Grassy Bald, Roadside, Northern Hardwood Forest,	Located during field surveys inside an activity area

Effects of Alternatives on Botanical Forest Concern Species

(1) Blue Ridge Bindweed (*Calystegia catesbiana* ssp. *sericata*)

The Biotics Database contains 40 records for *Calystegia catesbiana* ssp. *sericata*. The Nantahala National Forest contains 31 documented populations, including the population in the Fatback analysis area. The species usually grows in highly disturbed habitats, such as roadsides.

Direct and Indirect Effects - Alternatives B and C would maintain roads near *Calystegia* plants. Road maintenance may impact individual plants of *Calystegia* by direct mortality from heavy equipment. Because the plants sprout readily from deeply rooted rhizomes, however, direct effects will probably be short-lived, and unlikely to persist beyond 5 years. Because direct mortality would occur over a relatively short time period, indirect effects to gene flow among local populations would be minimal, and unlikely to affect the viability of the species.

Impacts of Past, Ongoing and Foreseeable Actions - Eight past actions on the Nantahala National Forest have impacted populations of *Calystegia* in the past 5 years (Table 3.9.1.3). Three of the past projects may have improved habitat for the species by increasing the amount of disturbed ground and open habitat in the project area. As a result, only five projects in the past 5 years may have negatively impacted populations of *Calystegia* directly through road construction and maintenance.

Table 3.9.1.3: Past projects on the Nantahala National Forest impacting populations of *Calystegia catesbiana* ssp. *sericata*

District	Project	Year	Determination of Effect	Level of Effect
Tusquitee	Eagle Fork Timber and Wildlife Project	2006	<i>May impact individuals but no trend towards federal listing</i>	Direct Effects
Highlands	Locust Gap Prescribed Burn	2003	<i>May impact individuals but no trend towards federal listing</i>	Direct and Indirect Effects

Wayah	Mulberry Road DOT	2003	<i>May impact individuals but no trend towards federal listing</i>	Direct and Indirect Effects
Tusquitee	FY2002 TSI	2002	Possible positive indirect effects	Direct and Indirect Effects
Wayah	County Line TS	2002	<i>May impact individuals but no trend towards federal listing</i>	Direct and Indirect Effects
Wayah	Onion Mountain DOT	2002	<i>May impact individuals but no trend towards federal listing</i>	Direct and Indirect Effects
Highlands	Appalachian ATV Adventures	2001	Possible positive indirect effects	Direct and Indirect Effects
Tusquitee	FY2001 TSI	2001	Possible positive indirect effects	Direct and Indirect Effects

The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Calystegia*. One future project on the Wayah RD, the Welch Timber and Wildlife Project, may negatively impact roadside populations of *Calystegia* through road maintenance.

Cumulative Effects - The cumulative effects of Alternatives B and C, primarily decreases in the number of plants in the activity areas over a period of 5 years through direct effects, would represent 15% [6 of 41] of the documented populations of *Calystegia* on the national forest.

Determination of Effect - Because the national forest contains at least 35 undisturbed populations of *Calystegia*, however, the Fatback Project is unlikely to impact the viability of the species across the forest.

(2) Purple Sedge (*Carex purpurifera*)

The Biological Conservation Database contains five records for *Carex purpurifera*, all of which occur on the Nantahala National Forest. These records do not include the population located in the Fatback areas for this analysis. The species usually grows in rich cove forests.

Direct and Indirect Effects - Alternatives B and C propose regeneration harvests in units containing *Carex purpurifera*. Direct effects would include damage and mortality from heavy equipment. The recovery rate of *Carex purpurifera* from harvest activities is not known, but the presence of the species in previously-harvested units suggests it can survive or reseed into regeneration units, presumably over the same time period necessary to re-establish the open conditions associated with pre-harvest conditions, a period estimated at 40 years. As a result, direct effects to *Carex purpurifera* would be expected to persist for approximately 40 years following harvest.

Direct mortality from harvest activities will reduce the number of plants in the population, producing indirect effects to the genetics of the neighboring plants. These indirect effects may include both decreases in the gene pool as well as decreases in the gene flow among neighboring plants, potentially resulting in more inbreeding, decreased seed set, and less vigorous seedlings. These effects will probably persist until the pre-treatment population is restored, estimated above at 40 years following harvest, and could affect *Carex purpurifera* plants growing in rich cove forest locations within a one mile radius of the activity areas, an area of approximately 3322 acres, due to potential decreases in pollen flow.

Impacts of Past, Ongoing and Foreseeable Actions - Two past actions on the Nantahala National Forest may have impacted populations of *Carex purpurifera* since 1997 (Table 3.9.1.4). Both of these projects fall within the estimated 40 year period for direct and indirect effects. The effects from the King Land Exchange were based on populations assumed to be present on the site. The effects from the Cable Cove Waterline probably encompassed a few plants over < 0.1 acres. The Nantahala National Forest contains one ongoing project potentially impacting *Carex purpurifera*, the Farmer Branch Timber Sale. The Farmer Branch area contains an extensive population of *Carex purpurifera*, growing in previously-disturbed forests.

Table 3.9.1.4: Past projects on the Nantahala National Forest potentially impacting populations of *Carex purpurifera*. The determination of effect comes from USFS NEPA analyses for the projects

District	Project	Year	Determination of Effect	Level of Effect
Wayah	King Land Exchange	2002	May impact individuals but no trend towards federal listing	Direct and Indirect Effects
Tusquitee	Cable Cove Waterline	2002	May impact individuals but no trend towards federal listing	Direct and Indirect Effects

The analysis area contains one past action on private land, a regeneration harvest on approximately 150 acres of rich cove forest, that may have impacted *Carex purpurifera* plants over the past few years. The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Carex purpurifera*.

Cumulative Effects - The cumulative effect of regeneration harvest, primarily decreases in the number of plants in the activity areas, and decreases in genetic flow among neighboring plants, may effect *Carex purpurifera* plants over an area of approximately 3452 acres under Alternative B, and 3832 acres under Alternative C. These effects would persist for approximately 40 years, the time period necessary to restore the open conditions of the preharvest forest community.

Determination of Effect - The national forest contains at least three undisturbed populations of *Carex purpurifera*, not including the new populations located during the Fatback project. At least one population is extensive. In addition, the species appears to be resilient to disturbance. As a result, the Fatback Project may impact individuals, but is unlikely to cause a trend toward federal listing or loss of viability for the species.

(3) American Columbo (*Frasera caroliniensis*)

The BD contains 21 records for *Frasera caroliniensis* in western North Carolina, including ten populations on the Nantahala National Forest. *Frasera* grows in open forests, although it can also be found in openings and along roadsides.

Direct and Indirect Effects - Alternatives B and C propose wildlife opening maintenance and pond construction near *Frasera* plants in the Jones Creek area. These activities may impact a few individuals of *Frasera* by direct mortality from heavy equipment. Because the affected plants are both large and long-lived, these direct effects can be expected to persist for the lifetime of the plants, estimated at 15 years. Because the number of plants directly affected would be minimal compared to the number of unaffected plants in the area, indirect effects to gene flow among local populations would be inconsequential, and unlikely to affect the viability of the species.

Impacts of Past, Ongoing and Foreseeable Actions - Four past actions on the Nantahala National Forest have impacted populations of *Frasera* since 1997 (Table 3.9.1.5). All of the projects fall within the estimated 15 year time period for direct effects. One of the past projects may have improved habitat for the species by increasing the amount of open forest in the project area. As a result, only three past projects may have negatively impacted populations of *Frasera*, primarily directly through road construction and maintenance.

Table 3.9.1.5: Past projects on the Nantahala National Forest impacting populations of *Frasera caroliniensis*

District	Project	Year	Determination of Effect	Level of Effect
Tusquitee	Eagle Fork TS	2006	<i>May impact individuals but no trend towards federal listing</i>	Direct Effects
Tusquitee	Chatuge Lake Biking/Hiking Trail	2004	<i>May impact individuals but no trend towards federal listing</i>	Direct Effects
Tusquitee	FY2002 TSI	2002	Possible positive indirect effects	Direct Effects
Wayah	Onion Mountain DOT	2002	<i>May impact individuals but no trend towards federal listing</i>	Direct and Indirect Effects

The analysis area contains one past action on private land, a regeneration harvest on approximately 150 acres of rich cove forest, that may have impacted *Frasera* plants over the past few years. The Nantahala National Forest also contains one future action, the Welsh Timber and Wildlife Project on the Wayah RD, that may negatively impact populations of *Frasera* through two-age regeneration harvests. The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Frasera*.

Cumulative Effects - The cumulative effects of Alternatives B and C, primarily decreases in the number of plants in the activity areas over a period of 15 years through direct effects, would represent 19% [4 of 21] of the documented populations on the national forest.

Determination of Effect – Because the national forest contains at least 17 undisturbed populations of *Frasera*, and many of these populations, including the population in the Jones Creek area, are extensive, numbering in the thousands of individuals, the Fatback project is unlikely to impact the viability of the species across the forest.

(4) Cumberland Azalea (*Rhododendron cumberlandense*)

The Biological Conservation Database contains five records for *Rhododendron cumberlandense*, all of which occur on the Nantahala National Forest. These records do not include the population located in the Fatback area for this analysis. The species usually grows in balds and natural openings at high elevation. In the analysis area, most of the plants grew along roadsides leading to activity areas. Only a few plants grew in regeneration units.

Direct and Indirect Effects - Alternatives B and C propose regeneration harvest in units containing *Rhododendron cumberlandense*. These alternatives will also maintain roads next to roadside subpopulations of the species. Direct effects would initially include damage and mortality from heavy equipment, and subsequently include potential mortality due to the dense canopy conditions of regenerating forests. The recovery rate of *Rhododendron cumberlandense* from harvest activities is not known, but the presence of the species in open and edge habitats, such as roadsides, suggests it can tolerate or benefit from relatively open conditions. As a result, direct effects to *Rhododendron*

cumberlandense growing along roadsides should be minimal, and be expected to persist for a relatively short time, probably no more than five years. Direct effects to *Rhododendron cumberlandense* growing in regeneration units may be more severe, and persist until the re-establishment of the open conditions characteristic of the preharvest community, estimated at 40 years following harvest.

Direct mortality may reduce the number of plants in the population, producing indirect effects to the genetics of the neighboring plants. Because most of the plants grow along roadsides, are unlikely to undergo mortality, and may benefit from some management activities, indirect effects to neighboring plants should be minimal, and unlikely to affect the viability of the species.

Impacts of Past, Ongoing and Foreseeable Actions - Two past actions on the Nantahala National Forest may have impacted populations of *Rhododendron cumberlandense* since 1997 (Table 3.9.1.6). Neither of the projects involved regeneration harvests, however, and the effects of the projects are probably best considered five-year impacts. In addition, both determinations were made on populations assumed to be present in the activity areas. One of the projects, the Burningtown Bald Prescribed Burn, may have benefited the species indirectly. Only one of the projects may have negatively impacted populations of *Rhododendron cumberlandense*, primarily indirectly by opening the forest community through prescribed fire.

Table 3.9.1.6: Past projects on the Nantahala National Forest potentially impacting populations of *Rhododendron cumberlandense*

District	Project	Year	Determination of Effect	Level of Effect
Wayah	Dirty John Prescribed Burn	2002	May impact individuals but no trend towards federal listing	Indirect Effects
Wayah	Burningtown Bald Prescribed Burn	1998	Possible positive indirect effects	Indirect Effects

The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Rhododendron cumberlandense*.

Cumulative Effects - The cumulative effects of Alternatives B and C, primarily decreases in the number of plants in the activity area over a period of 40 years through direct effects, would represent 33% [2 of 6] of the documented populations of *Rhododendron cumberlandense* on the national forest.

Determination of Effect - The national forest contains at least three undisturbed populations of *Rhododendron cumberlandense*. In addition, most of the population in the Fatback should not suffer direct mortality. As a result, the Fatback Project may impact individuals, but is unlikely to cause a trend toward federal listing or loss of viability for the species.

(5) Northern Green Orchid (*Platanthera flava* var. *herbiola*)

The Biological Conservation Database contains two non-historical records for *Platanthera flava* var. *herbiola*, both of which occur on the Nantahala National Forest. These records do not include the population located in the Fatback area for this analysis. The species usually grows in wetlands.

Direct and Indirect Effects - The population of *Platanthera* located in the Fatback analysis area will be excluded from all management activities, and protected by a 30 foot wide buffer zone. As a result, *Platanthera flava* var. *herbiola* should undergo no direct or indirect effects due to management activities.

Impacts of Past, Ongoing and Foreseeable Actions - No past actions on the Nantahala National Forest have impacted populations of *Platanthera flava var. herbiola* since 1997. The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Platanthera*.

Cumulative Effects - Because the Fatback project will produce no direct or indirect effects to the *Platanthera flava var. herbiola*, it will produce no cumulative effects to the species.

Determination of Effect - The Fatback Project will produce no effects to *Platanthera flava var. herbiola*.

Additional Species of Botanical Concern

(1) Yellowwood (*Cladrastis kentukea*)

The North Carolina State Heritage Program considers *Cladrastis kentukea* a watch list species. The species is not a sensitive or forest concern species. The number of populations on the national forest is not known, but *Cladrastis* appears to be rare on the Nantahala National Forest. The species was identified as an issue during internal scoping, and will undergo further analysis for effects.

Cladrastis grows as a subcanopy tree in very rich cove forests, and is considered intermediate in tolerance. Timber markers will favor *Cladrastis* as leave trees, and will leave trees and saplings in patches of forest, when the species is located growing in clusters. Contractors will be required to leave all *Cladrastis* plants during management activities.

Previous Survey Information - Because it is a watch list species, *Cladrastis* is not included in the North Carolina Heritage Program Biotics Database (BD). All previous survey information was provided on an anecdotal basis by Gary Kauffman, USFS botanist, and Joan Brown, USFS silviculturalist, both of whom worked on previous projects in the area.

New Surveys or Inventories Conducted - Field surveys for plants were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982).

Field surveys found *Cladrastis* plants in the following activity units: Stand 121-21, Stand 121-26, Stand 121-27, Stand 121-30, Stand 124-21, Stand 124-43, and Stand 124-44. Most locations consisted of isolated individuals. The largest cluster of plants was located in Stand 124-21, and consisted of several dozen individuals, many of which were <10 feet tall.

Direct and Indirect Effects - Alternatives B and C propose regeneration and group-selection harvests in units containing *Cladrastis kentukea*. Direct effects would potentially include incidental damage from heavy equipment. Because *Cladrastis* plants will be excluded from management activities, however, damage should be minimal, and produce negligible direct effects to the species. In addition, thinning should produce positive indirect effects to the species by opening the canopy, increasing the amount of light reaching subcanopy trees like *Cladrastis*. Improved light conditions may also increase the regeneration of the species.

Impacts of Past, Ongoing and Foreseeable Actions - The following projects have potentially impacted populations *Cladrastis kentukea* during the past 15 years: the Hazanet Timber and Wildlife Project on the Cheoah District in 2003, and the Poplar Cove, Ash Flats and Flatwoods Timber and Wildlife Projects in the Fatback area in the late 1980's and early 1990's. The analysis area contains one past action on private land, a regeneration harvest on approximately 150 acres of rich cove forest, that may

have impacted *Cladrastis* populations over the past few years. The Fatback analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Cladrastis kentukea*.

Cumulative Effects - Because the direct effects to the species should be negligible, the project should produce negligible cumulative effects to the species. The Fatback area was essentially clear cut in the early 1900's, and has undergone regeneration harvests in the 1960's, 1970's, 1980's and early 1990's. Despite these past actions, however, yellowwood remains relatively abundant in the Fatback area compared to other locations on the Nantahala National Forest.

A minimum of four populations of *Cladrastis kentukea* have been identified on the national forest: one in the Hazanet area on the Cheoah Ranger District, one in the Cable Cove area on the near Fontana Lake, one in the Fatback area, and one in Joyce Kilmer Memorial Forest (Gary Kauffman, personal communication). Two of these populations, the Hazanet population and the Fatback populations, may have been negatively impacted by regeneration harvests over the past fifteen years. The Fatback population, however, also underwent thinning treatments during these past activities, which may have produced indirect positive effects for the species. In addition, the proposed Fatback project may help offset possible negative effects from previous projects, due to the positive indirect effects of the proposed thinning treatments.

3.9.2. Terrestrial Wildlife Forest Concern Species Evaluation

Species Evaluated and Rationale

Forest concern species considered in this analysis are those included in the National Forests in North Carolina species list (January, 2002). These are species that occur or are likely to occur on the Forests and are identified by the North Carolina Natural Heritage Program as significantly rare. The objective is to manage habitats for all existing native and desired nonnative species in order to maintain at least viable populations of such species across the planning area (LRMP, Appendix K). All forest concern terrestrial animal species that might occur on the Nantahala National Forest were considered. Potentially affected species were identified from information on habitat relationships, element occurrence records of sensitive animals as maintained by the North Carolina Natural Heritage Program and field data on the activity areas. No species were known to occur in the project activity areas prior to the surveys undertaken for this project. The dusky azure butterfly (*Celastrina nigra*) is known to occur outside of the activity areas near Rock Gap in Compartment 121.

New Surveys or Inventories Conducted

The terrestrial snail fauna was sampled in each area proposed for regeneration harvesting in July of 2006 to determine the possible occurrence of rare mollusks. These sites were surveyed because canopy removal could adversely affect the habitat of these species. Dan Dourson, field biologist, Stanton, Kentucky, searched for these rare species and identified the animals collected.

Breeding bird surveys were conducted in May of 2006. A special emphasis was placed on determining whether Cerulean warblers occur in any activity areas. No Cerulean warblers were located. No other rare species were detected and no special habitats for any other forest concern species were located.

Species For Which Inventories Not Conducted and Justification -

Surveys were not conducted for species that are widely distributed across the Forest and not limited by the availability of suitable habitat.

Table 3.9.2.1. Known and potential forest concern species evaluated for this project

Dusky azure (<i>Celastrina nigra</i>)	Butterfly	Rich, moist deciduous forest	May occur
Dark glyph (<i>Glyphyalinia junaluskana</i>)	Snail	Moist leaf litter in deciduous woods	May occur
Open supercoil (<i>Paravitrea umbilicaris</i>)	Snail	Leaf litter on mountainsides	May occur

Effects of Alternatives by Species

(1) Dusky azure (*Celastrina nigra*)

This species may occur in parts of the project area. Habitat for this species is generally considered to be rich, moist deciduous forests, where it feeds on species such as wild geranium. The host plant is goat's beard. There may be some more specific habitat requirements that would account for the species apparent rarity. The flight period is limited to one or two weeks in the latter part of April, making it very difficult to collect information on the status of this species on the Forest.

Direct and Indirect Effects - In Alternative A, there would be no direct impacts or indirect effects to the habitat utilized by the dusky azure butterfly. In Alternatives B and C, if the species occurs within the activity areas, tree-felling operations could impact individuals through direct crushing. Alternatives B and C would result in a decrease in habitat of 185 acres in Alternative B and 192 acres in Alternative C. Herbicide treatments, crop tree release and construction of wildlife ponds would not affect this habitat.

Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 158 acres of early successional habitat (now 11-20 years old) across four of the five compartments. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects - In Alternative A, there would be no impacts to the dusky azure butterfly. In the action alternatives, tree-felling operations could impact individuals through direct crushing. In Alternative B the acres of habitat affected by the proposed action, plus the past timber sale, plus the existing road corridor would result in cumulative effects of 5%, 3%, 5%, 8%, and 10% loss of potential habitat in Compartments 102, 110, 111, 121, and 124, respectively. In Alternative C, cumulative effects would result in 5%, 2%, 7%, 7%, and 10%, respectively, loss of potential habitat in these compartments.

Determination of Effect - There are few records for this species in North Carolina. In Graham County, it is known from the F.S. system road at Stecoah Gap, the wildlife opening along Stecoah Creek, along Rhymer's Ferry road to the northwest, and along F.S. 2623. Two sites are roadsides or trails through rich cove forests, another is a roadside through an acidic cove forest and the last is a wildlife opening along the creek. This project would not affect any of the locations where the species is known to occur. If individuals occur within the project activity areas, they may be adversely affected, but this is unlikely to affect populations in the vicinity or across the Forest.

(2) Dark glyph (*Glyphyalinia junaluskana*)

This species was collected in one of the proposed regeneration units (Stand 124/21, Site C). A population of this animal is not likely to extend beyond the boundaries of the activity areas, so cumulative effects analysis is limited to the areas in which activities are being proposed.

Direct and Indirect Effects - In Alternative A, there would be no impacts to this species. In Alternatives B and C, tree-felling operations could impact individuals through direct crushing. The proposed

regeneration unit could adversely affect this species by altering habitat conditions. Habitat within the unit may be limited for a period of time. Individuals and habitat outside the unit will not be affected. To protect some occupied habitat for this species, two acres (at one location) in Stand 124/21 will be thinned rather than regenerated. Retaining additional canopy cover in the vicinity of the collection site will minimize potential adverse effects. The other activities proposed in this project will not affect this location.

Effects of Past, Ongoing and Future Projects - There are no past, ongoing or future projects that affect these locations.

Cumulative Effects - The cumulative effects would be the same as the direct and indirect effects.

Determination of Effect - This snail is known from seventeen sites (including this one) in Cherokee, and Macon Counties. The variety of elevations and forest types of these records indicate that the species is not stenotopic, or highly specialized. The small number of records for this species may be due to lack of effective sampling effort, rather than indicative of its actual status. Provided that additional canopy cover is left in Stand 124/21, individuals of *Glyphyalinia junaluskana* occurring within the one regeneration unit may be adversely affected by harvesting activities, but this is unlikely to affect populations in the vicinity or across the Forest.

(3) Open supercoil (*Paravitrea umbilicaris*)

This species was collected in three of the proposed regeneration units, Stands 124/21 (Site B), 110/36, and 124/45.

Direct and Indirect Effects - In Alternative A, there would be no impacts to this species. In Alternatives B and C, tree-felling operations could impact individuals through direct crushing. The three proposed regeneration units could adversely affect this species by altering habitat conditions. Habitat within the unit may be limited for a period of time.

In Macon County, one specimen was previously collected in a 15 year-old clearcut consisting of mostly young poplar. The presence of this species within a previous regeneration unit indicates that removing the canopy does not make the area completely unsuitable for an extended period of time. Populations may have been reduced, but apparently some individuals survived the harvest. It is unlikely that a species with such limited mobility was extirpated from the site and then reoccupied it recently.

Individuals and habitat outside the unit will not be affected. To protect occupied habitat for this species, two acres in each of three stands (124/21, 110/36, and 124/45) will be thinned rather than regenerated. Retaining additional canopy cover in the vicinity of the collection sites will minimize potential adverse effects. The other activities proposed in this project will not affect this location.

Effects of Past, Ongoing and Future Projects - There are no past, ongoing or future projects that affect this location.

Cumulative Effects - The cumulative effects would be the same as the direct and indirect effects.

Determination of Effect - This small snail is known from seventeen sites (including these three) in Cherokee, Graham, Swain and Macon Counties. The variety of elevations and forest types of these records indicate that the species is not stenotopic, or highly specialized. Due to its small size (5 mm), soil and leaf litter samples are the best method of collection. The small number of records for this species may be due to lack of effective sampling effort, rather than indicative of its actual status. Provided that additional canopy cover is left in Stands 124/21, 110/36 and 124/45, individuals of

Paravitrea umbilicaris occurring within the three regeneration units may be adversely affected by harvesting activities, but this is unlikely to affect populations in the area or across the Forest.

Provided that additional canopy cover is retained in the vicinity of the two collection sites in Stands 124/21, 110/36 and 124/45, this project may impact individuals of the dark glyph (*Glyphyalinia junaluskana*) and open supercoil (*Paravitrea umbilicaris*), but will not affect their viability across the Forest.

Table 3.9.2.2. Determination of effect of each alternative on the evaluated forest concern species

Species	Alternative A	Alternative B	Alternative C
Dusky azure (<i>Celastrina nigra</i>)	No impacts	May impact*	May impact
Dark glyph (<i>Glyphyalinia junaluskana</i>)	No impacts	May impact	May impact
Open supercoil (<i>Paravitrea umbilicaris</i>)	No impacts	May impact	May impact

*May impact individuals but is not likely to cause a trend to federal listing or a loss of viability across the Forest

3.9.3. Aquatic FC Species

Boundaries of Aquatic Analysis Areas

The boundaries of the aquatic analysis areas have been described in the Biological Communities section above (Section 3.5).

Aquatic Species Evaluated and Rationale

Data for aquatic resources exist in two forms: general inventory and monitoring of forest resources and data provided by cooperating resource agencies from resources on or flowing through the forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 are used primarily as historical data. Additional information specifically addressing aquatic species was obtained from NCWRC biologists, North Carolina Natural Heritage Program records, and US Fish and Wildlife Service biologists.

Forty-one aquatic forest concern species are either known to occur or may occur on the Nantahala National Forest (Aquatic Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of forest concern species in Macon County. Twenty-three forest concern species remained after this initial filter. These twenty-three species were then filtered using their habitat information and the availability of these habitats within the aquatic analysis area. Based upon the results of this filtering process eleven forest concern species were evaluated in this analysis (Table 3.9.3.1). These species were analyzed for this project because they are either known to occur within the project area or suitable habitat exists for these species. Species that do not have suitable habitat within the project area were eliminated from further analysis (Aquatic Attachment 1b).

Table 3.9.3.1. Aquatic forest concern species evaluated for the Fatback Project (see also Aquatic Attachment 1, Appendix D for a complete list of aquatic forest concern species on the Nantahala National Forest)

Species	Type	Habitat	Occurrence
<i>Cryptobranchus alleganiensis</i>	Amphibian	Rivers and large streams in Tennessee and Savannah systems	May occur in analysis area*
<i>Matrioptila jeanae</i>	Caddisfly	Clay, Macon, Jackson, and Transylvania Co.	May occur in analysis area*

Species	Type	Habitat	Occurrence
<i>Micrasema burksi</i>	Caddisfly	Clay, Macon, Jackson, and Transylvania Counties	May occur in analysis area*
<i>Micrasema sprulesi</i>	Caddisfly	Macon county	May occur in analysis area*
<i>Rhyacophila vibox</i>	Caddisfly	Whiteoak Creek, Macon County	May occur in analysis area*
<i>Somatochlora elongata</i>	Dragonfly	Specifics unknown	May occur in analysis area*
<i>Stylurus scudderi</i>	Dragonfly	Streams and rivers	May occur in analysis area*
<i>Baetopus trishae</i>	Mayfly	Specifics unknown	May occur in analysis area*
<i>Habrophleidiodes spp.</i>	Mayfly	Specifics unknown	May occur in analysis area*
<i>Seratella spiculosa</i>	Mayfly	Mountain streams	May occur in analysis area*
<i>Isoperla frisoni</i>	Stonefly	Mountain streams and rivers; Whiteoak Creek	May occur in analysis area*

*Where may occur means 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.

Effects of Alternatives on All Forest Concern Species

Direct and Indirect Effects – The direct and indirect effects of the proposed action on forest concern aquatic species would be the same as described for the aquatic biological communities and MIS (see Section 3.5). Implementation of Alternative A would have no impacts to any aquatic forest concern species because there would be no ground disturbing activity. Alternative B or Alternative C may impact individuals of the aquatic forest concern species within the 150 feet of streams affected by sedimentation. There would be no long term negative effects to any aquatic forest concern species.

Effects of Past, Ongoing and Future Projects – The past, ongoing and future effects on forest concern aquatic species would be the same as described for the aquatic biological communities and management indicator species (see Section 3.5).

Cumulative Effects – The cumulative effects of the proposed action on forest concern aquatic species would be the same effects as described within the direct, indirect, and cumulative effects for the aquatic biological communities and management indicator species (see Section 3.5).

Determination of Effect - Aquatic forest concern species *Cryptobranchus alleganiensis*, *Rhyacophila vibox*, *Micrasema burksi*, *Matrioptila jeanae*, *Micrasema sprulesi*, *Somatochlora elongata*, *Stylurus scudderi*, *Baetopus trishae*, *Habrophleidiodes spp.*, *Seratella spiculosa*, and *Isoperla frisoni* may occur within the project area. This project may impact individuals of the forest concern aquatic species but would not cause a trend to federal listing or a loss of viability of the above species because habitats for these species are common across their range and project design features would minimize impacts to these species (Table 3.9.3.2).

Table 3.9.3.2. Determination of effect of each alternative on the evaluated aquatic forest concern species

Species	Determination of Effect		
	Alternative A	Alternative B	Alternative C
<i>Cryptobranchus alleganiensis</i>	No impact.	May impact*	May impact*
<i>Matrioptila jeanae</i>	No impact.	May impact*	May impact*
<i>Micrasema burksi</i>	No impact.	May impact*	May impact*
<i>Micrasema sprulesi</i>	No impact.	May impact*	May impact*
<i>Rhyacophila vibox</i>	No impact.	May impact*	May impact*
<i>Somatochlora elongata</i>	No impact.	May impact*	May impact*
<i>Stylurus scudderi</i>	No impact.	May impact*	May impact*
<i>Baetopus trishae</i>	No impact.	May impact*	May impact*
<i>Habrophleidiodes spp.</i>	No impact.	May impact*	May impact*
<i>Seratella spiculosa</i>	No impact.	May impact*	May impact*
<i>Isoperla frisoni</i>	No impact.	May impact*	May impact*

*May impact individuals but would not cause a trend toward federal listing.

3.10. Additional Habitats and Biological Issues

3.10.1 RIPARIAN HABITAT

Forest Plan Direction

The riparian area consists of perennial streams and water bodies, wetlands, 100-year floodplains, and a zone on each side of all perennial streams and lakes which is a minimum of 30 feet wide (LRMP Amendment 5, pages III-179 and III-181). Riparian areas have been allocated into a separate management area (MA 18) in the LRMP, embedded within other management areas, and with its own general direction and standards.

Existing Condition

The aquatic analysis areas for the Fatback Project consist of the following watersheds: Poplar Cove Creek downstream to its confluence with Jones Creek; Cloer Branch downstream to its confluence with Lowery Branch; Anderson Branch downstream to its confluence with Lowery Branch; Lowery Branch to its confluence with Jones Creek; Allison Creek to its confluence with Jones Creek; Ash Flat Branch to its confluence with Allison Creek; Carpenters Branch to its confluence with Allison Branch; Lee Creek to its confluence with Jones Creek; and Jones Creek to its confluence with Poplar Cove Creek. The riparian areas along perennial streams in several stands proposed as timber harvest units and/or wildlife brushy openings have been mapped by an interdisciplinary ID team for Alternatives B and C, as specified in LRMP Amendment 5 (page III-181). The widths of these riparian areas range from 30' to 100' feet, as determined by the team.

A Streamside Management Zone (SMZ) of 100' from the streams (allowing no logging equipment) will be part of timber sale contracts for Alternatives B or C.

There are no wetlands or 100-year floodplains in the compartments in the project area.

Direct and Indirect Effects

The riparian habitats associated with the perennial water bodies present would not be affected by any actions, because there are no actions proposed within the riparian areas with all alternatives.

For all proposed actions in both action alternatives, the minimum 30 feet of remaining intact forest would protect the adjacent stream habitat. There would be no anticipated loss of shade to the streams or any increase in stream temperatures. The minimum 30-foot vegetation strip would also deter sediment from entering the streams. Thus, there would be no effects to any aquatic species in the water or any species or habitat within a minimum of 30 feet from the streams.

Cumulative Effects

There were no effects to riparian habitat when previous projects in the area were implemented, because the riparian areas were left intact with no actions in them. For all alternatives of this project, there would be no direct or indirect effects to riparian habitat because these alternatives retain all riparian vegetation. Effects to the analysis area are not occurring as a result of any past activities on private land. Approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). These culvert installations will cause a slight increase in sediment within the streams but this effect will dissipate as the sediment moves downstream and following the next bankful flow event. There are currently no projects planned in the analysis area for the future. Thus, for all alternatives of this project, there would be minimal cumulative effects to riparian habitat.

3.10.2. Invasive Species

Boundaries of Analysis

Spatial - Because non-native, invasive plants generally remain in disturbed areas, the analysis area for direct, indirect, past, and cumulative effects to non-native invasive plant species were confined to areas undergoing USFS management activities.

Temporal - Effects to invasive species cannot be correlated with specific projects. As a result, past effects must be summarized by the current condition in the analysis area, as determined by field surveys. Because invasive plants can maintain themselves indefinitely in the landscape, there is no future boundary for effects to these species.

Existing Condition

In the activity areas, the most invasive species are *Microstegium vimineum*, *Lonicera japonica*, and *Rosa multiflora*. Invasive species are most common in areas undergoing group-selection harvest in the past. These species also grow on roadsides leading to the proposed activity areas, a total of approximately ten acres in the botanical analysis area.

Effects of Alternatives on Invasive Plant Species

Direct and Indirect Effects - *Microstegium* apparently expands its range by heavy equipment carrying seeds into disturbed soil, and would be expected to colonize the edges of the roads, especially in moist areas with partial shade. Both *Lonicera japonica* and *Rosa multiflora* expand their ranges by bird-dispersal into recently disturbed, sunny habitats, often disturbed roadsides. Although not common in the project area, *Lonicera* and *Rosa* are certainly capable of dispersing into the activity area from adjacent

areas. Because group selection activities involve a number of small units spread through a large area, group selection produces relatively more edge habitats than two-age regeneration units. As a result, Alternative C, which proposes 413 acres of group selection, is more likely to facilitate the spread of non-native invasive plant species than Alternative B, which proposes no acres of group selection.

Historically, each mile of USFS road reconstruction can be correlated with 0.1 acres of invasive plants. The Fatback project, however, proposes no road construction or reconstruction. As a result, the project should produce minimal direct effects for non-native, invasive plant species due to road reconstruction or reconstruction.

Effects of Past, Ongoing and Future Projects - Because non-native invasives cannot be directly associated with former projects, past effects must be estimated using the current condition. The analysis area, including roadsides and adjacent private land, contains approximately ten acres of non-native, invasive plant species. The activity area contains no ongoing or foreseeable USFS or private projects that would potentially create habitat for invasive plant species.

Cumulative Effects - Because they propose no road construction or reconstruction, Alternatives B and C would produce minimal direct and indirect effects on non-native, invasive plant species due to road activities. Due to the amount of edge habitat associated with group selection, however, Alternative C is more likely to increase the amount of non-native, invasive plant species in the activity areas than Alternative B. The quantitative impact of group selection on the spread of invasives is not known, but if it represents 1% of the activity area, the 413 acres of group selection proposed under Alternative C would create 4.3 acres of suitable habitat for non-native, invasive plant species, a 40% increase from the existing condition. Because it proposes no group selection, Alternative B would produce minimal cumulative effects for non-native, invasive plant species.

Invasive plant species will be treated with herbicides throughout the activity area. As a result, the cumulative effect of the project may result in fewer populations of invasive plants species than the existing condition.

3.11. Soil and Water Resources

Existing Condition

The proposed project activities occur in Macon County. Soil Surveys of Macon County (USDA Natural Resources Conservation Service, 1996 and 1997) were reviewed to determine soil types in the proposed project activity areas. These soils consist predominantly of the Evard-Cowee (Ev) and Plott (Pw) complexes on the ridges and side slopes, and the Cullasaja-Tuckasegee (Cu) in the drainages. In addition, there are several areas of other soil complexes, including Trimont (Tr), Edneyville-Chestnut (Ed), Saunook gravelly loam (Sb), and Saunook loam (Sc). All of the soils (Ev, Sb, Sc, Cu, Pw, Tr, and Ed) are very deep, well-drained, and moderately permeable. All of the soil map units are used for woodland. There are no floodplain or prime farmland soils in the project area.

The existing access roads have a good grass cover on them at present. There are some culverts that need replacing.

Direct and Indirect Effects

Alternative A

There would be no new effects to soil or water quality as a result of management activities. Forest Service roads would not receive the benefits incurred from roadside thinning (ie, increased sunlight to the roadbed, and thus more road drying during inclement weather).

Alternatives B and C

Alternative B would entail somewhat more ground disturbance than Alternative C due to more proposed harvest acres (457 acres of regeneration harvests (379 acres) and thinnings (78 acres), vs. 366 acres (308 acres regeneration and 58 acres thinning) respectively). Construction and reconstruction of log landings would result in some soil exposure and compaction; the landings would be promptly seeded after use. Skid roads, trails, and log skidding in the ground-based logging harvest units would cause some soil disturbance and compaction in about 10% of each unit. The skid roads and trails would be seeded upon harvest unit closure, and these locations would be reused if future harvesting were proposed.

All road construction and/or reconstruction would be conducted according to LRMP standards and guidelines, and to the NC Forest Practices Guidelines Related to Water Quality (BMPs). Old existing culverts needing replacement would be replaced with new ones. There would be some temporary sedimentation on the days of culvert installation and removal. These effects would be minimized during operations by application of the design criteria for soil and water management described in section **1.1.2. DESCRIPTION OF THE PROPOSAL**. The small amount of sediment that may reach water would be diluted by additional tributary water entering the stream channels. The proposed activities should have no adverse impacts on soil productivity or water uses downstream of the project area. This is because the effects described above are expected to stay on-site within the analysis area.

Watershed research to date indicates that there would be little short or long-term adverse effects of the proposed two-aged regeneration and thinning harvesting and creation of brushy openings on water, soil, and vegetation sustainability and health (Swank, Vose, and Elliott 2001). Several different measures of stream health are expected to show little change as a result of the proposed activities. These would include stream chemistry, stream temperature, sediment accumulation, and quantity of streamflow after storms (Swank, Vose, and Elliott 2001). Implementation of past projects using the NC BMPs and FS design criteria has demonstrated that these practices are an effective means of controlling erosion and sedimentation from management activities. Nantahala RD staff and timber sale administrators would continue to monitor the effects of activities in an ongoing basis and as part of timber sale implementation and progress. Sales progress on a unit-by-unit basis and purchasers are not allowed to proceed to each new unit until all the required practices are completed and accepted by FS administrators.

Cumulative Effects Common to All Alternatives

The short-term minor effects to soil and water resources experienced during past projects conducted in the project area are no longer occurring. These effects, as would be expected with Alternatives B and C of this project, included some surface exposure, soil compaction on parts of previous harvest units (none of which are currently proposed for soil-disturbing management activities with either action alternative), and minor sedimentation on the days culverts were installed. There are no current projects on national forest lands adjacent to this analysis area. There are no known projects occurring on private lands currently or in the foreseeable future which would affect the project area lands. There are no currently-planned or foreseeable future Forest Service projects in the analysis area.

As discussed in the previous paragraph, there are no remaining effects from previous management activities in the project area, and no effects from any adjacent projects, private land, or anticipated future actions. Thus, the cumulative effects of this project (Alternatives B and C) are the expected direct and indirect effects of the actions proposed in Alternatives B and C as described above.

3.12. Air Resources

Existing Condition

The project area is designated as a Class II air quality area. It currently meets national ambient air quality standards (Bill Jackson, NFsNC Air Quality Specialist, personnel communication).

Direct and Indirect Effects

None of the alternatives is expected to result in large direct or indirect effects to air resources. There would be minor emissions associated with heavy equipment use in the proposed project activities, but these would not be abnormal for the general area.

Cumulative Effects

There are no effects to air quality from past projects in this analysis area. No ongoing projects are occurring that would affect air quality. Also, there are no additional Forest Service projects currently planned in this analysis area.

On adjacent private lands, there may be very small, localized, and short-term effects to air quality (such as smoky air) from individuals burning brush piles on their property. This would most likely occur during the spring and fall seasons, when property owners conduct yard cleanup work. Thus, with the minimal effects from burning on private land and minor vehicle emissions, the cumulative effects from this project would be minimal.

3.13. Timber and Vegetation Management

Existing Condition

All proposed harvesting activities would occur in the suitable timber base lands. The timber harvest activities proposed for the Fatback project occur on all slope aspects. Species composition in the area compartments consists predominantly of cove or upland hardwoods, with several areas composed of pine-hardwood and hardwood-pine stands. Many stands (3,290 acres, or 65%) are inventoried as aged between 61 and 100 years old (Refer to Appendix E, Age Class Distribution). Stands comprising 1,358 acres (27%) are greater than age 100. Stands aged 0-60 total 390 acres, or 8% of the total acreage.

Past disturbances in the compartments include exploitive logging which occurred prior to acquisition as National Forest lands, and the Chestnut blight, which came through the area in the 1930s. These two disturbances account for the majority of the stands being in the 61-100 year age classes, and also give rise to the two-aged character of some stands. Two-aged stands are those in which trees that remained following disturbance now comprise a mature overstory of large sawtimber-sized trees, scattered or clumped throughout younger, immature timber.

The last major harvest entries into the compartments were the Poplar Cove, Ash Flats, and Flatwoods timber sales, ranging from 1993-1998. All regenerated stands have been certified as successfully reforested. Current early successional habitat (stands ages 0-10) exist on 5 acres, or 0.1% of the area.

For the compartments in the project, small old growth patches have been selected after input by an interdisciplinary team. This selection is not part of the decision to be made for this project. The small patches include the following: 1) Compartment 102- stand 13, totaling 103 acres; 2) Compartment 110- stands 12 and 23, totaling 102 acres; 3) Compartment 111 – stand 5, totaling 57 acres; 4) Compartment 121– stands 2 and 3, totaling 101 acres; and 5) Compartment 124 – stands 26, 27, and 28, totaling 62 acres. The total small old growth patches for the area total 425 acres. These stands were selected so as to be adjacent to the Appalachian Trail, and/or they were located along the higher ridgelines, which generally are more remote and include more old growth attributes such as old age, more down woody debris, declining stand/tree conditions, lack of stand disturbance, etc.

Several commentors during the Scoping for this project mentioned the existence of two proposed special interest areas (NC Natural Heritage areas) within some of the area compartments. No project activities are proposed within these areas, and no effects to these areas are expected from the implementation of the proposed management activities.

Several commentors mentioned the extensive existing stands of cove hardwood immature sawtimber, consisting primarily of yellow poplar, in the analysis area. They concluded that these stands are a result of the large-scale logging which occurred in the early 20th century, and they requested restoration work aimed at enhancing species diversity in these stands. Wayah Ranger District staff are proposing an oak preharvest midstory treatment on 160 acres (5 stands) for this purpose (Refer to sections 1.1.2 and 2.2.3 above).

Environmental Consequences

Alternative A -This alternative would allow vegetation to continue in its current state. No new forest regeneration through timber management activities would be initiated. Some mortality of older trees which are showing signs of decline would be expected. Growth rates would decline in mature stands, with eventual competition-induced mortality of some trees.

Alternative B - Two-aged regeneration of the proposed stands would initiate approximately 159 acres of stands aged 0-10 in the compartments. Regeneration would originate from a combination of advanced reproduction and stump sprouts of the species present on the site, and from yellow poplar, black birch, and black cherry seedlings (these species can compete from seed with other species' regeneration sources). Species composition would be similar to that of the current hardwood stands. Treating grape and smoke vines in these stands before harvesting and at the end of the first growing season after harvest would reduce competition to the newly-established regeneration. Residual trees and snags in the two-aged stands would provide some structural diversity, aesthetic value, hard mast production, and wildlife habitat. Favoring oaks and hickories as leave trees would insure the continued presence of these species in the two-aged stands.

There could be lumber quality degrade in some residual trees in the two-aged stands following treatment due to epicormic branching along the boles of trees exposed to increased sunlight. This would be minimized by selecting healthy, vigorous individuals, which are less prone to epicormic branching, as leave trees.

Thinning the stands proposed (264 acres) and the oak midstory preharvest treatment would provide for improved species composition (by favoring oaks and black cherry over yellow poplar) in terms of both wood value and wildlife habitat. There would be increased growth of residual trees. Anticipated mortality would be salvaged and utilized. Log skidding would break up some of the understory, creating conditions more favorable for the establishment of advance reproduction of a variety of hardwood tree species, with probable resultant increased tree species diversity in the next generation.

The crop tree release treatments (49 acres) would release the largest, healthiest, most vigorous growers in these stands, thus eliminating nearby competing vegetation. The selected “crop” trees would thus grow larger and at a faster rate than they would otherwise. These treatments would contribute to the stated objective in the LRMP (page III-71, 75, and 84) of producing stands containing high-quality hardwood sawtimber.

Alternative C - The effects would be the same as those for Alternative B, except that the effects would occur on 118 acres of new stands aged 0-10 instead of 159 acres (Alternative B) and 208 acres of thinning instead of the 264 acres proposed for Alternative B.

Cumulative Effects

Alternative A -The cumulative effect for this alternative would be an interruption in the periodic regimen of forest regeneration by management activities conducted in order to achieve a more balanced age class distribution and sustain an even flow of habitats and resources in the project compartments.

Alternative B -There are no ongoing or proposed future management activities that would affect the timber/vegetation resources in the project compartments. The effects of Alternative B combined with previous sales would be the maintenance of growth and vigor in project stands. Regeneration of the proposed stands, combined with previous regeneration of the stands in the prior sales, would create and maintain a more balanced age class distribution than the current condition by shifting some mature stands into the age 0-10 class (refer to Appendix E, Age Class Distribution). Stands harvested in the previous entry are now in the 11-20 year age class (except for 5 acres remaining in the 0-10 year age class). In addition, the combination of Alternative B stand regeneration activities and past stand regeneration activities would provide for a continuous and sustainable flow of forest products and habitats over time. Activities on private lands are not anticipated to affect the national forest lands.

Alternative C - The effects would be the same as in Alternative B, except that the effects would occur on 118 acres of new stands being initiated into the 0-10 year age class. Maintained growth and vigor of forest stands as a result of thinning would occur on 56 fewer acres than for Alternative B.

3.14. Heritage Resources

Affected Environment

A heritage resource inventory was conducted in the proposed activity areas by a NFsNC archaeologist. Archaeological sites discovered during the survey and recommended for avoidance will be avoided.

Environmental Consequences

Alternative A - The no action alternative would have no potential to impact heritage resources.

Alternatives B and C - Direct, indirect, or cumulative effects to heritage resources are not expected to result from either action alternative because no actions would occur in areas recommended for avoidance. If any previously unknown heritage resources were discovered during project activities, operations would be suspended until an evaluation is made by the Forest Archaeologist and appropriate mitigation measures are applied.

3.15. Recreation Resources

Existing Condition

Some of the recreational use in the area is dispersed use associated with activities such as hiking, hunting, birding, fishing, wildflower observing, and gathering of forest products. The Appalachian National Scenic Trail passes through the higher elevations in the area.

Direct and Indirect Effects

Alternative A - Alternative A would cause no direct or indirect effects on recreation resources. The cumulative effect of taking no action would be a loss of recreational opportunities (such as hunting) associated with early successional habitats in the project area, since there would be no new early successional habitat provided by management activities. There would be no cumulative effects to the compartments if Alternative A were implemented.

Alternative B - Direct effects to recreation resources would be possible displacement of some dispersed recreational users during project activities (primarily hunters and wildlife watchers). This effect would be temporary in duration, lasting until project activities were completed, and minor in nature. There would be no effects from the proposed actions on the Appalachian Trail or the Appalachian Trail corridor; hikers would not be displaced.

Indirect effects to recreation resources would result from differences in recreational opportunities associated with habitat change. Hunters would probably find the regenerated stands more suitable for ruffed grouse hunting than squirrel hunting following project completion. Bird watchers might be more likely to see or hear rufous-sided towhees, chestnut-sided warblers, and indigo buntings in the new early successional habitat following regeneration. Blackberries would increase in the regenerated stands while they remain in early successional habitat, with a resultant increase in berry picking opportunities. The creation of brushy habitat around existing wildlife openings, vernal pools, seeding/reseeding of roads and wildlife openings, and other habitat improvements would create new opportunities for wildlife viewing.

Alternative C – Direct effects would be possible displacement of some dispersed recreation users, but less than that amount in Alternative B due to fewer harvest units.

Indirect effects as a result of implementing this alternative would be that fewer new opportunities would be created for dispersed use since fewer acres of early successional habitat would be created than for Alternative B.

Cumulative Effects

Alternative A - There would be no cumulative effects for Alternative A.

Alternative B - Past projects in this area created several acres of early successional habitat. Of that, 5 acres remains. Effects of the proposed action (Alternative B) would be the creation of recreational opportunities associated with approximately 185 new acres of early successional habitat such as better hunting and increased wildlife viewing. With improved seeded roads, increased hiking, horseback riding, and biking could occur with the implementation of this alternative. Cumulatively, early successional habitat and its associated benefits would be approximately 190 acres. People recreating on improved roads (hiking, horseback riding, biking) would have no newly constructed and/or reconstructed/seeded road.

Alternative C - The amount of early successional habitat available for recreational users using that kind of habitat would be approximately 149 acres. People recreating on improved roads (hiking, horseback riding, biking) would have no newly constructed and/or reconstructed/seeded road.

3.16. Scenery

Existing Condition

The scenery analysis encompasses the compartments in the project. Approximately 3,833 acres of the area compartments are in Management Area (MA) 3B, Sensitivity Level 2, with a Visual Quality Objective (VQO) of Modification (M) in the general area and Partial Retention (PR) for areas seen from the Appalachian Trail. Approximately 34 acres are in MA 4A, and 1,213 acres are in MA 4D, all with a VQO of Partial Retention (PR).

Direction in the LRMP for the M VQO is to manage activities so as to soften their visual impact and to meet the VQO within three growing seasons after harvesting. Direction for the PR VQO is for management activities to be visually subordinate to the characteristic landscape (LRMP, pg. G-1). The PR VQO must be met by the end of two growing seasons after management activities.

Direct and Indirect Effects

Alternative A

There would be no direct, indirect, or cumulative effects to scenery resources.

Alternative B

Direct and Indirect Effects – For the Appalachian Trail (AT) and the Trail corridor, the NFsNC landscape architect, working with district personnel and the Appalachian Trail Conservancy, delineated viewpoints and analyzed potential views of proposed project activities from these viewpoints, both in the field and with computer simulations. As a result of this analysis the following **design criteria** would be put in place for Alternatives B and C: 1) In stand 11-20, leave 20-25 square feet of residual basal area per acre (RBA) on the west half of the unit; 2) In stand 11-30, leave 25-30 RBA on the south half of the unit; 3) In stand 121-30, leave 25-30 RBA in the east half of the unit; 4) In stand 124-45, leave 25-30 RBA in the eastern tip of the unit; and 5) In stand 124-46, leave 25-30 RBA in the east 2/3 of the unit. With these design criteria implemented, all proposed harvest units would meet their assigned VQOs.

For dispersed recreation users other than hikers on the Appalachian Trail, the proposed management activities would be visible in several locations, but would meet their assigned VQOs within the required timeframe.

Cumulative Effects - The effects of past management activities on the visual resource are manifested in the current condition. These effects are minor, as the appearance of past management activities have blended into the overall forest canopy. The proposed actions would result in some changes to portions of the vegetation; these would blend in to the overall canopied appearance of the National Forest lands within two or three full growing seasons. Because the proposed activities for Alternative B would meet their assigned VQOs, there would be minor effects to the visual resource from these proposed actions. There are no ongoing activities in the project area that would affect scenery, and none currently planned for the future. There are no actions on private lands that are affecting the scenery resource on the national forest lands in the project area. Thus, if Alternative B were implemented, cumulative effects

would be the short-term changes to the scenery resources as described in the Direct and Indirect effects section above.

Alternative C

Direct and Indirect Effects – With the design criteria listed above being implemented for this alternative, all proposed harvest units would meet their assigned VQOs.

For dispersed recreation users other than hikers on Appalachian Trail, the proposed management activities would be visible in several locations, but would meet their assigned VQOs within the required timeframe.

Cumulative Effects - As described above for Alternative B, cumulative effects would be the short-term changes to the scenery resources as described in the Direct and Indirect effects section above.

3.17. Social and Economic Considerations

Existing Condition

The directly affected social and economic environment for this project is the local vicinity, which includes the community of Franklin and local forest products and service industries. Indirect effects would apply to the surrounding area.

A financial analysis for the timber sale portion of the project was conducted primarily to compare the relative costs and benefits associated with each alternative.

Social and Economic Consequences

Alternative A - This No Action alternative would provide no direct or indirect economic benefits or any new social benefits. The opportunity to provide wildlife habitat improvement, forest management, recreation, access, and economic benefits would be foregone.

Alternative B - The project would benefit the local economy by directly providing several months of work for a local logging crew and a site preparation/stand improvement contractor. There would be indirect benefits to industries involved in the primary and secondary manufacture of forest products, including the supply of raw materials and employment opportunities. There would be indirect economic benefits to local service industries which support forest workers, and to the local, state, and federal governments through income and other taxes.

An estimated 6,182 hundred cubic feet (CCF) of hardwood sawtimber and 1,403 hundred cubic feet (CCF) of pulpwood would be offered for sale in the local market. The Present Net Value (PNV) for this alternative would be approximately \$-18,147.

Refer to the Financial Analysis (Appendix B) for reports exhibiting more financial information.

Alternative C - There would be benefits to the economy as described in paragraph one under Alternative B.

An estimated 5,864 hundred cubic feet (CCF) of hardwood sawtimber and 1,263 hundred cubic feet (CCF) of pulpwood would be offered for sale in the local market. The Present Net Value (PNV) for this alternative would be approximately \$-25,817.

Refer to the Financial Analysis (Appendix B) for reports exhibiting more financial information.

3.18 Road Management

Existing Condition

Current access to the area is via several state and Forest Service (FS) roads. The FS roads are generally closed to public vehicular use.

Direct and Indirect Effects

Alternative A - There would be no change in current road management practices or open road density. Therefore, there would be no effects from implementation of this alternative.

Alternative B – There would be no change in the amount and length of roads in the analysis area, and therefore no direct or indirect effects. Existing roads would serve the needed function of relatively quick access in case of wildfires, access for proposed current and future silviculture, wildlife, and timber management activities, and seeded linear wildlife openings.

Alternative C – As in Alternatives A and B, there would be no change in the amount and length of roads in the analysis area, and therefore no direct or indirect effects. The existing roads would provide access for firefighting, management activities, and serve as seeded linear wildlife openings.

All existing roads are needed, and no changes would occur in the open road density. The current road management practices would not be changed with implementation of Alternative C. No FS roads in the project area need to be decommissioned at this time.

Cumulative Effects

Because there would be no changes to current road management practices with implementation of this alternative, there would be **no cumulative effects** to road management from implementing any project alternative.

4. LIST OF PREPARERS AND AGENCIES/PERSONS CONSULTED

4.1. List of Preparers

This document was prepared by Joan Brown, Wayah Ranger District Silviculturist. The Biological Evaluation (BE) was prepared by Doreen Miller, Nantahala National Forest Wildlife Biologist.

4.2. Agencies and Persons Consulted

The following additional persons have provided input or participated in the planning and/or analysis of this project:

Mike Bell, Wayah RD Timber Sale Administrator

Andy Baker, Wayah RD Forester

David Brook, Deputy State Historic Preservation Officer, NC Department of Cultural Resources

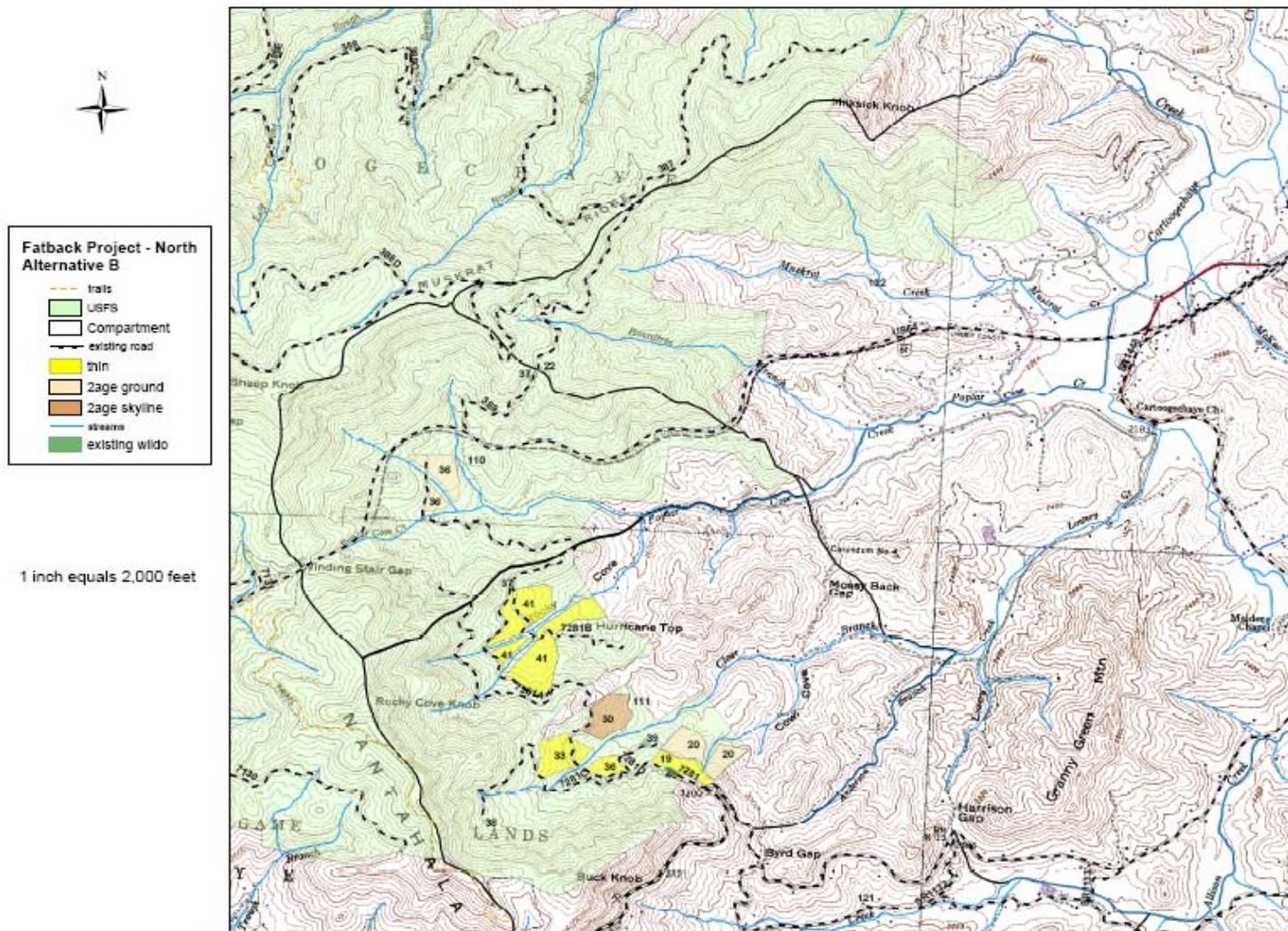
Erik Crews, NFsNC Landscape Architect

Morgan Sommerville, Appalachian Trail Conservancy
 Don O'Neill, Nantahala Hiking Club
 Duke Rankin, Nantahala NF Botanist
 Jason Farmer, Nantahala NF Fisheries Biologist
 Tim Southard, Wayah RD Timber Management Assistant
 Greg Brooks, Wayah RD Fire Management Officer
 Sam Parrish, NFsNC Zone Engineering Technician
 Alan Ratzlaff, U.S. Fish & Wildlife Service

5. APPENDICES

5.1. Appendix A – Alternative Maps

Note: Maps NOT to Scale

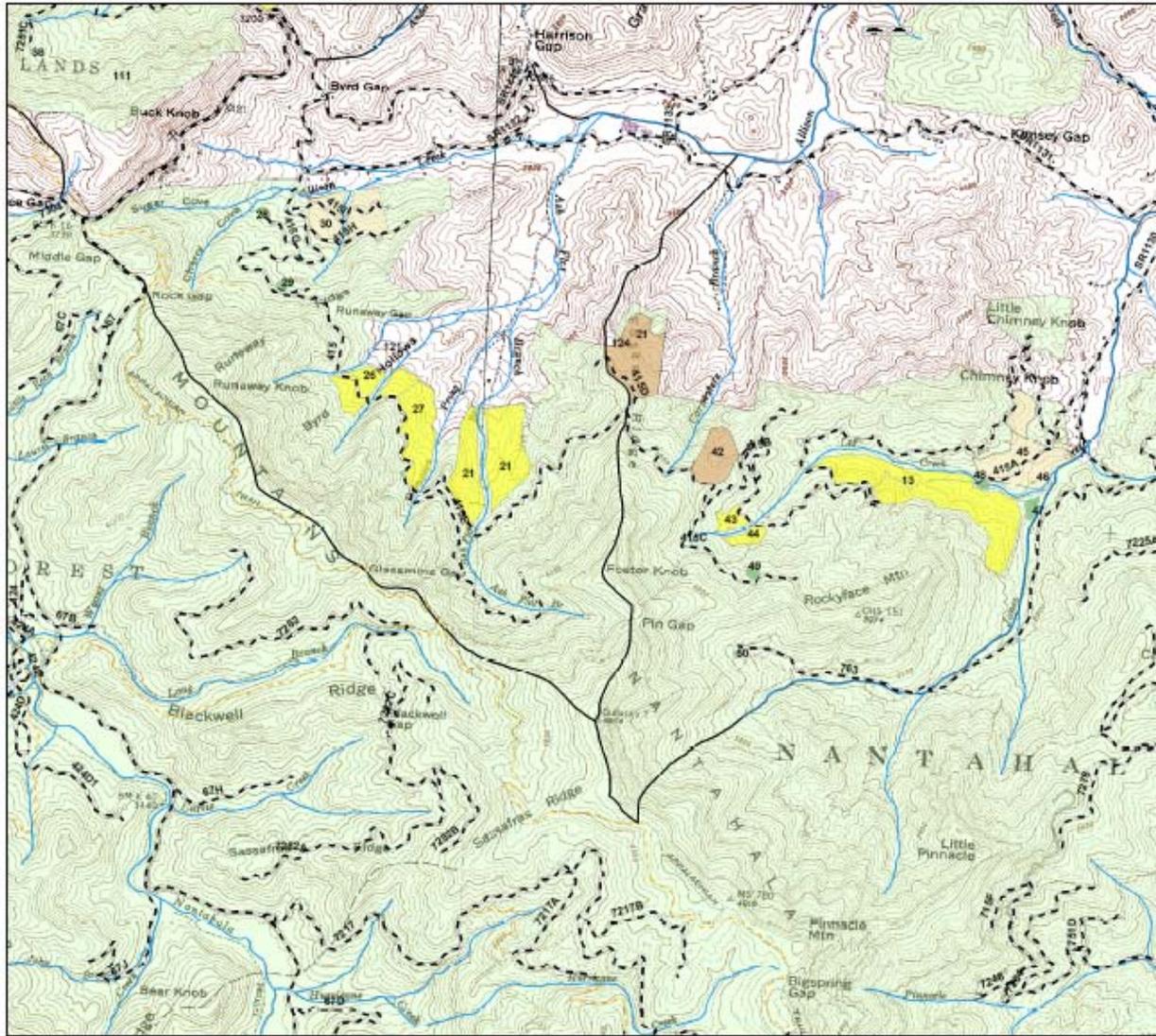


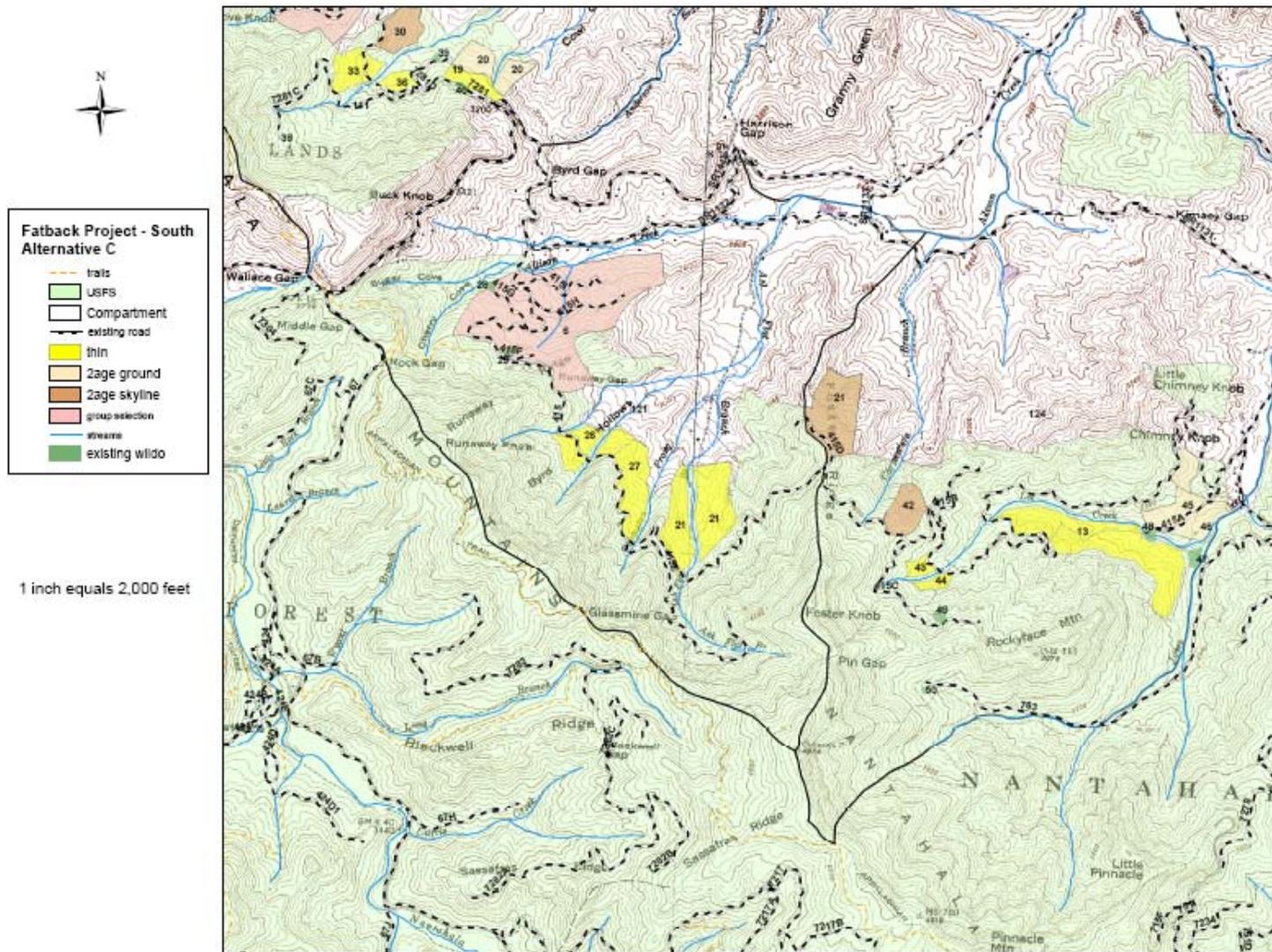


**Fatback Project - South
Alternative B**

- existing wldo
- trails
- USFS
- Compartment
- existing road
- thin
- 2age ground
- 2age skyline
- streams

1 inch equals 2,000 feet





5.2. Appendix B – Financial Analysis

NOTES

This Financial Analysis for the Fatback project has been prepared for the three alternatives, estimating the costs and revenues that would be expected to occur if one of them is implemented. **This analysis is primarily for the purpose of comparing the expected costs and revenues of the timber sale portion of the project between the alternatives.** The costs used are those associated with the project environmental analyses and documentation, timber sale preparation and administration, and essential site preparation and reforestation. The revenues used are the expected revenues from the timber sale. Costs and revenues are estimated in today's dollars.

The "Quicksilver Investment Analysis" is a software program developed by a Forest Service researcher at the North Central Forest Research Station. It was designed to calculate Present Net Value, Benefit/Cost Ratio, and other financial efficiency measures for different investment scenarios over time.

B/C Ratio	0.84
Investment Length (years)	8
Net Annual Equivalent (\$)	-\$3,834.60
Composite Rate of Return (percent)	1.79
Internal Rate of Return (percent)	NA

All Partners

Control

Discount Rate: 4.000

Cash Flows (number)	0
PV-Costs (\$)	NA
PV-Benefits (\$)	NA
Present Net Value (\$)	NA
B/C Ratio	NA
Investment Length (years)	NA
Net Annual Equivalent (\$)	NA
Composite Rate of Return (percent)	NA
Internal Rate of Return (percent)	NA

USFS

Alternative A

Discount Rate: 4.000

Cash Flows (number)	1
PV-Costs (\$)	-\$70,304.00
PV-Benefits (\$)	\$0.00
Present Net Value (\$)	-\$70,304.00
B/C Ratio	0.00
Investment Length (years)	1
Net Annual Equivalent (\$)	-\$73,116.16
Composite Rate of Return (percent)	NA
Internal Rate of Return (percent)	NA

USFS

Alternative B

Discount Rate: 4.000

Cash Flows (number)	12
PV-Costs (\$)	-\$163,657.79
PV-Benefits (\$)	\$145,511.17
Present Net Value (\$)	-\$18,146.62
B/C Ratio	0.89
Investment Length (years)	8
Net Annual Equivalent (\$)	-\$2,695.28
Composite Rate of Return (percent)	2.48
Internal Rate of Return (percent)	NA

USFS

Alternative C

Discount Rate: 4.000

Cash Flows (number)	12
PV-Costs (\$)	-\$163,479.58
PV-Benefits (\$)	\$137,662.18
Present Net Value (\$)	-\$25,817.40
B/C Ratio	0.84
Investment Length (years)	8

Net Annual Equivalent (\$) -\$3,834.60
 Composite Rate of Return (percent) 1.79
 Internal Rate of Return (percent) NA

USFS **Control** **Discount Rate: 4.000**

Cash Flows (number) 0
 PV-Costs (\$) NA
 PV-Benefits (\$) NA
 Present Net Value (\$) NA
 B/C Ratio NA
 Investment Length (years) NA
 Net Annual Equivalent (\$) NA
 Composite Rate of Return (percent) NA
 Internal Rate of Return (percent) NA

FATBACK TRANSACTION DETAILS

Alternative: Alternative A **Category** **Year(s)** **Quantity** **Value** **Rate(%)**
 Environmental Analysis Cost One time 1 1.00 Each \$65,000.00 4.00
Notes: New

Alternative: Alternative B **Category** **Year(s)** **Quantity** **Value** **Rate(%)**
 Environmental Analysis Cost One time 1 1.00 Each \$65,000.00 4.00
Notes: New
 Sale Admin Cost One time 6 1.00 Each \$7,700.00 4.00
Notes: New
 Sale Prep Cost One time 4 2,950.00 CCF \$9.00 4.00
Notes: New
 Site Prep Cost One time 8 159.00 Acres \$225.00 4.00
Notes: New

Alternative: Alternative C **Category** **Year(s)** **Quantity** **Value** **Rate(%)**
 Environmental Analysis Cost One time 1 1.00 Each \$65,000.00 4.00
Notes: New
 Sale Admin Cost One time 6 1.00 Each \$7,700.00 4.00
Notes: New
 Sale Prep Cost One time 4 2,729.00 CCF \$9.00 4.00
Notes: New
 Site Prep Cost One time 8 166.00 Acres \$225.00 4.00
Notes: New

BENEFIT USFS

Alternative: Alternative B **Category** **Year(s)** **Quantity** **Value** **Rate(%)**

Black Cherry <i>Notes: New</i>	Benefit	One time 6	78.00 CCF	\$149.34 4.00
Black Oak <i>Notes: New</i>	Benefit	One time 6	78.00 CCF	\$69.31 4.00
Hardwood Roundwood <i>Notes: New</i>	Benefit	One time 6	1,403.00 CCF	\$1.74 4.00
Low Grade Hdwd <i>Notes: New</i>	Benefit	One time 6	31.00 CCF	\$5.51 4.00
Mixed Hdwd <i>Notes: New</i>	Benefit	One time 6	309.00 CCF	\$63.15 4.00
Northern Red Oak <i>Notes: New</i>	Benefit	One time 6	108.00 CCF	\$172.46 4.00
White Oak <i>Notes: New</i>	Benefit	One time 6	15.00 CCF	\$69.37 4.00
Yellow Poplar <i>Notes: New</i>	Benefit	One time 6	928.00 CCF	\$60.51 4.00

<i>Alternative: Alternative C</i>	<i>Category</i>	<i>Year(s)</i>	<i>Quantity</i>	<i>Value</i>	<i>Rate(%)</i>
Black Cherry <i>Notes: New</i>	Benefit	One time 6	74.00 CCF	\$149.34	4.00
Black Oak <i>Notes: New</i>	Benefit	One time 6	73.00 CCF	\$69.31	4.00
Hdwd Roundwood <i>Notes: New</i>	Benefit	One time 6	1,263.00 CCF	\$1.74	4.00
Low Grade Hdwd <i>Notes: New</i>	Benefit	One time 6	30.00 CCF	\$5.51	4.00
Mixed Hdwd <i>Notes: New</i>	Benefit	One time 6	293.00 CCF	\$63.15	4.00
Northern Red Oak <i>Notes: New</i>	Benefit	One time 6	102.00 CCF	\$172.46	4.00
White Oak <i>Notes: New</i>	Benefit	One time 6	15.00 CCF	\$69.37	4.00
Yellow Poplar <i>Notes: New</i>	Benefit	One time 6	879.00 CCF	\$60.51	4.00

5.3 Appendix C - Biological Evaluation

PROPOSED ACTION

The proposed project is a timber sale and associated wildlife habitat improvement work in Macon County. Activities are proposed for Compartments 102, 110, 111, 121, and 124.

Alternatives

Alternative A would result in no action.

Alternative B would regenerate 159 acres by the 2-age method over seven units. An additional ten units (264 acres) would be thinned. Preharvest grapevine control would be conducted on six stands (112 acres). Vine control would be conducted on 103 acres in groups harvested in the previous entry. Oak preharvest midstory treatment would be done in five stands (160 acres). Crop tree release would be done in two stands (49 acres). Brushy cover would also be created around 13 existing wildlife openings by cutting most of the woody stems up to 100 feet back from the opening. This would add up to an additional 26 acres of early successional habitat. Up to 15 vernal pools would be constructed on roads and log landings. Saplings would be treated with herbicide 3-5 years post-harvest to maintain grass-forb habitat within the regeneration units. Non-native invasive plant species along roadsides would be treated with herbicides.

Alternative C would regenerate 118 acres by the 2-age method over five units. An additional nine units (totaling 208 acres) would be thinned. Three group selection units (totaling 413 acres) would create an additional 48 acres of early successional habitat. Preharvest grapevine control would be conducted on six stands (112 acres). Vine control would be conducted on 103 acres in groups harvested in the previous entry. Oak preharvest midstory treatment would be done in five stands (160 acres). Crop tree release would be done in two stands (49 acres). Brushy cover would also be created around 13 existing wildlife openings by cutting most of the woody stems up to 100 feet back from the opening. This would add up to an additional 26 acres of early successional habitat. Up to 15 vernal pools would be constructed on roads and log landings. Saplings would be treated with herbicide 3-5 years post-harvest to maintain grass-forb habitat within the regeneration units. Non-native invasive plant species along roadsides would be treated with herbicides.

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1.0 PROPOSED, ENDANGERED AND THREATENED SPECIES

1.1 AQUATIC RESOURCES

Boundaries of Aquatic Analysis Areas

This analysis addresses project area waters and analysis area waters associated with the Fatback Timber Project. Project area waters are defined as those in the area of potential site-specific impacts (Direct and Indirect Effects) on aquatic habitat and populations, and do not necessary overlap effects to botanical and wildlife resources. In addition to project area waters, the analysis area encompasses waters downstream that potentially could be impacted by project activities when considered within the watershed context (Cumulative Effects). The aquatic analysis areas for the Fatback Project consist of the following watersheds: Poplar Cove Creek downstream to its confluence with Jones Creek; Cloer Branch downstream to its confluence with Lowery Branch; Anderson Branch downstream to its confluence with Lowery Branch; Lowery Branch to its confluence with Jones Creek; Allison Creek to its confluence with Jones Creek; Ash Flat Branch to its confluence with Allison Creek; Carpenters Branch to its confluence with Allison Branch; Lee Creek to its confluence with Jones Creek; and Jones Creek to its confluence with Poplar Cove Creek.

Existing Conditions

Cartoogechaye Creek, Jones Creek, Lee Creek, Allison Creek, Ash Flat Branch, Thompson Prong, Carpenters Branch, Lowery Creek, Cloer Branch, Anderson Branch, and Poplar Cove Creek are classified by the North Carolina Department of Environment and Natural Resources (NCDENR) as class WS-III; Tr Waters. Class WS-III waters are protected as water supplies which are generally in moderately to highly developed watersheds and are suitable for all Class C uses. Class C waters are suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. Tr waters are suitable for natural trout propagation and maintenance of stocked trout.

The analysis area is characterized as containing habitat for coldwater fish species. Analysis area waters also provide extensive habitat for macroinvertebrates. Streams within the Fatback Project aquatic analysis area typically have substrates consisting mainly of cobble and gravels (see Attachment 1c). Analysis area streams are currently supporting the designated uses described by North Carolina Department of Environment and Natural Resources (NCDENR 2005).

Cartoogechaye Creek was included in the NCDENR, Division of Water Quality Basinwide Assessment Report (NCDENR, 2005). This site received a Good rating. An additional site on Jones Creek (above SR 1146) was surveyed in 2004. The habitat was ranked “somewhat low” due to sedimentation from private land development but the aquatic insect community rated excellent (NCDENR, 2005).

Species Evaluated and Rationale

Three aquatic PET species are either known to occur or may occur on the Nantahala National Forest (Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of PET species in Macon County. Three aquatic PET species remained after this initial filter. These species were then filtered using their habitat information and the availability of these habitats within the aquatic analysis area (Attachment 1a). Based upon the results of this filtering process no proposed, endangered, or threatened species were evaluated for this analysis (Table 1.1-1). Species that do not have suitable habitat within the project area were eliminated from further analysis.

Previous Survey Information

No aquatic PET species have been found during previous surveys within the aquatic analysis area.

Table 1.1-1: Known and potential endangered, threatened and sensitive aquatic species in Macon County evaluated for the Fatback Project (see also Attachment 1).

Species	Type	Habitat	Occurrence
Federally Listed Threatened and Endangered Species			
None			

New Surveys or Inventories Conducted

No additional aquatic surveys for PET species were conducted for this project. Existing data were used in this analysis because previous surveys for federally threatened and endangered aquatic species have been conducted and the Fatback Project would be implemented to prevent visible sediment from entering analysis area streams.

Effects of Alternatives on Aquatic Species

Direct and Indirect Effects

Alternative A, Alternative B, and Alternative C: No aquatic PET species occur within the aquatic analysis area; therefore, there would be no direct or indirect effects to any proposed, endangered, or threatened aquatic species or their habitats from implementing any of the alternatives.

Effects of Past, Ongoing and Foreseeable Actions

Previous activities within the Fatback Project area include timber harvest and road construction (Poplar Cove Sale, Ash Flats Sale, Flatwoods Sale, and Jones Creek sale). A portion of private lands within the Carpenter Branch watershed has been logged. There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects were minimized by application of erosion and sedimentation control measures (e.g. silt fence, sediment traps, seeding, and mulch). Specifically, the effects of these actions would have included sedimentation from the ground disturbing activities (road construction, reconstruction, and culvert installations). All of these effects, however, would have exhibited short-term impacts on aquatic resources, and would have dissipated in the time since management activities occurred in the Fatback analysis area. As a result, there are no present effects to aquatic resources in the Fatback analysis area as a result of past actions. As a result of the length of time since completion of these actions, any effects to the aquatic resources are reflected in the current affected environment.

Approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). These culvert installations will cause a slight increase in sediment within the streams but this effect will dissipate as it moves downstream and following the next bankfull flow event. These crossings will also improve aquatic passage for the sensitive aquatic species, *Cambarus georgiae*. There are no other ongoing activities occurring on federal lands within the Fatback Project aquatic analysis area. Private lands in the aquatic analysis area are primarily characterized by developed farmland and residential. There may be sedimentation from private lands within the watershed but these effects would not be cumulative with the effects of the Fatback Project because there would be no effects of the

proposed timber management. There are no other ongoing activities on private lands affecting the Fatback Project area waters.

There are no reasonably foreseeable future actions proposed for the Fatback Project area on federal lands; therefore, there would be no known effects from future actions. There are no known future actions planned on private lands that would affect the Fatback Project area waters.

Cumulative Effects

Alternative A, Alternative B, and Alternative C: There would be no cumulative effects to any aquatic PET species resulting from implementation of the Fatback Project because there would be no direct or indirect effects of the Fatback Project on any aquatic PET species because there are no aquatic PET species within the aquatic analysis area.

Determination of Effect

The Fatback Timber Project would have no effects to any aquatic proposed, endangered, or threatened species because the project design features would prevent visible sediment and herbicides from entering analysis area streams and no aquatic PET species occur within the aquatic analysis area. Consultation with the U.S. Fish and Wildlife Service is not required.

Table 1.1-2: Determination of effect of each alternative on the evaluated endangered, and threatened aquatic species.

Species	Alternative A	Alternative B	Alternative C
Federally Threatened and Endangered Species			
No effects			

1.2 BOTANICAL RESOURCES

Boundaries of Botanical Analysis Areas

Spatial. Because plants are rooted species that must be present in the activity areas to undergo effects, the analysis area for endangered and threatened species was confined to the expected impact zone surrounding the activity areas of the project. The expected impact zone may be larger than the activity area because impacts such as increased sunlight and decreased humidity may extend beyond the areas undergoing active management. These effects can be estimated to extend into the surrounding forest a distance equal to half the height of the canopy, or about 40 – 50 feet beyond the boundaries of the activity areas.

Temporal. Past effects for endangered and threatened species species are dependent upon both the activity as well as the life history characteristics of the individual species. For example, species characteristic of disturbed, open habitats, would be expected to respond positively to activities such as road construction. Species characteristic of mature forest communities, however, would be expected to respond negatively to the same activities. Because each plant species has a unique life history, the temporal response to management activities must be evaluated on a species-by-species basis.

Species Evaluated and Rationale

All endangered and threatened plant species listed by the U. S. Fish and Wildlife Service for the Nantahala National Forest were considered for this analysis (Attachment B1). No candidate plant species occur on the Nantahala National Forest, and therefore were not considered further.

Previous Survey Information

The Biotics Database was queried for endangered and threatened plant species growing in the activity areas. It contained no records for any endangered and threatened plant species in the activity areas.

New Surveys or Inventories Conducted

Field surveys for endangered and threatened plant species were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982). No endangered or threatened plant species were located during the field survey (Table 1.2-1).

Table 1.2-1: Summary of endangered and threatened plant species undergoing effects analysis for the Fatback Project (see Attachment B1 for a complete list of species evaluated).

Status	Species	Habitat	Reason for Effects Analysis
Endangered	None	Not applicable	Not applicable
Threatened	None	Not applicable	Not applicable

Effects of Alternatives on Botanical Species

Because no endangered or threatened plant species were located in the activity areas, there should be no direct, indirect or cumulative effects to any endangered or threatened plant species. Consultation with the U. S. Fish and Wildlife Service is not necessary for botanical resources.

1.3 WILDLIFE RESOURCES

Species Evaluated and Rationale

Proposed, endangered, and threatened (PET) species considered in this analysis are those currently listed by the U.S. Fish and Wildlife Service. All terrestrial animal species that might occur on the Nantahala National Forest were considered. Potentially affected species were identified from information on habitat relationships, element occurrence records of PET animals as maintained by the North Carolina Natural Heritage Program and field data on the project activity areas. Species with only incidental, migrant or historic occurrences in Cherokee County were not considered further. All but one of these species (the Indiana Bat) was dropped from further consideration due to a lack of suitable habitat in the area (Attachment 3).

Table 1.3.1. Known and potential proposed, endangered, and threatened species evaluated.

Species	Type	Habitat description	Likelihood of occurrence
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Indiana bat (<i>Myotis sodalis</i>)	Mammal	Roosts in caves and hollow trees	May occur
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The need for surveys for individual PET species was considered in light of direction found at FSM 2672.43, Supplement No. R8-2600-2002-2. This species could occur in the project activity areas.

Effects of Alternatives by Species

(1) Indiana Bat (*Myotis sodalis*)

On July 25, 1999, two Indiana bats were captured in a mist-net located in the upper Santeetlah Creek drainage in Graham County, North Carolina. Monitoring of the roost tree documented use by 28 bats. Given the species communal roosting habits, it is probable that all 28 bats were Indiana bats. Most of the cave sites and cave-like habitats available in western North Carolina do not provide suitable conditions for significant wintering habitat for Indiana bats. Thus, North Carolina was not considered likely to provide either significant wintering habitat or maternal roosting habitat. The capture of a reproductively active female Indiana bat in Graham County provided new information on the status and distribution of this species in North Carolina. At present, this is the southernmost known Indiana bat maternity colony. It is possible that other Indiana bat maternity colonies occur on the Forest, as well as individual roosting males. Potentially suitable summer roosting and foraging habitat does exist within the area.

Direct and Indirect Effects

Direct effects of disturbance and/or mortality from tree felling may occur between April 15 and October 15 if a tree that a bat is roosting in is cut. This is limited to this 6-month period because the bats are hibernating in caves the remainder of the year. Indirect effects may also occur to potential Indiana bat roosting and foraging habitat. To reduce the likelihood of direct effects to Indiana bats and indirect effects to Indiana bat habitat, this project would comply with the Terms and Conditions in the Biological Opinion of the U. S. Fish and Wildlife Service for the protection of the Indiana bat on the Nantahala and Pisgah National Forests.

This includes retention of standing trees with more than 25% exfoliating bark, shellbark, shagbark and bitternut hickories, snags, hollow, den, and cavity trees, trees in buffer zones along intermittent and perennial streams, and shade trees adjacent to some of the large snags. These measures would be implemented when the stands are marked for sale.

This project may impact a maximum of 192 acres of suitable habitat by 2-age regeneration and group selection. Based on the small number of currently suitable or potential roost trees that would be affected, effects on the bat population would be unlikely, and would not reach the scale where an adverse affect or actual take occurs. The sequence of events that would result in a tree being cut down in which a bat is roosting is unlikely; therefore, direct effects to Indiana bats should not occur.

Removing a small number of trees would not make the area unsuitable as summer habitat for Indiana bats. Indiana bats are known to use highly altered and fragmented landscapes. They may respond positively to habitat disturbance, particularly where forests are even-aged and closed-canopied. A diverse landscape may benefit Indiana bats, as long as sufficient mature forest and numbers of quality roost trees are provided. Given the amount of tree cutting, the area would still provide vast numbers of roost trees and potentially suitable habitat for Indiana bats.

Effects of Past, Ongoing and Future Projects

The Indiana bat model includes all identified past activities and ongoing activities within two miles of the proposed harvest units, as well as the proposed actions. The units of the Ray Branch Timber Sale are just outside of this area to the north. There are no known proposed future activities.

Cumulative Effects

Each time the model calculates the habitat suitability index; the combined effect on Indiana bat habitat in the analysis area is determined. **The Indiana bat habitat suitability index was calculated using the maximum tree-cutting alternative (Alternative B). This resulted in a less than 2% change from the baseline.** The Forest Plan limits cumulative effects to less than a 5% change from the baseline (Amendment 10 of LRMP). Because there is only a very minor loss of potential Indiana bat habitat in the area impacted, the proposed action would not affect the availability of Indiana bat habitat in the area.

Determination of Effect

This project **is not likely to adversely affect** the Indiana bat. The project will have no effect on any other federally proposed or listed terrestrial animal species. Consultation with the U.S. Fish and Wildlife Service **is required**.

Table 1.3.2. Determination of effect of each alternative on the evaluated proposed, endangered, and threatened species.

Species	<u>Alternative A</u>	<u>Alternative B</u>	<u>Alternative C</u>
Indiana bat	No effect	Not likely to adversely affect	Not likely to adversely affect

1.4 EFFECTS DETERMINATION FOR PET SPECIES

This project **is not likely to adversely affect** the Indiana bat (*Myotis sodalis*) because it will meet Forest Plan standards for the protection of the Indiana bat. The project will have no effect on any other federally proposed or listed species.

1.5 CONSULTATION HISTORY

Consultation with the U.S. Fish and Wildlife Service **is required** and has not been completed.

2.0 SENSITIVE SPECIES

2.1 AQUATIC RESOURCES

Species Evaluated and Rationale

Twelve aquatic sensitive species are either known to occur or may occur on the Nantahala National Forest (Attachment 1a). The North Carolina Natural Heritage Database was queried for occurrences of sensitive species in Macon County. Seven sensitive aquatic species remained after this initial filter. These seven species were then filtered using their habitat information and the availability of these habitats within the aquatic analysis area. Based upon the results of this filtering process one sensitive aquatic species was evaluated in this analysis (Table 2.1-1). This species was analyzed for this project

because it is either known to occur within the project area or suitable habitat exists for the species. Species that do not have suitable habitat within the project area were eliminated from further analysis (Attachment 1b).

Previous Survey Information

Previous surveys for sensitive aquatic species have been conducted within the Fatback aquatic analysis areas. These surveys consist of mussel surveys by the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service (USFS), and the North Carolina Wildlife Resources Commission (NCWRC). Electrofishing surveys have also been conducted in analysis area waters by the NCWRC and the USFS. Aquatic insects have been monitored by the NCDENR at fixed locations within the aquatic analysis area (NCDENR, 2005). Previous surveys within the aquatic analysis area indicate that *Cambarus georgiae* is known to occur within the Cartoogechaye Creek watershed (Butler 2002; page 28).

Table 2.1-1: Known and potential sensitive aquatic species in Macon County evaluated for the Fatback Project (see also Attachment 1).

Species	Type	Habitat	Occurrence
2001 Region 8 Regional Forester’s Sensitive Species List			
<i>Cambarus georgiae</i>	Crustacean	Streams in Little Tennessee River watershed, Macon County	May occur in analysis area*

*May occur means 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.

Direct and Indirect Effects.

Alternative A: Alternative A, the no-action alternative, would produce no direct, indirect, or cumulative effects to the aquatic sensitive species because there would be no ground disturbing activities proposed for this alternative.

Alternative B: The proposed wildlife opening rehabilitation, log landings, skid trail and skid road construction, and routine road maintenance would have no effects on any aquatic resources because these activities would be located outside of the riparian areas. In addition, any disturbed ground would be seeded to prevent erosion. Skid trails would not be located near any water sources and the trails would not require construction of a cut and fill slope; therefore, there would be very little ground disturbance that could produce sediment. Skid roads would avoid riparian areas and manage runoff with water bars. Following timber harvest, skid trails and skid roads would be seeded and closed to prevent visible sediment from entering any streams. The routine road maintenance would involve minor road surface repair, placement of gravel, and reseeding. These actions are unlikely to increase measurable sedimentation because the work would be done during dry periods and the disturbed soil would be either hardened with gravel or seeded to control erosion.

Most of the proposed activities will have no effects on any aquatic resources because these activities would be located outside of the riparian areas and effects of timber management would be avoided by implementation of the project design features and BMP’s. No road construction or road reconstruction is proposed for this project; therefore, this project would have no effects upon the analysis area waters.

Culvert installations within the project area streams would cause a slight increase in sediment within the stream channels.

In general, the duration of the effect of sedimentation depends upon stream type (stream energy available to move particles) and storm runoff magnitude and frequency. The effect could move downstream although it would dissipate the further removed it is from the source. Higher gradient stream channels may have these sediments scoured (i.e. flushed from the substrate and deposited in low velocity areas) and the effect would be dissipated throughout the stream channel.

A small quantity of sediments may enter UT 1 Allison Creek during culvert installation; however, these effects would not be measurable approximately 75 feet below the crossing. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter UT 1 Allison Creek. Effects from the culvert installation would be immeasurable at the confluence with the Allison Creek because the culvert installation would occur approximately 0.1 mile from the mouth of Allison Creek. Additional culverts may be installed within analysis area waters as needed. The effects of these culverts would be the same as described for the culvert installations within UT 1 Allison Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the sensitive species, *Cambarus georgiae*, within the UT 1 of Allison Creek by partially filling pools. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

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

Riparian vegetation: Stream temperatures in analysis area waters would not be affected by timber harvest because harvest would not occur within the riparian zones of any streams, which have been mapped by the IDT. These no-harvest areas would protect stream temperatures and prevent

sedimentation. Shoreline vegetation would not be cut; therefore, there would be no reduction in potential large woody debris recruitment.

The proposed activities within the aquatic analysis area may impact individuals of the aquatic sensitive species during culvert installations and within approximately 75 feet of stream below each crossing but these impacts would not cause a trend to federal listing because the small amount of sediment entering project area streams would be scoured from the channel during the next bankfull flow event.

Alternative C:

The effect of this alternative would be the same as the effects described for Alternative B because there would be no new road construction or reconstruction. The group selection harvest areas proposed for this alternative would have no effects to the aquatic resources because the groups would be located outside of riparian areas. The effects of culvert installations would be the same as in Alternative B. Alternative C may impact individuals of the aquatic sensitive species during culvert installations and within 75 feet of stream below each crossing but these impacts would not cause a trend to federal listing because the small amount of sediment entering project area streams would be scoured from the channel during the next bankfull flow event.

Impacts of Past, Ongoing and Foreseeable Actions.

Previous, ongoing, and foreseeable future activities within the Fatback Project area have been described in the PET discussion (Section 1.1) and would be the same for the aquatic sensitive species.

Cumulative Effects

The cumulative effects of the Fatback Project would include the effects of culvert installations for this project and the culvert installations for the Hurricane Damage Repairs. Implementation of Alternative A would have no impacts on any aquatic sensitive species because there would be no road construction, reconstruction, or culvert installations. Alternative B and Alternative C may impact individuals of the aquatic sensitive species, *Cambarus georgiae*, but would not cause a trend to federal listing or a loss of viability of the species because the effects of culvert installations would have short term effects and would be limited to short sections of the project area streams.

Determination of Effect

The sensitive species *Cambarus georgiae* may occur within the aquatic analysis area. This project may impact individuals of the sensitive aquatic species but is not likely to cause a trend to federal listing or a loss of viability of the above species because habitats for this species are common across its range and project design features would minimize impacts to this species by preventing visible sediment from entering the aquatic analysis area streams in measurable quantities.

Table 2.1-1: Determination of effect of each alternative on the evaluated sensitive aquatic species.

Species	Alternative A	Alternative B	Alternative C
2001 Region 8 Regional Forester’s Sensitive Species List			
<i>Cambarus georgiae</i>	No impact	May impact*	May impact*

*May impact individuals but would not cause a trend to federal listing or a loss of viability.

2.2 BOTANICAL RESOURCES

Boundaries of Botanical Analysis Areas

Spatial. Because plants are rooted species that must be present in the activity areas to undergo effects, the analysis area for sensitive species was confined to the expected impact zone surrounding the activity areas of the project. The expected impact zone may be larger than the activity area because impacts such as increased sunlight and decreased humidity may extend beyond the areas undergoing active management. These effects can be estimated to extend into the surrounding forest a distance equal to half the height of the canopy, or about 40 – 50 feet beyond the boundaries of the activity areas.

Temporal. Past effects for sensitive plant species are dependent upon both the activity as well as the life history characteristics of the individual species. For example, species characteristic of disturbed, open habitats, would be expected to respond positively to activities such as road construction. Species characteristic of mature forest communities, however, would be expected to respond negatively to the same activities. Because each plant species has a unique life history, the temporal response to management activities must be evaluated on a species-by-species basis.

Species Evaluated and Rationale

All sensitive species listed by the Regional Forester (USFS, 2001) were also considered for this analysis.

Previous Survey Information

The Biotics Database was queried for sensitive plant species growing in the activity areas. The Biotics Database contained records for the sensitive species mountain catchfly, *Silene ovata*, and waterfan, *Hydrothyria venosa*, within one mile of the activity areas. Because mountain catchfly grows in rich cove forests, a common forest community in the activity areas, it will be assumed to be present, and undergo further analysis for direct and indirect effects. Waterfan is an aquatic species restricted to mountain streams, a habitat that could potentially be impacted by road maintenance at stream crossings. As a result, waterfan, should it occur in the botanical analysis area, could be directly or indirectly impacted by the project, and therefore the species will undergo further analysis.

New Surveys or Inventories Conducted

Field surveys for sensitive plant species were conducted in April, May and September, 2006, by Wilson Rankin, Botanist for the Nantahala National Forest. Surveys consisted of a timed meander with increased intensity in the most diverse areas. Surveys were continued until no new species or microhabitat was detected (Goff, *et al.* 1982).

One sensitive species was located during the field surveys: one individual of *Juglans cinerea*, the butternut, was located in Stand 124-21, on Foster Ridge (Table 2.2-1). No other sensitive plant species were located during the survey.

Table 2.2-1: Summary of sensitive plant species undergoing effects analysis for the Fatback Project (see Attachment B1 for a complete list of species evaluated)

Status	Species	Habitat	Reason for Effects Analysis
Sensitive	<i>Hydrothyria venosa</i>	Steams	Assumed to be present due to local records and suitable habitat near activity areas.
Sensitive	<i>Juglans cinerea</i>	Rich Cove Forest, Oak Hickory Forest	Located during the field survey at one location in an activity area.
Sensitive	<i>Silene ovata</i>	Rich Cove Forest, Mesic Oak-Hickory, Roadside	Assumed to be present due to local records and suitable habitat in the activity areas.

Effects of Alternatives on Botanical Sensitive Species

- Waterfan (*Hydrothyria venosa*)

The BCD contains over 70 records for *Hydrothyria venosa* in western North Carolina, primarily on the Pisgah and Nantahala National Forests. *Hydrothyria* grows in mountain streams.

Direct and Indirect Effects. Alternatives B and C may involve road and culvert work at several stream crossings, some of which may be upstream of *Hydrothyria* plants. Sediment from the work could affect *Hydrothyria* plants directly by inundating the plants or shearing them from the substrate. These effects are unlikely to extend more than 75 feet from the activity areas, and persist no longer than the next high flow event, which can be expected to occur, on average, approximately every 1.5 years (Jason Farmer, personal communication). No *Hydrothyria* plants, however, were located within 75 feet of an activity area during the field surveys. As a result, there should be no direct or indirect effects to any *Hydrothyria venosa* plants.

Impacts of Past, Ongoing and Foreseeable Actions. At least one past action on the Nantahala National Forest has potentially impacted populations of *Hydrothyria* during the past 1.5 years, the time period that impacts from current management practices can be expected to persist (Table 2.2-2). The Fatback entry area also contains one ongoing project, Road Projects Due to Storm Damage, that may impact populations of *Hydrothyria*. The Fatback entry area contains no foreseeable USFS or private actions that may impact *Hydrothyria* plants.

Table 2.2-2: Past and ongoing projects on the Nantahala National Forest that may impact populations of *Hydrothyria venosa*

District	Project	Year	Determination of Effect
Highlands	Road Projects Due to Storm Damage	2005	<i>May impact individuals but no trend towards federal listing</i>
Wayah	Road Projects Due to Storm Damage	Ongoing	<i>May impact individuals but no trend towards federal listing</i>

Cumulative Effects. Because the action alternatives would produce no direct or indirect affects to populations of *Hydrothyria venosa*, the project will have no cumulative effects to the species.

- Butternut (*Juglans cinerea*)

Once fairly common throughout its range, the species is imperiled by the butternut canker, a disease that eventually kills the tree. The North Carolina Heritage Program currently does not track the species. As a result, the Biological Conservation Database contains no records for the species, and the conservation status of the species on the Nantahala National Forest is uncertain. In the Fatback area, *Juglans cinerea* was located at one site, in Stand 124-21, on Foster Ridge.

Direct and Indirect Effects. Although the tree grows in an activity area, all walnut trees would be excluded from timber activities. As a result, the tree would not undergo any direct effects. Because walnut trees are canopy trees that would be expected to grow best in full sunlight, opening the canopy with a regeneration harvest may indirectly improve the habitat for the species. These indirect effects are unlikely to extend beyond the activity areas, and would be expected to persist for approximately 10 years following regeneration harvest, the time necessary to re-establish a regenerating forest canopy.

Impacts of Past, Ongoing and Foreseeable Actions. No past actions on the Nantahala National Forest have impacted populations of *Juglans cinera* since 1998, and the national forest contains no ongoing USFS projects that would potentially impact populations of *Juglans cinera*. One past action on private land, a harvest activity on approximately 150 acres, south of Compartment 124 in the Carpenter Branch drainage, may have impacted an undetermined number of butternut trees. Two future activities on the Nantahala National Forest, the Welsh Timber and Wildlife Project on the Wayah RD and the Stecoah Gap Timber and Wildlife Project on the Cheaoh RD, may produce indirect, positive effects to the species by opening the forest, encouraging the growth of any *Juglans cincera* trees growing in the stands.

Cumulative Effects. Because it would produce only indirect positive effects, the Fatback project would produce a positive cumulative effect to populations of *Juglans cinerea* on the Nantahala National Forest.

- Mountain Catchfly (*Silene ovata*)

The Biological Conservation Database contains 43 records for *Silene ovata* in western North Carolina, including eleven on the Nantahala National Forest. The species often grows in rich cove forests and forest edges at higher elevations. No populations of *Silene ovata* were located in the activity areas during the field surveys. Because of the proximity of existing records and the presence of suitable habitat in the activity units, however, the species was assumed to be present in the analysis areas.

Direct and Indirect Effects. Alternatives B and C would both regenerate rich cove forests, the primary habitat for *Silene ovata*. Regeneration activities may impact *Silene* plants directly through direct mortality from heavy equipment and skidding actions, or through changes to the forest habitat. These habitat changes include increases in sunlight and temperature, and decreases in soil moisture, all of which would increase the transpiration stress on the plants. Regeneration activities may also impact *Silene* plants indirectly, by changing the habitat from open forest to a dense stand of regenerating saplings. These regenerating stands often create thick shade, which can lower herbaceous diversity in the stands. Regeneration harvests may also impact the breeding characteristics of understory plants by removing breeding individuals from the local population.

Because impacts to rich cove species are unlikely to extend beyond the harvest activities, direct and indirect effects would be confined to the activity areas. Effects to rich cove species, such as *Silene*, can be expected to persist for approximately 40 years following regeneration harvest, the minimal time necessary for understory herbs to recover to pre-treatment levels (see Biological Evaluation). For the

purposes of this analysis, the group selection harvests proposed in Alternative C will be considered regeneration harvests because, over the timber cycle, group harvests produce the same open conditions as two-age, regeneration harvests.

Alternatives B and C would also thin rich cove forests. Because thinning requires less intensive procedures, and retains relatively high amounts of canopy cover compared to regeneration harvests, thinning is unlikely to directly or indirectly impact *Silene ovata* plants, and may improve the habitat for the species by increasing sunlight and nutrients for understory plants.

Alternative B would impact 130 acres of rich cove forest potentially containing populations of *Silene ovata* through two-age regeneration harvests, while Alternative C would impact 510 acres of rich cove forest through two-age regeneration harvests and group selection harvests.

Impacts of Past, Ongoing and Foreseeable Actions. According to previous NEPA analyses, three past actions on the Nantahala National Forest may have impacted populations of *Silene ovata* since 1997 (Table 2.2-3). Two of the actions, both prescribed burns, may have positively affected populations by opening the forest community, increasing light to the herbaceous layer.

Table 2.2-3: Past projects on the Nantahala National Forest impacting populations of *Silene ovata*.

District	Project	Year	Determination of Effect
Wayah	Welsh Timber and Wildlife Project	2005	May impact individuals, but no trend towards federal listing
Highlands	Locust Gap Burn	2003	Possible positive indirect effects
Highlands	Coward Bald Burn	2000	Possible positive indirect effects

Cumulative Effects. Although no populations were located in the activity areas, Alternatives B and C may impact populations of *Silene ovata*, should they occur in the regeneration and group selection units, primarily through direct mortality from harvest activities and habitat change, and indirect mortality through forest regeneration. Past actions on the Nantahala National Forest may have negatively impacted one population of *Silene ovata* and positively impacted two populations. Because western North Carolina contains at least 43 undisturbed populations of *Silene*, however, the Fatback project is unlikely to cumulatively affect the viability of the species across the national forest.

2.4 Determination of Effect

Regeneration harvests may impact individuals of the sensitive species *Silene ovata*, should they occur in the activity areas, but the project is unlikely to result in a trend towards federal listing or a loss of viability for the species, because the national forest contains a relatively high number of undisturbed populations. Regeneration harvests may also indirectly improve habitat for the sensitive species *Juglans cinerea*, by opening the forest canopy over the trees. Because no other sensitive plant species were located in the activity areas, there should be no direct, indirect or cumulative effects to any other sensitive plant species (Table 2.4-1).

Table 2.4-1: Determination of effect of each alternative on the evaluated sensitive plant species.

USFS Status	Species	Alternative A	Alternative B	Alternative C
Sensitive	<i>Juglans</i>	No impact.	May produce indirect,	May produce indirect,

	<i>cinerea</i>		positive effects	positive effects
Sensitive	<i>Silene ovata</i>	No impact.	May impact individuals*	May impact individuals*
Sensitive	<i>Hydrothyria venosa</i>	No impact.	No impact	No impact

*May impact individuals, but unlikely to cause a trend towards federal listing or a loss of viability across the national forest.

2.3 WILDLIFE RESOURCES

Species Evaluated and Rationale

Sensitive species considered in this analysis are those identified by the Regional Forester for which population viability is a concern (August, 2001). The objective is to manage habitats for all existing native and desired nonnative species in order to maintain at least viable populations of such species (FSM 2670.12). Adverse effects must not create trends towards federal listing. All sensitive terrestrial animal species that might occur on the Nantahala National Forest were considered (Attachment 3). Potentially affected species were identified from information on habitat relationships, element occurrence records of sensitive animals as maintained by the North Carolina Natural Heritage Program and field data on the project activity areas. Species with only incidental, migrant or historic occurrences in Macon County were not considered further. All but eight of these were excluded from further analysis due to lack of suitable habitat in the activity areas, or being outside the known range of the species (Attachment 3). No species were known to occur in the project activity areas prior to the surveys undertaken for this project.

Table 2.3.1. Known and potential sensitive species evaluated for this project.

Northern bush katydid (<i>Scudderia septentrionalis</i>)	Insect	Treetops at edges of broadleaved forest	May occur
Rock-loving grasshopper (<i>Trimerotropis saxatilis</i>)	Insect	Lichen covered rock outcrops	May occur
Frosted elfin (<i>Callophrys irus</i>)	Butterfly	Open woods and borders, in dry situations	May occur
Diana fritillary butterfly (<i>Speyeria diana</i>)	Butterfly	Deciduous and pine woodlands	May occur
Glossy supercoil (<i>Paravitrea placentula</i>)	Snail	Leaf litter on wooded hillsides and ravines	May occur
S. appalachian salamander (<i>Plethodon teyahalee</i>)	Amphib.	Moist forests at all elevations	May occur
Eastern small-footed bat (<i>Myotis leibii</i>)	Mammal	Roosts in hollow trees in summer	May occur
Southern water shrew (<i>Sorex palustris puntulatus</i>)	Mammal	Small streams 12-15' wide above 3000'	May occur

New Surveys or Inventories Conducted

The project activity areas were evaluated as suitable habitat for sensitive species. Proposed activity areas were surveyed for the presence of special habitats (such as wetlands, boulder fields, caves or mines) that could be adversely affected by project activities. No special habitats were located.

The terrestrial snail fauna was sampled in each area proposed for 2-age regeneration harvesting in June of 2006 to determine the possible occurrence of the glossy supercoil. These sites were surveyed because canopy removal could adversely affect the habitat of this species. Dan Dourson, an experienced field biologist from Stanton, Kentucky, collected the animals and identified them.

Species For Which Inventories Not Conducted and Justification

The need for surveys for individual PETS species was considered in light of direction found at FSM 2672.43, Supplement No. R8-2600-2002-2. Inventories were not conducted for the katydid, grasshopper, two butterflies, the southern Appalachian salamander, the eastern small-footed bat or the southern water shrew. These seven species were considered as potentially occurring within the project activity areas. Habitat is not limited across the Forest, so information on the number and location of individuals in this particular area would not change the assessment of effects to viability of the population.

Effects of Alternatives by Species

(1) Northern bush katydid (*Scudderia septentrionalis*)

Direct and Indirect effects - This species utilizes treetops at the edges of broadleaved forest. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. The habitat may be impacted positively by the creation of new forest edges around seven regeneration units and thirteen wildlife openings in Alternative B, and five regeneration units, 47 group selection units and thirteen wildlife openings in Alternative C. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat created through past regeneration harvesting is no longer present as these stands have matured. There are no known ongoing or future projects what would create this habitat.

Cumulative Effects - The cumulative effects would be the same as the direct and indirect effects.

Determination of Effect - Forest-wide this species has probably benefited from past forest management, which created new forest edge to offset the concurrent maturation of other forest stands. This project may impact individuals of this species, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(3) Rock-loving grasshopper (*Trimerotropis saxatilis*)

Direct and Indirect effects - This species utilizes lichen-covered rock outcrops. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been lost in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – *Cumulative effects would be a slight increase in habitat lost due to road improvement work for Alternative B and none for Alternative C.*

Determination of Effect - Forest-wide this species has lost habitat due to wildlife opening construction and road construction/reconstruction. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(3) Frosted elfin (*Callophrys irus*)

Direct and Indirect effects - This species is a butterfly, which occurs in open woods and borders in dry situations. Alternative A would have no effect. Tree felling operations, could impact individuals through direct crushing. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been lost in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – Cumulative effects would be a slight increase in habitat lost due to road improvement work for Alternative B and none for Alternative C.

Determination of Effect - Forest-wide this species has lost habitat due to wildlife opening construction and road construction/reconstruction. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(4) Diana fritillary butterfly (*Speyeria diana*)

Direct and Indirect effects - This species occurs in different forest types, but seems to prefer roadsides through cove forests. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. A small amount of habitat may be created by road improvement work for Alternative B, but not for Alternative C. Regeneration activities should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects – A small amount of habitat has been created in the past due to road construction activities. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – Cumulative effects would be a slight increase in habitat due to road improvement work for Alternative B, but not for Alternative C.

Determination of Effect - Forest-wide this species has probably benefited from past forest management, which created new forest roadside habitat. This project may impact individuals of this species, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(5) Glossy supercoil (*Paravitrea placentula*)

No glossy supercoils were located in project activity areas; therefore, there will be no direct or indirect effects to this species. Since there are no direct or indirect effects, there will be no cumulative effects.

(6) Southern Appalachian salamander (*Plethodon teyahalee*)

Direct and Indirect effects - This species is found in moist forests in the southwestern mountains at all elevations. Alternative A would have no effect. Tree felling operations could impact individuals through direct crushing. Habitat may be lost by road improvement work, regeneration activities and brushy openings, which include 185 acres in Alternative B, and 192 acres in Alternative C. Habitat will be temporarily decreased where insolation increases from the removal of canopy trees. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat has been lost in the past due to road construction activities and past regeneration activities, which reduced habitat on 158 acres in the past 20 years. Stands older than 20 years have probably achieved canopy cover and reformation of the litter layer sufficient to support salamander populations. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - Habitat would exist throughout the area, except in the past and proposed regeneration areas and the road corridor, which total 434 acres in Alternative B and 441 acres in Alternative C, which are less than 10% of the 5 compartments. Much suitable habitat would remain. This cumulative effect will soon decrease, as many of these acres are close to 20 years old now and will shortly age into the condition of suitable habitat.

Determination of Effect - This species is thought to be fairly common across Graham, Swain, Cherokee, Clay and Macon counties. Dr. Richard Highton's collection at the Smithsonian lists 1007 records for this species from 10 counties in North Carolina, at elevations from 1160 feet to 6000 feet. This includes 267 records on the Nantahala National Forest, distributed across the same 10 counties and four ranger districts. Since the species is widely distributed, potentially occupying nearly a half million acres of National Forest land, current management is unlikely to affect the availability of suitable habitat.

Forest-wide this species has lost habitat due to wildlife opening construction road construction/reconstruction and regeneration activities. The concurrent maturation of younger stands into suitable habitat has offset this loss because forest plan standards that limit the amount of regeneration allowed in any compartment, management area and analysis area prevent cumulative effects to this species in a given area. Since the species is widely distributed, potentially occupying nearly a half million acres of National Forest land, current management practices are unlikely to affect the availability of suitable habitat. This project may impact individuals of this species and cause a loss of habitat. The adverse effects to individuals and habitat would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(7) Eastern small-footed bat (*Myotis leibii*)

This species is thought to roost in hemlock forests, rock crevices, caves, mines, bridges or buildings, and uses other habitats for feeding. Little is known regarding summer nursery sites and summer foraging or

roosting habitat. Suitable maternity habitat may be lacking across the Forest, if otherwise appropriate sites are not exposed to the sun.

Direct and Indirect effects - Alternative A would result in a loss of foraging habitat as existing openings mature. In the action alternatives tree felling operations could impact individuals through direct crushing. Creating openings in the canopy could improve feeding habitat for forest bats, which are attracted to the insects supported by grassy/brushy habitat areas. No special roosting habitats, such as hemlock forests, rock crevices, caves, mines, bridges or buildings will be adversely affected. Habitat could be created by regeneration activities and brushy openings, which include 185 acres in Alternative B, and 292 acres in Alternative C, which are about 3% of the 5 compartments. Road construction and reconstruction should not affect the habitat. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

Effects of Past, Ongoing and Future Projects - Habitat has been created in the past due to regeneration activities on 158 acres in the past 20 years. These acres have matured and are no longer desirable feeding habitat. The road corridor across Winding Stairs Gap in Compartment 110 is maintained in early successional habitat of about 91 acres. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects - The proposed action plus the existing road corridor would result cumulative effects of 276 acres in Alternative B and 283 acres in Alternative C. This is about 5% of the 5 compartments.

Determination of Effect - This species has been collected from most counties in western North Carolina, although it is rarely trapped during mist-netting surveys. The species has probably benefited from past forest management, which created new forest openings to offset the concurrent maturation of other forest stands. This project may impact individuals of this species, but benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

(8) Southern water shrew (*Sorex palustris punctulatus*)

Direct and Indirect effects - This species is known to occur on small first order streams up to 12-15' wide, with rhododendron cover across Macon, Swain and Clay counties. Alternative A would have no effect. Culvert replacement across suitable streams could adversely affect individuals through direct crushing and effect habitat through direct loss and sedimentation. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat. Under Alternatives B and C, two culverts will be replaced; however there will be minimal direct loss of habitat, and the sedimentation effects would not be measurable approximately 75 feet below each crossing. There will be a temporary increase in suspended sediments, but the effects should diminish as the stream crossings and new stream banks are re-vegetated.

Effects of Past, Ongoing and Future Projects - The existing condition of the aquatic resources is the result of all past effects. Roads were constructed and at least 25 culverts were installed in suitable streams for these projects. The effects of these culvert installations would have included direct loss of habitat of about 30 feet and sedimentation of approximately 75 feet of stream at each crossing. The sedimentation effects, however, would have exhibited short-term impacts and would have dissipated in the time since management activities occurred in the analysis area.

In addition, approximately 23 stream crossings are being replaced for storm damage repairs (2004 hurricane damage). This will result in minimal direct loss of habitat. These culvert installations will cause a slight increase in sediment within the streams, but this effect will dissipate as it moves downstream and following the next bankfull flow event. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – The cumulative effects would include the effects of constructing stream crossings for this and past projects, and culvert installations for this project and the hurricane damage repairs. Cumulative direct loss of habitat is limited to the existing 25 stream crossings. Sedimentation effects from Alternatives B and C include the 23 culverts being replaced for storm damage repairs (2004 hurricane damage) and the two culverts being replaced for this project. This impact would have short term effects, and would be limited to short sections of project area streams, affecting approximately 75 feet at each site, and will dissipate as it moves downstream and following the next bankfull flow event.

Determination of Effect - This species has been recorded from nine sites on the Nantahala, most of these being recent records from Macon County from Dr. Joshua Laerm and his students surveying small mammal populations. The species is thought to be widespread, but occurs in low densities and is difficult to capture. Alternative B may impact individuals of this species and adversely affect the habitat. The adverse effects would be minor considering the status and distribution of this species on the Nantahala National Forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the Forest.

Determination of Effect

Table 2.3.2. Determination of effect of each alternative on the evaluated sensitive species.

Species	Alternative A	Alternative B	Alternative C
Northern bush katydid	No impacts	May impact*	May impact
Rock-loving grasshopper	No impacts	May impact	May impact
Frosted elfin	No impacts	May impact	May impact
Diana fritillary butterfly	No impacts	May impact	May impact
Glossy supercoil	No impacts	No impacts	No impacts
Southern Appalachian salamander	No impacts	May impact	May impact
Eastern small-footed bat	No impacts	May impact	May impact
Southern water shrew	No impacts	May impact	No impacts

*May impact individuals but is not likely to cause a trend to federal listing or a loss of viability across the Forest

The project may impact individuals of the northern bush katydid (*Scudderia septentrionalis*), rock-loving grasshopper (*Trimerotropis saxatilis*), frosted elfin (*Callophrys irus*), Diana fritillary butterfly (*Speyeria diana*), southern Appalachian salamander (*Plethodon teyahalee*), eastern small-footed bat (*Myotis leibii*), and the southern water shrew (*Sorex palustris puntulatus*), but will not impact their viability across the Forest. This project will not impact any other sensitive species. No cumulative effects on species viability across the Forest will result from this project.

2.4 EFFECTS DETERMINATION FOR SENSITIVE SPECIES

The project may impact individuals of *Cambarus georgiae*, *Silene ovata*, *Juglans cinerea*, the northern bush katydid (*Scudderia septentrionalis*), rock-loving grasshopper (*Trimerotropis saxatilis*), frosted elfin (*Callophrys irus*), Diana fritillary butterfly (*Speyeria diana*), southern Appalachian salamander (*Plethodon teyahalee*), eastern small-footed bat (*Myotis leibii*), and the southern water shrew (*Sorex palustris puntulatus*), but will not impact their viability across the Forest. This project will not impact any other sensitive species. No cumulative effects on species viability across the Forest will result from this project.

4.0 MITIGATION MEASURES

No other mitigation measures above and beyond those included in the project proposal are necessary to protect proposed, endangered, threatened, or sensitive plant or animal species as a result of actions that would occur with this project.

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5.4 Appendix D – Other Biological Attachments and References

BOTANICAL ATTACHMENTS

Attachment 1: Endangered, threatened and sensitive plant species, Pisgah and Nantahala National Forests.

USFS Status	Species	Habitat/Distribution
Endangered	<i>Geum radiatum</i>	High Elevation Rocky Summit
	<i>Gymnoderma lineare</i>	High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove in Gorge
	<i>Houstonia montana</i>	Grassy Bald, High Elevation Rocky Summit
	<i>Isotria medeoloides</i>	White Pine Forest, Mesic Oak-Hickory
	<i>Sagittaria fasciculata</i>	Southern Appalachian Bog, Streamside, Swamp Forest-Bog Complex
	<i>Sarracenia jonesii</i>	Southern Appalachian Bog

	<i>Sarracenia oreophila</i>	Southern Appalachian Bog
	<i>Sisyrinchium dichotomum</i>	Montane Oak Woodland, Mafic Rock, Escarpment
Threatened	<i>Helonias bullata</i>	Southern Appalachian Bog, Swamp Forest-Bog Complex
	<i>Hexastylis naniflora</i>	Rich Cove Forest, Mesic Oak-Hickory
	<i>Hudsonia montana</i>	High Elevation Rocky Summit, Pine-Oak/Heath Forest
	<i>Liatrix helleri</i>	High Elevation Rocky Summit, Montane Acidic Cliff
	<i>Solidago spithamaea</i>	High Elevation Rocky Summit
	<i>Spiraea virginiana</i>	Riverside Scour Zone
Sensitive	<i>Aconitum reclinatum</i>	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest
	<i>Acrobolbus ciliatus</i>	Spruce-Fir Forest, Spray Cliff
	<i>Allium cuthbertii</i>	Low Elevation Granitic Dome
	<i>Aneura maxima</i>	Spray Cliff
	<i>Anzia americana</i>	Gorge, Acidic Cove
	<i>Arabis patens</i>	Montane Mafic Cliff, Montane Calcareous Cliff
	<i>Aspiromitus appalachianus</i>	Stream
	<i>Asplenium X ebenoides</i>	Montane Calcareous Cliff
	<i>Bartramidula wilsonii</i>	Spray Cliff, Moist Montane Acidic Cliff, Gorge
	<i>Bazzania nudicaulis</i>	Spruce-Fir Forest
	<i>Berberis canadensis</i>	Rich Cove Forest, Glade, Mafic Rock
	<i>Botrychium jenmanii</i>	Rich Cove Forest
	<i>Brachydontium trichodes</i>	Spruce-Fir Forest
	<i>Bryocrumia vivicolor</i>	Spray Cliff, Moist Montane Acidic Cliff, Gorge
	<i>Buckleya distichophylla</i>	Hemlock Hardwood Forest, Acidic Cove Forest,
	<i>Buxbaumia minakatae</i>	Rotting Logs
	<i>Calamagrostis cainii</i>	High Elevation Rocky Summit
	<i>Campylopus paradoxus</i>	High Elevation Rocky Summit
	<i>Cardamine clematitidis</i>	Boulderfield Forest, Northern Hardwood Forest, Spruce-Fir Forest, High Elevation Seep
	<i>Carex biltmoreana</i>	High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff
	<i>Carex communis</i> var. <i>amplisquama</i>	Rich Cove Forest, Mafic Rock
	<i>Carex misera</i>	High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome
	<i>Carex radfordii</i>	Rich Cove Forest, Escarpment Gorge
	<i>Carex roanensis</i>	Rich Cove Forest, Montane Oak-Hickory
	<i>Carex schweinitzii</i>	Southern Appalachian Bog, Swamp Forest-Bog Complex
	<i>Cephalozia macrostachya</i> ssp. <i>australis</i>	Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Cephaloziella massalongi</i>	High Elevation Rocky Summit
	<i>Cheilolejeunea evansii</i>	Acidic Cove, Oak-White Pine Forest, Escarpment Gorge
	<i>Chelone cuthbertii</i>	Southern Appalachian Bog
	<i>Cleistes bifaria</i>	Pine-Oak/Heath Forest, Pine-Oak Woodland
	<i>Coreopsis latifolia</i>	Rich Cove Forest, Northern Hardwood Forest
	<i>Danthonia epilis</i>	High Elevation Granitic Dome, Seep
	<i>Delphinium exaltatum</i>	Rich Cove Forest, Grassy Bald, Glade, Montane Oak-Hickory, Mafic Rock
	<i>Desmodium ochroleucum</i>	Openings, Xeric Woodlands
	<i>Diervilla rivularis</i>	Streamside, Acidic Cove Forest
	<i>Diplophyllum apiculatum</i> var. <i>taxifolioides</i>	Roadbank

	<i>Diplophyllum obtusatum</i>	Spruce-Fir Forest
	<i>Ditrichum ambiguum</i>	Acidic Cove Forest, High Elevation Red Oak
	<i>Drepanolejeunea appalachiana</i>	Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest
	<i>Entodon concinnus</i>	Moist Montane Calcareous Cliff
	<i>Ephebe americana</i>	High Elevation Rocky Summit
	<i>Euphorbia purpurea</i>	Northern Hardwood Forest, Rich Cove Forest, Mesic Oak-Hickory Forest
	<i>Eurybia avita</i>	Rock Outcrops
	<i>Fissidens appalachiensis</i>	Streams at High Elevations
	<i>Fothergilla major</i>	Pine-Oak/Heath Forest, Montane Oak Woodland, Roadside
	<i>Frullania appalachiana</i>	Spruce-Fir Forest
	<i>Frullania oakesiana</i>	Spruce-Fir Forest
	<i>Gentiana austromontana</i>	Grassy Bald, High Elevation Red Oak Forest, Northern Hardwood Forest
	<i>Geum geniculatum</i>	Boulderfield Forest, High Elevation Seep
	<i>Glyceria nubigena</i>	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Spruce-Fir Forest
	<i>Grammitis nimbata</i>	Spray Cliff
	<i>Hasteola suaveolens</i>	Montane Alluvial Forest
	<i>Helianthus glaucophyllus</i>	Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside
	<i>Heuchera longiflora</i> var. <i>aceroides</i>	Rock Outcrops in Rich Cove Forest, Mafic Rock
	<i>Hexastylis contracta</i>	Acidic Cove Forest
	<i>Hexastylis rhombiformis</i>	Acidic Cove Forest, Hemlock Hardwood Forest, Montane Alluvial Forest
	<i>Homaliadelphus sharpii</i>	Dry Montane Calcareous Cliff
	<i>Hydrothyria venosa</i>	Stream
	<i>Hygrohypnum closteri</i>	Stream
	<i>Hymenophyllum tayloriae</i>	Spray Cliff, Grotto, Gorge
	<i>Hypericum graveolens</i>	High Elevation Seep, Wet Meadow
	<i>Hypericum mitchellianum</i>	High Elevation Seep, Wet Meadow
	<i>Hypotrachyna virginica</i>	High Elevation Forest
	<i>Ilex collina</i>	Northern Hardwood Forest, Boulderfield Forest, Southern Appalachian Bog, Swamp Forest Bog Complex
	<i>Juglans cinerea</i>	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest
	<i>Juncus caesariensis</i>	Low Elevation Southern Appalachian Bog
	<i>Lejeunea blomquistii</i>	Spray Cliff
	<i>Leptodontium excelsum</i>	Spruce-Fir Forest
	<i>Leptohymenium sharpii</i>	Spruce-Fir Forest
	<i>Liatris turgida</i>	High Elevation Granitic Dome, Montane Oak Woodland
	<i>Lilium grayi</i>	Northern Hardwood Forest, High Elevation Seep, Grassy Bald, Wet Meadow
	<i>Lophocolea appalachiana</i>	Spray Cliffs, Wet Rocks Near Mountain Streams
	<i>Lysimachia fraseri</i>	Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside
	<i>Malaxis bayardii</i>	Southern Appalachina Bog, Wet Meadows
	<i>Mannia californica</i>	Dry Montane Acidic Cliff
	<i>Marshallia grandiflora</i>	Southern Appalachian Bog

	<i>Marshallia trinervia</i>	Moist, Rocky Stream Banks
	<i>Marsupella emarginata</i> var. <i>latiloba</i>	Spray Cliff
	<i>Megaceros aenigmaticus</i>	Stream
	<i>Metzgeria fruticulosa</i>	High Elevation Forest
	<i>Metzgeria furcata</i> var. <i>setigera</i>	Spruce-Fir Forest, Acidic Cove Forest in Gorge
	<i>Metzgeria uncigera</i>	Acidic Cove Forest
	<i>Monotropsis odorata</i>	Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest
	<i>Nardia lescurii</i>	Peaty Soil over Moist Rocks
	<i>Packera millefolia</i>	Rock Outcrops
	<i>Pellia X appalachiana</i>	Rock Outcrops Near Spray Cliffs
	<i>Penstemon smallii</i>	Rock Outcrops, Woodlands
	<i>Physcia pseudospeciosa</i>	High Elevation Granitic Dome
	<i>Plagiochasma intermedium</i>	Streamside Limestone Rock
	<i>Plagiochasma wrightii</i>	Streamside Limestone Rock
	<i>Plagiochila austinii</i>	Moist Montane Acidic Cliff
	<i>Plagiochila caduciloba</i>	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Plagiochila echinata</i>	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Plagiochila sharpii</i>	High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Plagiochila sullivanii</i> var. <i>spinigera</i>	Spray Cliff
	<i>Plagiochila sullivanii</i> var. <i>sullivanii</i>	Spray Cliff, Spruce-Fir Forest
	<i>Plagiochila virginica</i> var. <i>caroliniana</i>	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Plagiochila virginica</i> var. <i>virginica</i>	Limestone Outcrops
	<i>Plagiomnium carolinianum</i>	Rock Outcrop in Acidic Cove Forest in Gorge, Streambank
	<i>Plantahera integrilabia</i>	Southern Appalachian Bog, Swamp Forest-Bog Complex
	<i>Platyhypnidium pringlei</i>	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Poa paludigena</i>	Southern Appalachian Bog
	<i>Polytrichum appalachianum</i>	Rocky Summits, Mid to High Elevation
	<i>Porella japonica</i> ssp. <i>appalachiana</i>	Spray Cliff
	<i>Porella wataugensis</i>	Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Porpidia diversa</i>	High Elevation Rocky Summit
	<i>Porpidia herteliana</i>	High Elevation Rocky Summit
	<i>Prenanthes roanensis</i>	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest
	<i>Pycnanthemum beadleii</i>	Rock Outcrops, Woodlands
	<i>Pycnanthemum torrei</i>	Xeric Oak-Hickory, Glade
	<i>Radula sullivanii</i>	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge
	<i>Radula voluta</i>	Spray Cliff
	<i>Rhachithecium perpusillum</i>	Hardwood Trees
	<i>Rhododendron vaseyi</i>	Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside
	<i>Riccardia jugata</i>	Rotten Logs in Acidic Cove Forest in Gorge

	<i>Robinia viscosa</i>	High Elevation Granitic Dome
	<i>Robinia viscosa</i> var. <i>hartwegii</i>	High Elevation Granitic Dome, Woodlands
	<i>Rudbeckia triloba</i> var. <i>pinnatiloba</i>	Rich Cove Forest, Montane Mafic Cliff, Mafic Rock
	<i>Rugelia nudicaulis</i>	Spruce-Fir Forest
	<i>Sabatia capitata</i>	Glade, Pine-Oak Woodlands
	<i>Saxifraga caroliniana</i>	Wet Rock Faces
	<i>Schlotheimia lancifolia</i>	Oak-Hickory Forest, Acidic Cove Forest, Hemlock Hardwood Forest, Highlands Plateau, Gorge
	<i>Scopelophila cataractae</i>	Copper-rich Soils, Roadsides
	<i>Scutellaria altamaha</i>	Rock Outcrops, Woodlands
	<i>Scutellaria arguta</i>	Boulderfield Forest
	<i>Scutellaria pseudoserrata</i>	Rock Outcrops, Woodlands
	<i>Scutellaria saxatilis</i>	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest
	<i>Shortia galacifolia</i> var. <i>brevistyla</i>	Acidic Cove Forest, Streambank, Gorge
	<i>Shortia galacifolia</i> var. <i>galacifolia</i>	Acidic Cove Forest, Streambank, Gorge
	<i>Silene ovata</i>	Rich Cove Forest, Mesic Oak-Hickory, Roadside,
	<i>Solidago simulans</i>	High Elevation Granitic Dome
	<i>Sphagnum flavicomans</i>	Seeps on Rock or Spray Cliffs
	<i>Sphenolobopsis pearsonii</i>	Fraser-Fir Forest
	<i>Splachnum pennsylvanicum</i>	Southern Appalachian Bog
	<i>Stachys clingmanii</i>	Northern Hardwood Forest, Boulderfield Forest
	<i>Sticta limbata</i>	High Elevation Forest
	<i>Taxiphyllum alternans</i>	Spray Cliff, Mafic Rock
	<i>Thalictrum macrostylum</i>	Serpentine Woodland, Serpentine Forest
	<i>Thaspium pinnatifidum</i>	Southern Appalachian Bog
	<i>Thermopsis fraxinifolia</i>	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath
	<i>Tortula ammonsiana</i>	Moist Montane Mafic Cliff
	<i>Trillium pusillum</i> var. <i>pusillum</i>	Rich Cove Forest
	<i>Trillium rugelii</i>	Rich Cove Forest at Low Elevation
	<i>Trillium simile</i>	Rich Cove Forest
	<i>Tsuga caroliniana</i>	Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit
	<i>Viola appalachiensis</i>	Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory
	<i>Waldsteinia lobata</i>	Acidic Cove Forest, Mesic Oak-Hickory, Gorge
	<i>Xanthoparmelia monticola</i>	High Elevation Rocky Summit

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AQUATIC ATTACHMENTS

Attachment 1a: Endangered, threatened, sensitive and forest concern aquatic species, Nantahala National Forest.

USFS Status	Type	Species	Habitat/Distribution
<i>Endangered/ Threatened</i>	Bivalve	<i>Alasmidonta raveneliana</i>	Little Tennessee River drainage and Tuckaseegee River; Nolichucky River
	Bivalve	<i>Pegias fabula</i>	Lower Little Tennessee River; historic record from Valley River, Cherokee Co.
	Fish	<i>Cyprinella monacha</i>	Little TN River; French Broad River system
<i>Sensitive</i>	Bivalve	<i>Alasmidonta varicose</i>	Little Tennessee River, Macon and Swain Co.
	Bivalve	<i>Fusconaia barnesiana</i>	Lower Little TN River and Hiwassee River
	Bivalve	<i>Lasmigona holstonia</i>	Valley River, Historic Record, Cherokee Co.
	Crustacean	<i>Cambarus georgiae</i>	Streams in Little TN River, Macon Co.
	Crustacean	<i>Cambarus parrishi</i>	Streams in Hiwassee River drainage
	Crustacean	<i>Cambarus reburus</i>	Tributary to Horsepasture River, Transylvania Co.; upper French Broad River
	Crustacean	<i>Cambarus chaugaensis</i>	Streams in Savannah River drainage, Jackson, Macon, and Transylvania Co.; SC and GA
	Dragonfly	<i>Macromia margarita</i>	Rivers, Macon, Swain, Transylvania Co.; Caldwell Co.
	Fish	<i>Etheostoma vulneratum</i>	Large streams and rivers, Little TN River system, Jackson, Macon, Swain Co.
	Fish	<i>Percina squamata</i>	Higher gradient upland rivers,

USFS Status	Type	Species	Habitat/Distribution
			Tennessee River system, Cherokee, Jackson, Macon, Swain Co.
<i>Forest Concern</i>	Amphibian	<i>Cryptobranchus alleganiensis</i>	Rivers and large streams, TN and Savannah River systems
	Bivalve	<i>Alasmidonta viridis</i>	Little Tennessee River, Swain Co.
	Bivalve	<i>Elliptio dilatata</i>	Little TN and Hiwassee Rivers, Cherokee Co.; New River
	Bivalve	<i>Lampsilis fasciola</i>	Little TN, French Broad and Pigeon Rivers, historic records
	Bivalve	<i>Pleurobema oviforme</i>	Little TN and Hiwassee drainages, Cherokee Co.
	Bivalve	<i>Villosa vanuxemensis</i>	Hiwassee River system, Cherokee Co.; French Broad River system
	Bivalve	<i>Villosa iris</i>	Little TN and Hiwassee Rivers, Martin and Brasstown Crks; French Broad R.
	Bivalve	<i>Villosa trabilis</i>	Hiwassee River
	Caddisfly	<i>Matrioptila jeanae</i>	Clay, Macon, Jackson, and Transylvania Co.
	Caddisfly	<i>Micrasema burksi</i>	Clay, Macon, Jackson, and Swain Co.
	Caddisfly	<i>Micrasema sprulesi</i>	Macon
	Caddisfly	<i>Rhyacophila amicus</i>	Cullasaja R., Macon Co.; Whiterock, Spainhour, Deep Crk; North Toe and Oconoluftee Rivers
	Caddisfly	<i>Rhyacophila vibox</i>	Whiteoak Cr, Macon Co
	Crustacean	<i>Cymocythere clavata</i>	Symbiotic on crayfish in mountain streams and rivers in Savannah River system, Transylvania Co.; French Broad River system
	Crustacean	<i>Dactylocythere prinsi</i>	Symbiotic on crayfish, Savannah River drainage, Jackson Co.
	Crustacean	<i>Skistodiaptomus carolinensis</i>	Lake Ravenel, Macon Co.
	Dragonfly	<i>Somatochlora elongate</i>	Specifics unknown
	Dragonfly	<i>Stylurus scudderi</i>	Streams and rivers
	Fish	<i>Clinostomus funduloides sp. 1</i>	Little TN River drainage, Jackson and Macon Co.
	Fish	<i>Erimystax insignis</i>	Hiwassee River, Cherokee Co.
	Fish	<i>Etheostoma inscriptum</i>	Large streams in Savannah River system

USFS Status	Type	Species	Habitat/Distribution
	Fish	<i>Hybopsis rubrifrons</i>	Savannah River system, Transylvania Co.
	Fish	<i>Luxilis chrysocephalus</i>	Reported in Little TN River system, Macon Co.; Cane River system
	Fish	<i>Micropterus coosae</i>	Savannah River system, Transylvania and Jackson Co.
	Fish	<i>Moxostoma sp. 1</i>	Little TN and Hiwassee River drainages
	Fish	<i>Notropis lutipinnis</i>	Savannah and Little TN River systems, Jackson and Transylvania Co.; Broad River system
	Fish	<i>Noturus flavus</i>	Warmwater streams and rivers, Little TN River drainage, Swain Co.; Nolichucky and French Broad River systems
	Fish	<i>Stizostedion (Sander) canadense</i>	Large streams, rivers, reservoirs in Hiwassee River system, Cherokee Co.; French Broad River system
	Gastropod	<i>Elimia (Goniobasis) interrupta</i>	Hiwassee River and tributaries, Cherokee Co.
	Gastropod	<i>Leptoxis virgata</i>	Hiwassee River; report possibly in error
	Mayfly	<i>Barbaetis benfieldi</i>	Caney Fork, Jackson Co.; Jacob Fork, Burke Co.; French Broad River, Transylvania Co.
	Mayfly	<i>Baetopus trishae</i>	Specifics unknown
	Mayfly	<i>Drunella longicornis</i>	Mountain streams and rivers; Williamson Creek, Transylvania Co.
	Mayfly	<i>Habrophlediodes spp</i>	Specifics unknown
	Mayfly	<i>Seratella spiculosa</i>	Mountain streams
	Stonefly	<i>Bolotoperla rossi</i>	Mountain streams and rivers; Transylvania Co.
	Stonefly	<i>Isoperla frisoni</i>	Mountain streams and rivers; Whiteoak Creek, Macon Co.; Transylvania Co.
	Stonefly	<i>Megaleuctra williamsae</i>	UT Cullasaga River, Macon Co.; Mull Crk, Jackson Co.; Cove Crk, Haywood Co.
	Stonefly	<i>Zapada chila</i>	Small streams, Beech Flat Prong, Swain Co.; Ashe Co.

Attachment 1b: Endangered, threatened, proposed and sensitive aquatic species evaluated for the Fatback Project. The analysis includes known and potentially occurring rare aquatic species from the Macon County, NC, and the Little Tennessee River system. Potential occurrence is based on known distributions of the species and the presence of suitable habitat.

Type	Name	USFS Status	Likelihood of Occurrence in Analysis Area
Threatened and Endangered Species			
Mollusk	<i>Alasmidonta raveneliana</i>	E	Not likely to occur ¹
Mollusk	<i>Pegias fabula</i>	E	Not likely to occur ¹
Fish	<i>Erimonax monacha</i>	T	Not likely to occur ¹
Sensitive Species			
Crustacean	<i>Cambarus chaugaensis</i>	S	Not likely to occur ¹
Crustacean	<i>Cambarus georgiae</i>	S	May occur ³
Dragonfly	<i>Macromia margarita</i>	S	Not likely to occur ¹
Fish	<i>Etheostoma vulneratum</i>	S	Not likely to occur ¹
Fish	<i>Percina squamata</i>	S	Not likely to occur ¹
Mollusk	<i>Alasmidonta varicose</i>	S	Not likely to occur ¹
Mollusk	<i>Fusconaia barnesiana</i>	S	Not likely to occur ¹

Notes:

1 = No suitable habitat present or vicinity records in the analysis area, but the species may be present in the county.

2 = Suitable habitat present, but no vicinity records.

3 = Vicinity records, in or downstream of the analysis area, but not necessarily in project area.

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WILDLIFE ATTACHMENTS

Attachment 1. Proposed, endangered, threatened, and sensitive terrestrial animal species considered.

Species	Type	Habitat description	Likelihood of occurrence
Federally Threatened and Endangered Species			
Noonday globe	Snail	Restricted to the Nantahala Gorge	No; outside the range
Bog turtle	Reptile	Sunlit, marshy meadows, bogs, wet pastures	No; lacks suitable habitat
Bald eagle	Bird	Nests in large, open grown trees near lakes	No; nests are unlikely
Carolina n. flying squirrel	Mammal	Spruce-fir and northern hardwoods above 4000'	No; outside the range
Indiana bat	Mammal	Roosts in caves and hollow trees	Yes
2001 Region 8 Regional Forester's Sensitive Species			
<i>Cicindela ancocisconensis</i>	Beetle	High elevation forests; > 4000'	No; elevation is < 4000'
<i>Trechus luculentus unioi</i>	Beetle	Rocks and moss in wet ravines in w. Graham county	No; outside the range
Divergent melanoplus	Insect	Glades and balds, 1800 – 1417'; Jackson county	No; outside the range
Serrulate melanoplus	Insect	Valleys and lower slopes, e. Graham county	No; outside the range
Northern bush katydid	Insect	In the treetops at the edges of broadleaved forests	Yes

Rock-loving grasshopper	Insect	Lichen-covered rock outcrops	Yes
Frosted elfin	Butterfly	Open woods and borders, usually in dry situations	Yes
Diana fritillary butterfly	Butterfly	Deciduous and pine woodlands near streams	Yes
Fraser fir angle	Moth	Spruce-fir forests with fraser fir	No; lacks suitable habitat
Lost Nantahala cave spider	Spider	Blowing Springs and Lost Nantahala Cave	No; outside the range
<i>Nesticus sheari</i>	Spider	Boulder fields in moist or rich forests; Graham co.	No; outside the range
<i>Nesticus silvanus</i>	Spider	Boulder fields in moist or rich forests	No; lacks suitable habitat
Black mantleslug	Snail	High elevation forests; mainly spruce-fir	No; lacks suitable habitat
Glossy supercoil	Snail	Leaf litter on wooded hillsides and ravines	Yes
Santeetlah dusky salamander	Amphibian	Stream headwaters and seepage areas	No; outside the range
Junaluska salamander	Amphibian	Wider portions of streams below 2395' elevation	No; outside the range
Tellico salamander	Amphibian	Hardwood forests in Unicoi Mountains	No; outside the range
S. Appalachian salamander	Amphibian	Moist forests at all elevations	Yes
Peregrine falcon	Bird	Large vertical rock cliffs	No; lacks suitable habitat
Migrant loggerhead shrike	Bird	Fields and pastures	No; lacks suitable habitat
App. Bewick's wren	Bird	Woodland borders or openings at high elevations	No; lacks suitable habitat
Rafinesque's big-eared bat	Mammal	Old buildings, caves, mines, bridges	No; lacks suitable habitat
Southern rock vole	Mammal	Rocky areas in spruce-fir, n. hwsd and balds	No; lacks suitable habitat
E. Small-footed bat	Mammal	Hemlock forests, rock crevices, caves, mines	Yes
Southern water shrew	Mammal	Small streams up to 12-15' wide above 3000'	Yes

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5.4. Appendix E – Age Class Distribution

R8 FSveg - Age Class Distribution

Date Of Report: July 10, 2007, 10:59 am EST

[R8 FSveg Home](#)
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Admin Forest: 11 - North Carolina, District: 11 - Wayah

Found **156** stands in 'dbelcher.r8_fsveg_stands_view' for Project: **LEGACY_CISC_DATA**, Compartments List: **102, 110, 111, 121, 124**

Acres for Suitable and UnSuitable Lands by Forest Type as of 2007.

Admin NF: 11 - North Carolina District: 11 - Wayah Compartments: **102, 110, 111, 121, 124**

	1	2	3	4	5	6	7	8	9	10	11	12	13
	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101-110	111-120	121-130
14													
15													
0													
131-140													
	141-150+	Total	Percent										

Forest Type= 3, White pine													
0	0	28	0	0	0	7	0	0	0	0	0	0	0
0	0	35	1										
Forest Type= 8, Hemlock-hardwood													
0	0	0	0	0	0	0	0	26	0	0	0	0	0
0	0	26	1										
Forest Type= 10, White pine-upland hardwood													
0	0	30	0	0	0	0	0	0	0	0	0	0	0
0	0	30	1										
Forest Type= 41, Cove hardwood - white pine - hemlock													
0	0	0	0	0	0	0	0	0	16	0	0	0	0
0	0	16	0										
Forest Type= 45, Chestnut oak-scarlet oak-yellow pine													
0	0	0	0	0	0	0	7	0	11	10	124	10	0
46	0	208	4										
Forest Type= 48, Northern red oak-hickory-yellow pine													
0	0	0	0	0	0	0	0	0	0	0	0	46	0
0	0	46	1										
Forest Type= 50, Yellow poplar													
0	0	0	0	0	0	0	49	186	638	0	0	0	0
0	0	873	17										
Forest Type= 53, White oak-northern red oak-hickory													
0	0	91	75	30	0	0	33	426	396	63	123	208	217
149	257	2068	41										
Forest Type= 55, Northern red oak													
0	0	0	0	0	0	0	0	0	0	0	0	29	0

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