United States Department of Agriculture | Forest Service | National Forests in North Carolina
Pisgah National Forest
Appalachian Ranger District
Burnsville Station | PO Box 128
US 19 Bypass
Burnsville, NC 28714-0128
828-682-6146

File Code: 1950-1
Date: October 28, 2008

Dear Interested Public:

My staff has assembled an Environmental Assessment (EA) evaluating the Dylan 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 Dylan project 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 for the project.

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-nantahala@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 the management of the National Forests in North Carolina.

Sincerely,

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

DYLAN PROJECT
NANTAHALA RANGER DISTRICT
OCTOBER 2008

Proposed Action:	**Management activities in 4 Nantahala Ranger District compartments to provide for ecosystem restoration and Nantahala/Pisgah National Forest desired future conditions. Two-aged regeneration of 10 hardwood stands** totaling approximately 143 acres by commercial timber sale, followed by site preparation, natural regeneration, and new stand improvement after the first growing season; **thinning of 9 hardwood stands** totaling approximately 218 acres by commercial timber sale; **slashing, burning, and planting of shortleaf pine** on 2 stands totaling approximately 28 acres; **existing wildlife opening refurbishing** on all existing openings and creating a brushy buffer around them on approximately 5 acres; **maintenance of existing linear wildlife openings; preharvest vine control** with herbicides in 3 stands on approximately 59acres; **vine control** with herbicides in previous harvest entry groups on approximately 54 acres; **oak preharvest midstory treatment** on approximately 300 acres; **timber stand improvement by crop tree release** in 8 stands on approximately 169 acres; **creation of new wildlife habitat** using various treatment methods; **0 miles of new road construction and 0 miles of road reconstruction**; **watershed restoration on one existing Forest system road** for approximately 0.5 mile, 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 88, 125, 126, 150, 151, 152 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

TABLE OF CONTENTS

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 88, 125, 126, 121, and 152. These lands are in the watersheds of Jones Creek, Skeenah Creek, Coweeta Creek, Bradley Branch, Mulberry Creek, and Commissioner Creek. Forest types are predominantly upland and cove hardwoods, with some mixed hardwood-yellow pine stands, and mixed white pine-cove hardwood/hemlock stands.

The compartments occur within Management Areas (MAs) 2A, 3B, 2C, 4C, 5, and 4D. Embedded within these MAs is MA 18 (riparian areas around perennial water bodies). Management areas 2A, 3B, and 4D are suitable for timber management. MAs 2C 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 the ridgeline at the top of Compartment 125.

1.1.2. DESCRIPTION OF THE PROPOSAL

The **proposed action** includes tree harvesting using conventional ground-based and skyline yarding systems, pre- and postharvest 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, watershed restoration on one section of Forest system road, 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 vegetation habitat improvement, and for forest regeneration, sustainability, and provision of early successional habitat:

Regenerate a total of approximately 143 acres in 10 units by commercial timber harvest using the two-aged regeneration method (Table 1.1.2.1). These stands are all upland or cove hardwood 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 88-5 (about 24 acres), 126-7 (about 25 acres), 126-45 (about 7 acres), 126-46 (about 5 acres), 126-47 upper part (about 13 acres), 152-38 (about 14 acres), and 152-39 (about 4 acres) by conventional ground skidding logging systems. Harvest stands 125-46 (about 18 acres), 125-48 (about 10 acres), 126-47 lower part (about 12 acres), and 152-33 (about 11 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 218 acres by commercial timber harvest in stands 88-15 (about 17 acres), 125-15 (about 19 acres), 125-22 (about 64 acres), 125-49 (about 18 acres), 125-50 (about 3 acres), 125-51 (about 18 acres), 126-20 (about 51 acres), 152-22 (about 22 acres), and 152-32 (about 6

acres) (Table 1.1.2.1). Thin these stands 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
Dylan Project Proposed Harvest Treatments – Alternative C (Preferred)

Comp-St.	Acres
2-age ground	
88-5	24
126-7	25
126-45	7
126-46	5
126-47 upper	13
152-38	14
152-39	4
	92
2-age cable	
125-46	18
125-48	10
126-47 lower	12
152-33	11
	51
Thin	
88-15	17
125-15	19
125-22	64
125-49	18
125-50	3
125-51	18
126-20	51
152-22	22
152-32	6
	218

At least two growing seasons prior to harvesting stands 88-5, 125-48, and 126-7 (totaling about 59 acres), **cut individual grape and smoke vines** in these stands, 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 the above paragraph using triclopyr amine or triclopyr ester herbicide. Do this work in all existing groups in Compartments 125, 126, and 152 (47 groups on approximately 54 acres), and conduct manual release of ash, 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 143 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 and imazypyr mixed in mineral oil.

Conduct an oak preharvest midstory treatment on approximately 300 acres in stands 88-18 (35 acres), 125-3 (36 acres), 125-6 (20 acres), 125-31 (31 acres), 125-33 (23 acres), 126-19 (27 acres), 126-24 (31 acres), 126-26 (53 acres), and 126-27 (44 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 treatment of 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 169 acres in stands 88-10 (about 25 acres), stand 125-20 (about 24 acres), stand 126-28 (about 23 acres), stand 151-8 (about 25 acres), stand 151-12 (about 13 acres), stand 151-24 (about 25 acres), stand 152-22 (about 11 acres), and stand 152-28 (about 23 acres). These stands are high-value sapling stands of cove and upland hardwoods currently ages 8-14 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/mineral oil solution or triclopyr amine mixed 50% in water.

As seedlings become available, conduct enrichment plantings with chestnut blight-resistent 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 Nantahala 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 5 existing openings. Work would consist of reseeding 5 existing openings (totaling about 5 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 5 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 10 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 (10 units on approximately 143 acres). Conduct this treatment after the proposed units are harvested and the new stands are about 3-5 years of age. This treatment would be for the purpose of maintaining some grass/forb habitat in these new stands for a 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 of the existing FS roads (main FS roads and their subsidiary roads A-D) in these compartments for 30 feet back from the roadbanks (FS Road #s 7225, 7250, 7290, 763, 7291, 7292, and 7293). 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.

There would be no road reconstruction or reconstruction in this proposed action alternative.

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 10 stands to be regenerated (about 143 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 2A, 3B, 2C, 4C, 4D, and 14 general direction and standards as described on pages III-63 through III-70, pages III-71 through III-76, pages III-77-88, 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.

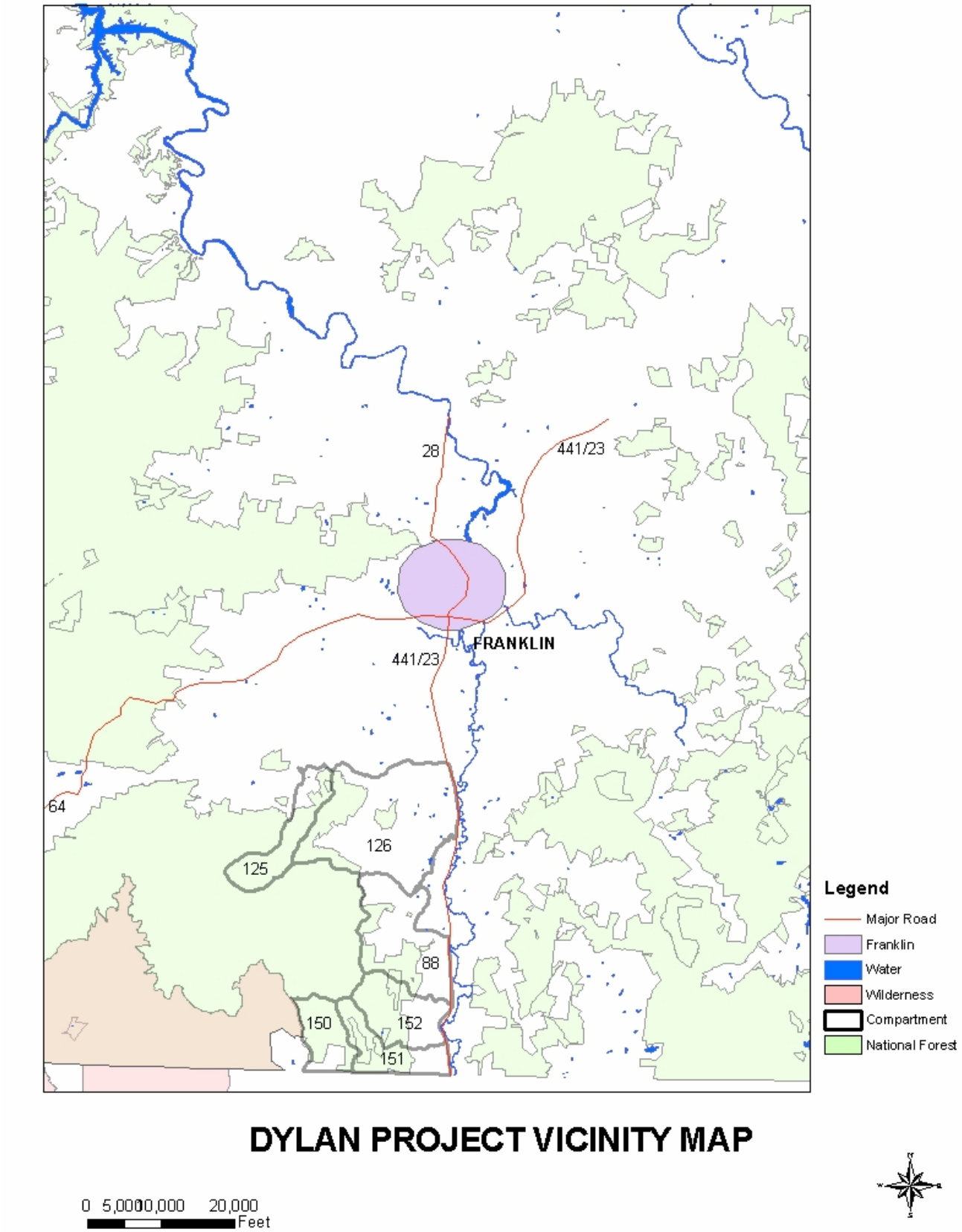
Soil and Water Management: Use brush barriers, silt fence, or hay bales to prevent visible sediment from entering streamcourses as needed. Revegetate all exposed cut and fill slopes within 30 days of initial disturbance. Revegetate and/or mulch disturbed soil at stream crossings the same day. Restrict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

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



DYLAN PROJECT 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.

LRMP direction for the pertinent Management Areas (MAs) is as follows:

MA 2A: Managed for open roads through a scenic forest;

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 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 5: Emphasizes large backcountry areas where there is little evidence of humans or activities other than recreational use. An unroaded forest environment and natural-appearing forests with large old trees are desirable;

MA 14: Appalachian National Scenic Trail and its foreground zone, as mapped through the Visual Management System, characterized by a predominantly natural-appearing environment. 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 38 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 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 or pine-hardwood 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; and

5) Conduct forest management activities in order to provide for improvement and/or restoration of existing forest stands within the area.

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 in April-May of 2008. A project Scoping Record with maps and a proposed activity list was posted on the National Forests in NC internet website in order for individuals and groups to comment on the project proposal. Responses to the Scoping Record included 36 email letters of general support from area hunters, Josh Kelly and Stephen Novak - Wildlaw, Yolanda Saunooke – Eastern Band of the Cherokee, Mike Giles – Highlands Ruffed Grouse Society, Steve Henson – Southern Appalachian Multiple Use Council, Rick Layser – National Wild Turkey Federation, Don Mallicoat – SE Area Ruffed Grouse Society, Hugh Irwin – Southern Appalachian Forest Coalition, and Dave McHenry – NC Wildlife Resources Commission (NCWRC). In addition, the project has been listed in the NFsNC Schedule of Proposed Actions, 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 sustainable management of the existing resources, as well as the creation of early successional habitat. Other issues raised were the existing road system and proposed road reconstruction, nonnative invasive species, and forest restoration. 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 topics of a broader nature such as general Forest Service policy issues, 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

This alternative was designed to address the issue of regeneration harvesting using group selection (an uneven-aged management system) versus intermediate treatments such as thinning.

Alternative B includes tree harvesting using conventional ground-based and skyline yarding systems, pre- and postharvest 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, road construction and reconstruction, watershed restoration on one section of Forest system road, rare plant species habitat restoration, and understory planting of hybrid American chestnut trees in the proposed regeneration areas as available. 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 116 acres by commercial timber harvest using the two-aged regeneration method (Table 2.2.2.1). 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 88-5 (about 24 acres), 126-7 (about 25 acres), 126-45 (about 7 acres), the upper part of 126-47 (about 13 acres), and 152-38 (about 14 acres) by conventional ground skidding logging systems. Harvest stands 125-48 (about 10 acres), the lower part of 126-47 (about 12 acres), and152-33 (about 11 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 389 acres to uneven-aged management in six stands (stands 125-15 (25 acres), 125-22 (95 acres), 125-49 (29 acres), 125-51 (23 acres), 126-20 (51 acres), 126-21 (about 144 acres), and 152-22 (22 acres)). **Regenerate the areas with small groups** (group selection) of approximately one acre each (Table 2.2.2.1). All of these stands except stand 152-22 contain regeneration harvesting by group selection from the previous harvest entry in the mid-1990s. Stand 125-15 would contain 5 groups (totaling about 11 acres), stand 125-22 would have 16 groups (about 16 acres), stand 125-49 would contain 5 groups (about 5 acres), stand 125-51 would have 3 groups (about 3 acres), stand 126-20 would have 8 groups (about 8 acres), stand 126-21 would have 24 groups (about 24 acres), and stand 152-22 would have 3 groups (about 3 acres).

Thin a total of approximately 45 acres by commercial timber harvest in stands 88-15, 88-33, and 152-32 (Table 2.2.2.1). 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 2.2.2.1

Dylan Project Proposed Harvest Treatments – Alternative B

Treatment		**Remarks**
2-age ground		
Comp-St.	Acres	
88-5	24	
126-7	25	
126-45	7	
126-47 upper	13	
152-38	14	
	83	
2-age cable		
125-48	10	
126-47 lower	12	
152-33	11	
	33	
Group Selection		
125-15	25 (gross)	5 groups
125-22	95 (gross)	16 groups
125-49	29 (gross)	5 groups
125-51	23	3 groups

	(gross) 51	
126-20	(gross) 144	8 groups
126-21	(gross) 22	24 groups
152-22	(gross)	3 groups
	389	64 groups

Thin

88-33	22
88-15	17
152-32	6
	45

At least two growing seasons prior to harvesting stands 88-5, 125-48, and 126-7 (totaling about 59 acres), **cut individual grape and smoke vines** in these stands, 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 the above paragraph using triclopyr amine or triclopyr ester herbicide. Do this work in all existing groups in Compartments 125, 126, and 152 (47 groups on approximately 54 acres), and conduct manual release of ash, 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 116 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 and imazypyr mixed in mineral oil.

Conduct an oak preharvest midstory treatment on approximately 300 acres in stands 88-18 (35 acres), 125-3 (36 acres), 125-6 (20 acres), 125-31 (31 acres), 125-33 (23 acres), 126-19 (27 acres), 126-24 (31 acres), 126-26 (53 acres), and 126-27 (44 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 treatment of 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 169 acres in stands 88-10 (about 25 acres), stand 125-20 (about 24 acres), stand 126-28 (about 23 acres), stand 151-8 (about 25 acres), stand 151-12 (about 13 acres), stand 151-24 (about 25 acres), stand 152-22 (about 11 acres), and stand 152-28 (about 23 acres). These stands are high-value sapling stands of cove and upland hardwoods currently ages 8-14 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/mineral oil solution or triclopyr amine mixed 50% in water.

As seedlings become available, conduct enrichment plantings with chestnut blight-resistent 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 Nantahala 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 5 existing openings. Work would consist of reseeding 5 existing openings (totaling about 5 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 5 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 10 additional acres of early successional habitat in the project area.

Create a new wildlife opening at the end of the newly-constructed segment of FS road #7225B1 (see paragraph C below). This opening would be approximately one acre and would be seeded with an appropriate wildlife mixture of grasses and forbs.

Use herbicide (triclopyr ester) in a backpack spray application to kill young saplings in the skid roads/trails of proposed two-aged regeneration units (10 units on approximately 143 acres). Conduct this treatment after the proposed units are harvested and the new stands are about 3-5 years of age. This treatment would be for the purpose of maintaining some grass/forb habitat in these new stands for a 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 of the existing FS roads (main FS roads and their subsidiary roads A-D) in these compartments for 30 feet back from the roadbanks (FS Road #s 7225, 7250, 7290, 763, 7291, 7292, and 7293). 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.

Construct approximately 1.1 miles of new FS system road. This includes one segment, built onto the end of FS road #7225B1, through stands 126-20 and 126-21 in the Black Mountain area (refer to Alternative B map). The purpose of this road construction would be to access the northeastern part of Compartment 126 and stands 126-20 and 21. Road construction would occur over an existing old woods roadbed in this location.

Reconstruct approximately 1.2 miles of existing FS roads. This includes two segments: about 0.4 miles of FS Road 7293A, and a 0.8-mile segment of existing FS road #7250 to access stand 88-33 (refer to Alternative B map).

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 by the 2-aged method (about 116 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 2A, 3B, 2C, 4C, 4D, and 14 general direction and standards as described on pages III-63 through III-70, pages III-71 through III-76, pages III-77-88, 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.

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 guidlines 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.

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.

2.2.3. ALTERNATIVE C

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

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. 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

3.2.1). When these effects are evaluated within a forestwide 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 forestwide trends.

The amount of habitat changed by the project is checked for consistency with the Forest Plan (LRMP) and the recent trends in activities. If any inconsistencies are discovered, 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 (3.2.1) 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 (Eastern) Towhee	Decrease	Early-successional (0-10)	Early successional (11-20)	
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
Coolwater streams	Smallmouth bass	No/1
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 Evalutation

Boundaries of Analysis Area

Only botanical resources within, or adjacent to, the activity areas were analyzed in detail. Botanical resources in the activity areas include rich cove forests (biological communities), forests ≥ 100 years old (special habitat component), and ginseng (management indicator species; see also MIS Tables 3.2.1 through 3.2.3 above for selection criteria). For cumulative effects, effects to botanical resources were compared to the total amount of resources in Compartments 88, 125, 126 and 152, the four compartments undergoing management activities.

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 forest communities 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 areas. Effects to community attributes can be expected to persist for approximately 40 years following regeneration harvest, the amount of time necessary to restore an open, relatively mature forest (Table 3.3.1).

Forest communities ≥ 100 yr - In general, the age class of a forest community is affected only by regeneration harvest. As a result, analyses for direct and indirect effects to forest communities ≥ 100 years old will be confined to the activity areas. Effects to forest communities ≥ 100 years old, by definition, persist for 100 years after treatment (Table 3.3.1).

Ginseng - Ginseng grows in cove forests characterized by closed canopies and open understories. Regeneration harvest alters this habitat directly by increasing light and decreasing humidity at the forest floor (USFS, 2001, pg. 822). These direct effects should be confined to the immediate vicinity of the activity areas, and, due to the rapid growth of stump sprouts, are unlikely to persist more than two growing seasons following the harvest.

Regenerating forest may also directly impact ginseng by creating a dense thicket of sprouts that may competitively exclude the plants during the successional development of the community. Regenerating forests tend to eliminate the smaller, but not the larger, plants in the activity area. This effect would be partially offset by the herbicide treatment of undesirable sprouts. The effect would be confined to the activity areas, and would persist for at least 20 years. After 20 years, the regenerating forest should be sufficiently open to alleviate impacts to the surviving understory plants (Rankin and Tramer, 2002, Harrelson and Matlack, 2006; Table 3.3.1).

In addition to the direct effects, reducing the number of flowering ginseng plants in the activity areas 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.

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 Dylan Project

Resource Category	**Resource Undergoing Further Analysis**	**Boundaries for Analysis area**		
		Direct and Indirect Effects		Trend Analysis
		Spatial	Temporal	
Communities	Rich Cove Forests	Activity areas under-going regeneration harvest	40 yr after regeneration harvest to restore relatively mature forest conditions	Forest Level
Habitat Component	Forest communities ≥ 100 yr	Activity areas under-going regeneration harvest	100 yr after regeneration harvest to restore age class	Forest Level
Management Indicator Species	Ginseng	Activity areas under-going regeneration harvest for direct effects; one mile pollination radius for indirect effects	2 yr for direct effects from harvest activities; 20 yr after harvest to escape the direct effects of the regenerating forest and the indirect effects on pollination	Forest Level

Effects of Alternatives on Communities

(1) Rich Cove Forests

Direct and Indirect Effects - Because it proposes no management activites, Alternative A would produce no direct or indirect effects to rich cove forests.

Alternative B proposes both two-age and group-selection harvests in rich cove forests, while Alternative C proposes two-age harvests. For the purposes of this analysis, group-selection harvests will be considered regeneration harvests affecting the entire group-selection unit, because group-selection anticipates a series of harvests that would eventually regenerate the entire unit. Both two-age and group-selection treatments reduce the amount of canopy cover and basal area in rich cove forests by removing canopy trees. Both treatments would also diminish the community attributes associated with late-successional rich cove forest in the activity areas for approximately 40 years, the time period necessary to re-establish the canopy and understory characteristics associated with later-successional cove forests.

Regeneration harvests would also reduce the population sizes of understory species, such as ginseng, by initially increasing transpiration stress, and secondarily increasing canopy shade. Regeneration units would become equal areas of early successional habitat for wildlife species for 20 years.

In addition to regeneration harvests, Alternatives B and C also proposed thinning treatments. Thinning treatments 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.

Rich cove communities are the dominant forest types in all regeneration units except Stands 88-33, 126-8, 152-17, 152-33, 152-38 and 152-39. Rich cove forests affected by regeneration harvests, both two-age and group-selection, total 428 acres under Alternative B, and 140 acres under Alternative C. Compared to Alternative C, Alternative B will directly impact 288 additional acres of rich cove forest.

Effects of Past, Ongoing and Foreseeable Actions - Past effects to rich cove forests can be summarized by the existing condition of the forests in the analysis area. Because the effects of past management tend to dissipate after 40 years, past effects would be most evident in forests < 40 years old. The four compartments in the analysis area contain approximately 2288 acres of rich cove forests, of which 581 acres are < 40 years old. As a result, past effects to canopy cover, basal area and the distribution of understory plants impact approximately 25% of the rich cove forests in the analysis area. The analysis area contains no other ongoing or foreseeable USFS or private actions that would potentially affect rich cove forests.

Cumulative Effects - Because it would produce no direct or indirect effects, Alternative A would produce no cumulative effects to cove forest communities. The cumulative effect of two-age and group-selection harvests, primarily decreases in the canopy cover and basal area of overstory trees, and loss of biomass and diversity in understory plants, would total 1063 acres of rich cove forest under Alternative B, or approximately 46% of the rich cove forests in the four compartments of the analysis area. The cumulative effect of two-age harvest would total 721 acres of rich cove forest under Alternative C, or approximately 32% of the rich cove forests in the four compartments.

Summary - 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 areas represent a reduction of < 1% of these cove forests across the national forests, persisting for a 40 year period. As a result, the Dylan project is unlikely to substantially alter the current trend for cove forests.

Table 3.3.2. Summary of project effects of each alternative on the evaluated management indicator species

Community	**Summary of Project Effects**		
	Alternative A	Alternative B	Alternative C
Rich Cove Forests	None affected	Decreased cover and old-growth characteristics on 428 acres of two-age and group-selection harvest for 40 yr; decreased management indicator species populations for 20 years	Decreased cover and old-growth characteristics on 140 acres of two-age harvest for 40 yr; decreased management indicator species populations for 20 years

Effects of Alternatives on Special Habitat Components

(1) Forest communities ≥ 100 years old

Direct and Indirect Effects - Because it proposes no management activities, Alternative A would produce no direct or indirect effects to forest communities ≥ 100 yr.

Alternatives B and C propose two-age, regeneration harvests in forest communities ≥ 100 yr. Two-age harvest reduces the amount of canopy cover and basal area in forest communities ≥ 100 yr by removing most of the canopy trees, eliminating many of the old growth characteristics of the communities. This affect would be limited to the activity areas, and would persist, by definition, for 100 years following harvest. The units would become equal areas of early successional habitat for wildlife species for 20 years.

Under Alternative B, two forest communities ≥ 100 yr would undergo harvest: Stands 152-33 and 152-38, a total of 25 acres. Under Alternative C, three forest communities ≥ 100 yr would undergo harvest: Stands 152-33, 152-38 and 152-39, a total of 29 acres.

Effects of Past, Ongoing and Foreseeable Actions - Past effects to forest communities ≥ 100 yr can be summarized by the existing condition of the forests in the analysis area. Because all forest communities have the capacity to become 100 year old forest, any forest communities in the activity areas < 100 years old exhibit the effects of past activities. For Compartments 88, 125, 126 and 152, these effects total 3348 of the 4863 total acres. The analysis area contains no other ongoing or foreseeable USFS or private projects that would potentially impact forest communities ≥ 100 yr.

Cumulative Effects - Because it would produce no direct or indirect affects, Alternative A would produce no cumulative effects to forest communities ≥ 100 yr. Regeneration harvests would produce a cumulative effect of 3373 acres under Alternative B, and 3377 acres under Alternative C (Table 3.3.3).

Summary - The trend for forest communities >100 yr on the Nantahala and Pisgah National Forests is increasing, from 47,591 acres in 1980 to 166,078 acres in 2000 (USFS, 2001, pg. 23). The cumulative effect for Alternative B represents a negative impact of 2% of the forest communities ≥ 100 yr across the national forests. As a result, the Dylan Project is unlikely to substantially alter the current trend for forest communities ≥ 100 yr across the forests.

Table 3.3.3. Summary of project effects of each alternative on the evaluated special habitat components

Special Habitat Components	**Summary of Project Effects**		
	Alternative A	Alternative B	Alternative C
Forest communities ≥ 100 yr	None affected	Decreased by 25 acres for 100 yr following activity	Decreased by 29 acres for 100 yr following activity

Effects of Alternatives on Management Indicator Species

(1) Ginseng

Direct and Indirect Effects - Because it proposes no management activites, Alternative A would produce no direct or indirect effects to ginseng plants.

Alternative B proposes both two-age and group-selection harvests in rich cove forests potentially containing ginseng plants, while Alternative C proposes two-age harvests. For the purposes of this analysis, group-selection harvests will be considered regeneration harvests affecting the entire group-selection unit, because group-selection anticipates a series of harvests that would eventually regenerate the entire unit. Due to the dense shading produced by regenerating forests, the regeneration harvests proposed under Alternatives B and C will directly affect ginseng plants growing in the activity areas by reducing the number of plants for at least 20 years, especially in the smaller size classes. Under Alternative B, direct effects will occur on approximately 428 acres of two-age and group-selection harvests. Under Alternative C, direct effects will occur on approximately 140 acres of two-age harvests.

In addition, indirect effects to neighboring ginseng plants, estimated using a one mile radius around the activity areas, may affect ginseng plants over a 20 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. Under Alternatives B and C, indirect effects may impact ginseng plants on approximately 3000 additional acres of cove forests

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 lands can be summarized using the existing condition in the analysis area. Because impacts to ginseng from harvest activities persist for an estimated 20 years, the effects of past actions can be summarized by the number of acres of rich cove forest $\leq$ 20 years old. The four compartments in the analysis area for cumulative effects contain a total of 62 acres of rich cove forest $\leq$ 20 years old. These forest communities probably contain fewer ginseng plants than comparable areas of more mature rich cove forests. The analysis area contains no ongoing of 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 3490 acres of ginseng plants under Alternative B, and 3202 acres under Alternative C, for a period of 20 years.

Summary - The trend for ginseng is decreasing, primarily due to harvest for commercial sale (USFS, 2001, 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 3500 acres of direct and indirect effects over a 20 year period, represent a total impact of < 1.5% of these cove forests. As a result, the Dylan 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 (*Panax quinquefolium*)	None affected	Decreased populations on 428 acres of regeneration and group-selection harvest for 20 yr; decreased gene flow on an additional 3000 acres	Decreased populations on 140 acres of regeneration harvest for 20 yr; decreased gene flow on an additional 3000 acres

3.4. Terrestrial Wildlife MIS and Special Habitat Evaluation

Species Evaluated and Rationale

All management indicator species whose habitat is potentially affected by project activities were evaluated (see Tables 3.2.1 and 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 (*Ursus americanus*)	Mammal	Hard mast, soft mast, dens	May occur
White-tailed deer (*Odocoileus virginianus*)	Mammal	Hard mast, browse, grass/clover	May occur
Rufous-sided (Eastern) towhee (*Pipilo erythrophthalmus*)	Bird	Early-successional (0-10)	Likely to occur
Ruffed grouse (*Bonasa umbellatus*)	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 4D (MA 4D), where forest-wide direction is to provide habitat conditions for species such as black bear, white-tailed deer, and eastern wild turkey. Standards for MA 4D are to provide no more than 10% in early successional habitat, and a minimum of 0.5% 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 all of the compartments. Alternatives B and C would result in the creation of new early successional habitat in all four compartments. Table 3.4.2 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

	Total acres	**Alt A** (0-10)	**Alt B** (0-10)	**Alt C** (0-10)
Compartment 88	918	0	26 (3%)	26 (3%)
Compartment 125	1460	0	43 (3%)	40 (3%)
Compartment 126	1325	0	96 (7%)	77 (6%)
Compartment 152	1132	0	31 (3%)	50 (4%)

Effects of Past, Ongoing and Future Projects **–** The last timber sale in these compartments resulted in 130 acres of early successional habitat in all four compartments. These areas are no longer in the 0-10 year age class. There are no other 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 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 196 acres in Alternative B, and 193 acres in Alternative C. Preharvest grapevine control would reduce soft mast production on 113 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 130 acres of early successional habitat (now 11-20 years old) in all four 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 2019, 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 196 acres in Alternative B and 193 acres in Alternative C of brushy areas as a result of two-age harvests, group selection and cutting around wildlife openings. 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 would reduce soft mast production on 113 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 130 acres of early successional habitat (now 11-20 years old and still considered soft mast-producing species) in all four compartments. 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 would result in cumulative effects of 4%, 5%, 10%, and 7% in soft-mast producing species in Compartments 88, 125, 126, and 152, respectively. In Alternative C, cumulative effects would result in 4%, 5%, 9%, and 9%, 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 and group selection units are in hard mast-producing forest types and are greater than 40 years old. As a result, the project will cut approximately 196 acres of these species under Alternative B and 193 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 867 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 1063 acres under Alternative B and 1060 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

	Total acres	**Alt A** (0-10)	**Alt B** (0-10)	**Alt C** (0-10)
Compartment 88	918	190 (21%)	216 (24%)	216 (24%)
Compartment 125	1460	198 (14%)	241 (17%)	238 (16%)
Compartment 126	1325	234 (18%)	330 (25%)	311 (23%)
Compartment 152	1132	245 (22%)	276 (24%)	295 (26%)

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 30 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, group selection units and brushy areas around wildlife openings, as a result of woody material left from harvesting operations. This includes a total of 196 acres under Alternative B and 193 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 130 acres of early successional habitat (now 11-20 years old) in all four 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.	196 acres created.	193 acres created.
Early successional communities (11-20 yr)	Absent.	196 acres created after 10 years post-harvest.	193 acres created after 10 years post-harvest.
Soft mast-producing species (< 20 yr)	Decline due to aging of existing communities	196 acres created by two-age harvest.	193 acres created.
Hard mast-producing species (> 40 yr)	Increase due to aging of existing communities	196 acre reduction	193 acre reduction
Permanent grass/forb openings	No change.	No change.	No change.
Down woody material	None affected.	Increase on 196 acres	Increase on 193 acres.

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 196 acres in Alternative B and 193 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.

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Effects of Past, Ongoing and Future Projects – The last timber sale in these compartments resulted in 130 acres of early successional habitat (now 11-20 years old) in all four compartments. There are no known other ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the proposed action, plus the past timber sale would result in cumulative effects of 4%, 5%, 10%, and 7% in mid-successional habitat in Compartments 88, 125, 126, and 152, respectively (see Table 3.4.3 above). In Alternative C, cumulative effects would result in 4%, 5%, 9%, and 9%, respectively, in mid-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 130 acres of early successional habitat (now 11-20 years old) in all four compartments. 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 10% in early successional habitat, no more than 10% in soft mast producing species and will still have at least 74% of their acres in hard mast production under Alternatives B and C. Therefore, the effects of the alternatives on white-tailed deer were estimated to be beneficial for Alternatives B and C (Table 3.4.4).

Forest-wide Trends - Across the Forest, white-tailed deer populations are stable to slightly increasing. While hard mast capability has increased in recent years, the amount of early successional habitat has declined. Grass/forb plantings 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.

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 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 130 acres of early successional habitat (now 11-20 years old) in all four compartments. 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 10% in early successional habitat, no more than 10% in soft mast producing species and will still have at least 74% of their acres in hard mast production under Alternatives B and C. Therefore, the effects of the alternatives on black bear were estimated to be beneficial for Alternatives B and C (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. 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 3.4.2.

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 continued lack of this habitat in the near future. Alternatives B, and C would result in an increase in this

special habitat, resulting in 196 acres in Alternative B and 193 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 130 acres of early successional habitat (now 11-20 years old) in all four compartments. There are no other known ongoing or future projects that would affect this habitat.

Cumulative Effects – In Alternative B, the proposed action, plus the past timber sale would result in cumulative effects of 4%, 5%, 10%, and 7% in mid-successional habitat in Compartments 88, 125, 126, and 152, respectively (see Table 3.4.3 above). In Alternative C, cumulative effects would result in 4%, 5%, 9%, and 9%, respectively, in mid-successional habitat in these compartments.

Forest-wide Trends - Across the Forest, eastern towhee populations are in decline. 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	+196 a.	+326 a.	+193 a.	+323 a.
White-tailed deer	Adverse	Adverse	Beneficial	Beneficial	Beneficial	Beneficial
Black bear	Adverse	Adverse	Beneficial	Beneficial	Beneficial	Beneficial
Eastern towhee	Decrease	Decrease	+196 a.	+196 a.	+193 a.	+193 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 3.4.1. 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 Dylan 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 Dylan Project consist of the following watersheds: Commissioner Creek downstream to its confluence with the Little Tennessee River; Mulberry Creek downstream to its confluence with the Little Tennessee River; Bradley Branch downstream to its confluence with Norton Branch; Unnamed tributary of Coweeta Creek and Howard Branch to their confluence with Coweeta Creek; North Fork Coweeta Creek to its confluence with Coweeta Creek; Coweeta Creek to its confluence with the Little Tennessee River; Bates Branch to its confluence with the Little Tennessee River; Black Mountain Branch to its confluence with South Fork Skeenah Creek; South Fork Skeenah Creek; Jones Creek to its confluence with Allison Creek.

Existing Conditions for Aquatic Communities and MIS

Coweeta Creek is classified by the North Carolina Department of Environment and Natural Resources (NCDENR) as class B Tr waters. Bates Branch is classified as class C Waters. Commissioner Creek, Mulberry Creek, Skeenah Creek, and Black Mountain Branch are classified as Class C Tr waters. Jones Creek is classified as WS-III Tr waters. Class B waters are waters primarily used for recreation and any other use designated under Class C waters. 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. Class WS-III waters are protected as water supplies which are generally in low to moderately developed watershed and are suitable for all Class C uses.

The analysis area is characterized as containing habitat for coldwater fish species. Analysis area waters also provide extensive habitat for macroinvertebrates. Streams within the Dylan Project aquatic analysis area typically have substrates consisting mainly of cobble and gravels (see Appendix D, Aquatic Attachment 1c). Analysis area streams are currently supporting the designated uses described by North Carolina Department of Environment and Natural Resources (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. Jones Creek, South Fork Skeenah Creek, Black Mountain Branch, Coweeta Creek, Mulberry Creek, and Commissioner Creek provide habitat for rainbow trout and brown trout. Blacknose dace will not be analyzed further because there are no records for the occurrence of blacknose dace within the aquatic analysis area waters. As a result, wild rainbow trout and wild brown trout were selected for further analysis. Brook trout were selected as MIS because this species occurs within Commissioner Creek. There is no reservoirs within the aquatic analysis area and no habitat for the reservoir species largemouth bass; therefore, this species was not selected as a project MIS. 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 or warmwater 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 brook trout habitat would be changes in water quality. Therefore, the number of stream miles 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 brook trout (*Salvelinus fontinalis*), rainbow trout (*Oncorhynchus mykiss*), and brown trout (*Salmo trutta*). Approximately 35 miles of coldwater streams occur within the analysis area.

Direct and Indirect Effects - Alternative A: Alternative A, the no-action alternative, would involve no ground disturbing activities or herbicide applications. No watershed improvements would be done. The existing condition of the road in need of rehabilitation would continue. Sedimentation and turbidity from the damaged road would continue to occur during rain events. This alternative would not improve the coldwater habitats because it would not eliminate a chronic sediment source. As such, this alternative would not meet the Forest Plan direction for Management Area 18.

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 require construction of a cut and fill slope; therefore, there would be very little ground disturbance that could produce sediment. Skid roads would 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. This alternative would also have beneficial effects to the aquatic resources due to the watershed improvements within the Bates Branch watershed.

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.

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 Best Management Practices (BMP's). Culvert installations within the project area streams would cause a slight increase in sediment within the stream channels.

A small quantity of sediments may enter Black Mountain Branch and an unnamed tributary of South Fork Skeenah Creek during culvert installations; however, these effects would not be measurable approximately 75 feet below the crossings. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installations would be immeasurable at the confluence with South Fork Skeenah Creek because the culvert installation would occur approximately 1.0 mile from the mouth of Black Mountain Branch and unnamed tributary of South Fork Skeenah Creek. Additional culverts may be installed within analysis area waters as needed for drainage. The effects of these culverts would be the same as described for the culvert installations within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the coldwater streams community within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek by partially filling pools within the first 75 feet below the crossing. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

The road construction and reconstruction proposed for this project may increase sedimentation within the Black Mountain Branch watershed and the unnamed tributary of South Fork Skeenah Creek; however, these effects would be minimized by application of project design features (e.g. out slope drainage, brush barriers, water bars, seeding, sediment traps) to control storm water runoff from road surfaces. Due to the erosion control techniques designed into the project, sedimentation from these roads would be immeasurable at the confluence of Black Mountain Branch with South Fork Skeenah Creek. Sediments from this type of road construction have been shown to be filtered effectively within 20 feet below the fill slope. The majority of the road would be located at least 100 feet from Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek; therefore, activities within these areas would have no effects on the aquatic resources of either streams except during culvert installations. The road reconstruction within the Coweeta Creek watershed and the Mulberry Creek watershed would not cause an increase in sediment within either of these streams because the roads are located well outside of any riparian zones. Any erosion from road surface runoff would be filtered before reaching any perennial water sources.

In accordance with the Vegetation Management Final Environmental Impact Statement (VM-FEIS), herbicide spraying would not occur within 30 horizontal feet of water unless the herbicide has been approved for aquatic applications. The herbicide triclopyr (ester formulation) has the potential to cause direct mortality to aquatic organisms at a concentration of 0.74 parts per million (ppm). The amine formulation of triclopyr can be lethal at concentrations of 91 ppm (VM-FEIS). Concentrations of glyphosate at 24 ppm can be lethal to some aquatic organisms (VM-FEIS). Sublethal effects, such as lethargy or hypersensitivity, have been observed in fish at concentrations of 0.1 mg/L – 0.43 mg/L. No adverse effects have been observed in fish or aquatic invertebrates from exposure to imazapic concentrations up to 100 mg/L. Field applications of herbicides where stream buffers have been maintained have resulted in concentrations of these herbicides in streams below the lethal concentration – generally concentrations $\leq$ 0.0072 ppm in the adjacent streams (Durkin, 2003a; Durkin, 2003b; and Durkin and Follansbee, 2004). Furthermore, these herbicides degrade into nontoxic compounds in approximately 65 days (VM-FEIS). The 30 foot buffers would prevent the Estimated Environmental Concentrations of glyphosate or triclopyr from reaching the LC_{50} (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM-FEIS) because the herbicides would not enter the streams in any measurable quantity. Concentrations of these herbicides in adjacent waters where the waters were buffered (33 feet) resulted in concentrations of $\leq$0.0072 ppm. These concentrations are too low to produce the lethal or 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 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 are being 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 would impact approximately 75 feet of stream below each crossing but these impacts would not change the forest-wide a trend for this habitat type 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 generally be the same as the effects described for Alternative B except there would be no new road construction and 1.16 miles less road 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. There would be no effects of culvert installations because no culvert would be needed in Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. Alternative C would not impact the coldwater streams communities because there would be no culvert installations within Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. This alternative would improve the coldwater habitats resulting from the watershed restoration within the Bates Branch watershed.

Effects of Past, Ongoing and Future Projects – Previous activities within the Dylan Project area include timber harvest and road construction (Coweeta Gap Salvage, Firewood Salvage, Mulberry Creek Timber Sale, and Jones Creek Timber sale). There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects where 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 Dylan analysis area. As a result, there are no present effects to aquatic resources in the Dylan 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 11 stream crossings were replaced for storm damage repairs (2004 hurricane damage) within the Jones Creek watershed. These culvert installations may have caused a slight increase in sediment within the streams but these effects have dissipated since project completion. These crossings also improved aquatic passage for the coldwater stream organisms. There are no existing effects to the aquatic resources resulting from these activities.

There are no ongoing activities occurring on federal lands within the Dylan 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 Dylan Project because there would be no effects of the proposed timber management beyond the project area streams. There are no other ongoing activities on private lands affecting the Dylan Project area waters.

The Fatback Project will involve timber management activities within the Jones Creek watershed. There will be no effects to Jones Creek from these activities because the project design features will prevent visible sediment from entering project area streams. There are no other reasonably foreseeable future actions proposed for the Dylan aquatic analysis 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 Dylan Project area waters.

Cumulative Effects – Alternative B: The cumulative effects of Alternative B would include the effects of culvert installations for this project. Alternative B may impact approximately 0.54% of the streams until the next bankfull flow event but this impact would not affect the forest-wide trends for the coldwater streams community 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).

Alternative C: The cumulative effects of Alternative C would only include the direct and indirect effects of the Dylan Project. Alternative C of Dylan Project would have no effects to any aquatic resources (see discussion in the Direct and Indirect Effects Section above). This alternative would have positive impacts to the coldwater streams community resulting from the reduction in sedimentation because of the watershed restoration work (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 change in forest –wide trend	No change in forest –wide trend	No change in forest –wide trend

Effects of Alternatives on Management Indicator Species

(1) Brook trout, rainbow trout and brown trout

Direct and Indirect Effects - Alternative A: Alternative A, the no-action alternative, would produce no direct or indirect effects to the aquatic MIS because there would be no ground disturbing activities proposed for this alternative. The effects of sedimentation from the eroding road in the Bates Branch watershed are dissipating prior to reaching any potential habitats for the aquatic MIS. This alternative would meet Forest Plan standards by maintaining the existing wild trout populations.

Alternative B and Alternative C: The effects of these alternatives on the project MIS would generally be the same as those described for the Biological Communities discussion above for coldwater streams. There would be no direct or indirect effects to the aquatic MIS from the Dylan Project because the proposed road construction and reconstruction and the timber harvest activities (including skid trail construction and herbicide treatments) would not be located near any streams containing fish. 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 brook trout, rainbow trout, or brown trout. The current forest wide trends for brook trout, rainbow trout, and brown trout are stable and implementation of either alternative would not affect these population trends because the project design features would prevent visible sediment from entering any stream with fish populations.

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 B and Alternative C: In the absence of direct and direct effects from the proposed actions, there would be no cumulative effects to the aquatic MIS. Implementation of either 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**
Brook trout	No change	No change	No change
Rainbow trout	No change	No change	No change
Brown trout	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.	428 acres affected	140 acres affected
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.	0.0 miles affected.	0.0 miles affected.
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.	25 acres affected	29 acres affected
Early successional communities (0-10 yr)	Absent.	196 acres created	193 acres created
Early successional communities (11-20 yr)	None affected.	196 acres created (later)	193 acres created (later)
Soft mast-producing species	None affected.	196 acres created	193 acres created
Hard mast-producing species (>40 yr)	None affected.	196 acres affected	193 acres affected
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.	1 created.

Snags and dens (>22" dbh)	Retained.	Retained.	Retained.
Down woody material	None affected.	Increase on 196 acres	Increase on 193 acres

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 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 (Appendix D, 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, threatened and sensitive plant species were conducted in April, May, June and August, 2007, 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 microhabitats were detected (Goff, *et al*. 1982). No endangered or threatened plant species were located during the field survey.

Botanical Species Undergoing Analysis for Effects

Because no endangered or threatened plant species were located during the field surveys, and the Biotics Database contained no records for endangered or threatened species in the activity areas, there should be no direct or indirect effects to any endangered or threatened species. As a result, no endangered or threatened species underwent further analysis for effects (Table 3.7.1.1).

Table 3.7.1.1. Summary of endangered and threatened plant species undergoing effects analysis for the Dylan Project (see App. D, Botanical 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 will be no direct, indirect or cumulative effects to any endangered or threatened plant species.

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 (App. D, 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 (*Myotis sodalis*)	Mammal	Roosts in caves and hollow trees	May occur

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 (*Myotis sodalis*) because all standards and guides for the protection of this species, as listed in Amendment 10 of the Land and Resources Management Plan, will be followed. The U.S. Fish and Wildlife Service has concurred with this determination in their Biological Opinion for Amendment 10. The project will have no effect on any other federally proposed or listed terrestrial animal species.

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

Species	Alternative A	Alternative B	Alternative C
Indiana bat	No effect	Not likely to adversely affect	Not likely to adversely affect

Consultation History - On April 7, 2000, the USDI Fish and Wildlife Service (FWS) issued its biological opinion (BO) about the Nantahala & Pisgah Forest Plan's effect on Indiana bat. The FWS rendered a non-jeopardy opinion and an incidental take statement. The opinion listed several reasonable and prudent measures required to minimize incidental take. In July, 2000, the Nantahala & Pisgah Land and Resource Management Plan was amended (Amendment 10) to add management direction and standards for protection of the endangered Indiana bat.

3.7.3. Aquatic PET Species

Species Evaluated and Rationale

Three aquatic PET species are either known to occur or may occur on the Nantahala National Forest (App. D, 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 (Attachment 1a). These species were then filtered using habitat information and the availability of these habitats within the aquatic analysis area. Based upon the results of this filtering process one proposed, endangered, or threatened species was evaluated for this analysis. 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. Although the upper Little Tennessee River is considered critical habitat for the federally threatened spotfin chub, no individuals have been observed upstream of Lake Emory.

Table 3.7.3.1: Known and potential endangered, threatened aquatic species in Macon County evaluated for the Dylan Project (App. D, Aquatic Attachment 1)

Species	Type	Habitat	Occurrence
Federally Listed Threatened and Endangered Species			
Erimonax monachus	Fish	Little TN River; French Broad River system	Not likely to occur within analysis area but its designated critical habitat does occur within the analysis area

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 Dylan Project would be implemented to prevent visible sediment from entering analysis area streams.

Effects of Alternatives on Aquatic Species

Direct, Indirect, and Cumulative 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 from implementing any of the alternatives. There would be no cumulative effects resulting from any past ongoing, or foreseeable future actions to any aquatic PET species resulting from implementation of the Dylan Project because there would be no direct or indirect effects of the Dylan Project on any aquatic PET species and because there are no aquatic PET species within the aquatic analysis area. There would be no direct, indirect, or cumulative effects to the designated critical habitat for the spotfin chub because project design features would prevent visible sediment from entering project area streams and the culvert installation in Black Mountain Branch would occur over 4 miles from the Little Tennessee River. Any effects to the aquatic resources at this crossing would dissipate prior to reaching the Little Tennessee River.

Determination of Effect - The Dylan 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. Project design features would prevent visible sediment from entering the project area streams and water temperatures would not be affected because riparian buffers would not be harvested; therefore, there would be no effects to the designated critical habitat for the spotfin chub. 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			
Erimonax monachus	No Effects	No Effects	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.

3.8. Region 8 Sensitive Species

3.8.1. Botanical Sensitive Species

Species Evaluated and Rationale

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

Previous Survey Information

The Biotics Database was queried for sensitive plant species growing in the activity areas. It contained no records for any sensitive plant species in the activity areas. The Biotics Database contained records for the sensitive species Biltmore sedge, *Carex biltmoreana*, outcrop ragwort, *Packera millefolium*, mountain catchfly, *Silene ovata*, and waterfan, *Hydrothyria venosa*, within one mile of the activity areas.

New Surveys or Inventories Conducted

Field surveys for sensitive plant species were conducted in April, May, June and August, 2007, 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 microhabitats were detected (Goff, *et al*. 1982). Field surveys located no sensitive species in the activity units.

Species Undergoing Analysis for Effects

Because *Silene ovata* grows in rich cove forests, a common forest community in the activity areas, it was assumed to be present, and underwent further analysis for direct and indirect effects (Table 3.8.1.1). *Hydrothyria venosa* is an aquatic species restricted to mountain streams. The habitat is present at stream crossings leading to activity areas, and could be impacted by road construction and maintenance. As a result, the species was assumed to be present, and underwent further analysis for effects. Both *Carex*

biltmoreana and *Packera millefolium* are confined to rock outcrops. Because this community is not located in any of the activity areas, it is very unlikely either species is located in any of the activity areas. As a result, neither species underwent further analysis for effects.

Table 3.8.1.1. Summary of sensitive plant species undergoing effects analysis for the Dylan Project (see App. D, Botanical Attachment 1 for a complete list of species evaluated)

Status	Species	Habitat	Reason for Effects Analysis
Sensitive	*Hydrothyria venosa*	Steams	Assumed to be present due to local records and suitable habitat near activity areas.
Sensitive	*Silene ovata*	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 Biotics Database contains over 70 records for *Hydrothyria venosa* in western North Carolina, primarily on the Pisgah and Nantahala National Forests. *Hydrothyria* grows in mountain streams. No populations of *Hydrothyria* 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.

Direct and Indirect Effects – Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Hydrothyria*. 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 (Jason Farmer, personal communication). 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 found within 75 feet of a stream crossing 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).

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
Nantahala*	Road Projects Due to Storm Damage	2006	*May impact individuals but no trend towards federal listing*

*formerly the Wayah Ranger District

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

Cumulative Effects - Because none of the alternatives would produce direct or indirect affects to populations of *Hydrothyria venosa*, the project will have no cumulative effects to the species.

Determination of Effect – Because none of the alternatives would produce direct, indirect or cumulative effects to the species, the Dylan Project is unlikely to impact the viability of the *Hydrothyria venosa* across the national forest.

(2) Mountain Catchfly (*Silene ovata*)

The Biotics 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.

Direct and Indirect Effects – Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Silene ovata*. Alternatives B and C would regenerate rich cove forests, the primary habitat for *Silene*. Alternative B would regenerate cove forests through both 91 acres of two-age harvests as well as 337 acres of group-selection, which, for analysis purposes, will be considered a regeneration harvest over the entire management area. Alternative C would regenerate 140 acres of rich cove forest through two-age management. 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 at least 20 years following regeneration harvest, the minimal time necessary for understory herbs to recover to pre-treatment levels.

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.

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 3.8.1.3). 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
Nantahala*	Coward Bald Burn	2000	Possible positive indirect effects
Nantahala*	Locust Gap Burn	2003	Possible positive indirect effects

*formerly the Highlands Ranger District

One ongoing activity on the Nantahala National Forest, the Welsh Timber and Wildlife Project on the Nantahala (formerly Wayah) Ranger District, may produce direct, negative effects to a roadside population of the species through road maintenance. One future activity on the Nantahala National Forest, the Fatback Timber and Wildlife Project on the Nantahala (formerly Wayah) Ranger District, may produce direct, negative effects to populations through harvest activities. The analysis area contains no ongoing or future activities on public or private land that may impact populations of *Silene ovata*.

Cumulative Effects - Because it would produce no direct or indirect effects, Alternative A would produce no cumulative effects to *Silene ovata*. The cumulative effects of Alternatives B and C, primarily decreases in the number of plants in the activity areas over a period of 20 years, would represent 7% (3 of 43) of the documented populations of *Silene* on the national forest.

Determination of Effect - Because western North Carolina contains at least 40 undisturbed populations of *Silene*, the Dylan Project is unlikely to 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. 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	*Silene ovata*	No impact.	May impact individuals*	May impact individuals*
Sensitive	*Hydrothyria venosa*	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

Refer to the Biological Evaluation (BE), Appendix C, for background information about the sensitive species considered:

(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 proposed for **Alternative B** and twelve regeneration units proposed for **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 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 wildlife opening construction and road reconstruction for **Alternatives B and 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 and cause a loss of habitat. The adverse effects to individuals and habitat would be minor, however, considering the status and distribution of the habitat on the 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 **Alternatives B and 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 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 **Alternatives B and 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 **Alternatives B and 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, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the 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 and regeneration activities, which include 132 acres in **Alternative B** and 165 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 in the analysis area by 130 acres over 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. 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, which total 262 acres in **Alternative B** and 295 acres in **Alternative C**. These acres represent less than 15% of the 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 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. Since the species is widely distributed, potentially occupying nearly a half million acres of national forest, 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 limiting the amount of regeneration harvests by compartment, management area and analysis area prevent cumulative effects to this species in any given area. Because the species is widely distributed, potentially occupying nearly a half million acres of national forest, 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 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. Under **Alternative B**, tree felling 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, which include 132 acres in **Alternative B** and 165 acres in **Alternative C**. These 165 acres represent less than 10% of the 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 130 acres in the past 20 years. These acres have matured and are no longer desirable feeding habitat. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – The actions proposed for **Alternative B** would result in cumulative effects of 132 acres. The actions proposed for **Alternative C** would result in cumulative effects of 165 acres.

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 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 1 would have no effect. Road improvement across suitable streams could adversely affect individuals through direct crushing and effect habitat through direct loss and sedimentation. Direct loss of habitat should be minimal, however, 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. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

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 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. 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 past projects, and road improvements for this project. Cumulative direct loss of habitat would be limited to the existing stream crossings. Sedimentation effects from Alternative 2 would be limited to road improvements. 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. These effects would dissipate as they move downstream, and after each subsequent high flow event.

Determination of Effect - This species has been recorded from nine sites on the Nantahala National forest, most of these 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 2 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 national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

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 (App. D, 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 based upon habitat information and the availability of these habitats within the aquatic analysis area (Attachment 1a). Based upon the results of this filtering process two sensitive aquatic species were evaluated in this analysis (Table 3.8.3.1). Species that do not have suitable habitat within the project area were eliminated from further analysis (App. D, Aquatic Attachment 1b).

Previous Survey Information

Previous surveys for sensitive aquatic species have been conducted within the Dylan 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).

Table 3.8.3.1: Known and potential sensitive aquatic species in Macon County evaluated for the Dylan Project (App. D, Aquatic Attachment 1)

Species	Type	Habitat	Occurrence
2001 Region 8 Regional Forester's Sensitive Species List			
Cambarus georgiae	Crayfish	Streams in Little TN River, Macon Co.	May occur*
Macromia margarita	Dragonfly	Rivers, Macon, Swain, Transylvannia Co.; Caldwell Co.	May occur*

*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, Indirect, and Cumulative Effects - Alternative A: Alternative A, the no-action alternative, would involve no ground disturbing activities or herbicide applications. No watershed improvements would be done. The existing condition of the road in need of rehabilitation would continue. Sedimentation and turbidity from the damaged road would continue to occur during rain events. This alternative would not improve habitat for the two sensitive aquatic species because it would not eliminate a chronic sediment source. As such, this alternative would not meet the Forest Plan direction for Management Area 18.

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 require construction of a cut and fill slope; therefore, there would be very little ground disturbance that could produce sediment. Skid roads would 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. This alternative would also have beneficial effects to the aquatic resources due to the watershed improvements within the Bates Branch watershed.

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.

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

A small quantity of sediments may enter Black Mountain Branch and an unnamed tributary of South Fork Skeenah Creek during culvert installations; however, these effects would not be measurable approximately 75 feet below the crossings. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installations would be immeasurable at the confluence with South Fork Skeenah Creek because the culvert installation would occur approximately 1.0 mile from the mouth of Black Mountain Branch and unnamed tributary of South Fork Skeenah Creek. Additional culverts may be installed within analysis area waters as needed for drainage. The effects of these culverts would be the same as described for the culvert installations within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the sensitive species, *Cambarus georgiae*, within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek by partially filling pools within the first 75 feet below the crossing. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

The road construction and reconstruction proposed for this project may increase sedimentation within the Black Mountain Branch watershed and the unnamed tributary of South Fork Skeenah Creek; however, these effects would be minimized by application of project design features (e.g. out slope drainage, brush barriers, water bars, seeding, sediment traps) to control storm water runoff from road surfaces. Due to the erosion control techniques designed into the project, sedimentation from these roads would be immeasurable at the confluence of Black Mountain Branch with South Fork Skeenah Creek. Sediments from this type of road construction have been shown to be filtered effectively within 20 feet below the fill slope. The majority of the road would be located at least 100 feet from Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek; therefore, activities within these areas would have no effects on the aquatic resources of either streams except during culvert installations. The road reconstruction within the Coweeta Creek watershed and the Mulberry Creek watershed would not cause an increase in sediment within either of these streams because the roads are located well outside of any riparian zones. Any erosion from road surface runoff would be filtered before reaching any perennial water sources.

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 are being 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 generally be the same as the effects described for Alternative B except there would be no new road construction and 1.16 miles less road 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. There would be no effects of culvert installations because no culvert would be needed in Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. Alternative C would not impact the aquatic sensitive species, *Cambarus georgiae* or *Macromia margarita*, because there would be no culvert installations within Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. This alternative would improve habitats for the sensitive aquatic species resulting from the watershed restoration within the Bates Branch watershed.

Impacts of Past, Ongoing and Foreseeable Actions - Previous activities within the Dylan Project area include timber harvest and road construction (Coweeta Gap Salvage, Firewood Salvage, Mulberry Creek Timber Sale, and Jones Creek Timber sale). There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects where 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 Dylan analysis area. As a result, there are no present effects to aquatic resources in the Dylan 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 11 stream crossings were replaced for storm damage repairs (2004 hurricane damage) within the Jones Creek watershed. These culvert installations may have caused a slight increase in sediment within the streams but these effects have dissipated since project completion. These crossings also improved aquatic passage for the coldwater stream organisms. There are no existing effects to the aquatic resources resulting from these activities.

There are no ongoing activities occurring on federal lands within the Dylan 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 Dylan Project because there would be no effects of the proposed timber management beyond the project area streams. There are no other ongoing activities on private lands affecting the Dylan Project area waters.

The Fatback Project will involve timber management activities within the Jones Creek watershed. There will be no effects to Jones Creek from these activities because the project design features will prevent visible sediment from entering project area streams. There are no other reasonably foreseeable future actions proposed for the Dylan aquatic analysis 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 Dylan Project area waters.

Cumulative Effects - Alternative B: The cumulative effects of Alternative B would include the effects of culvert installations for this project. Alternative B may impact approximately 0.54% of the streams until the next bankfull flow event but this impact would not affect the forest-wide trends for the aquatic sensitive species 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).

Alternative C: The cumulative effects of Alternative C would only include the direct and indirect effects of the Dylan Project. Alternative C of Dylan Project would have no effects to any aquatic resources (see discussion in the Direct and Indirect Effects Section above).

Alternative B may negatively impact individuals of the aquatic sensitive species, *Cambarus georgiae* or *Macromia margarita*, 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. Implementation of Alternative C would have no negative impacts to the aquatic sensitive species. This alternative may have positive impacts to the aquatic sensitive species resulting from the reduction in sedimentation because of the watershed restoration work.

Determination of Effect - The sensitive species *Cambarus georgiae* and *Macromia margarita* 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 these species are common across their range and project design features would minimize impacts to these 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			
Cambarus georgiae	No impact	May impact[1]	No impact[2]
Macromia margarita	No impact	May impact[1]	No impact[2]

[1]May impact individuals but would not cause a trend to federal listing or a loss of viability.
[2]May improve habitats for species.

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 areas 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; App. D, Botanical Attachment 2). Only forest concern species located inside the activity areas during the field surveys, or with previous collection data inside the activity area, were analyzed in detail.

Previous Survey Information

The Biotics Database was queried for forest concern plant species growing in or near the activity areas. It contained records for the forest concern species roundleaf serviceberry (*Amelanchier sanguinea*), Blue Ridge bindweed (*Calystegia catesbiana* ssp. *sericata*), American columbo (*Frasera caroliniensis*), golden-mane moss (*Macrocoma sullivantii*), granite-dome bluet (*Houstonia longifolia* var. *glabra*) and cliff stonecrop (*Sedum glaucophyllum*) within one mile of the activity areas.

New Surveys or Inventories Conducted

Field surveys for forest concern plant species were conducted in April, May, June and August, 2007, 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).

Two forest concern species were located during the field surveys: one population, comprised of at least two subpopulations, of Blue Ridge bindweed (*Calystegia catesbiana* ssp. *sericata*), growing along roadsides in Compartment 125, and one extensive population, comprised of at least three subpopulations, of American columbo (*Frasera caroliniensis*), growing in open forests in Compartments 88 and 125. No other forest concern species were located during the field surveys.

Botanical Species Selected for Effects Analysis

Because *Calystegia* and *Frasera* were both located in or near activity areas, both species will be analyzed for potential effects (Table 3.9.1.1). Roundleaf serviceberry, (*Amelanchier sanguinea*), golden-mane moss (*Macrocoma sullivantii*), granite-dome bluet (*Houstonia longifolia* var. *glabra*) and cliff stonecrop (*Sedum glaucophyllum*), all species confined to rocky outcrops, were not located in the activity areas, and will not undergo additional analysis for effects.

Table 3.9.1.1. Summary of forest concern species undergoing effects analysis for the Dylan Project. See Attachment 2 for a complete listing of forest concern plant species evaluated for the project

Species	Habitat	Reason for Effects Analysis
Calystegia catesbiana ssp. *sericata*	Roadside and Edge Habitats	Located during field surveys on forest roads leading to activity area
Frasera caroliniensis	Mesic Oak-Hickory 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 Dylan analysis area. The species usually grows in highly disturbed habitats, such as roadsides.

Direct and Indirect Effects - Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Calystegia*. Alternatives B and C would maintain roads near *Calystegia* plants. Road maintenance may impact individual plants of *Calystegia* directly by 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 - Six past actions on the Nantahala National Forest have impacted populations of *Calystegia* in the past 5 years (Table 3.9.1.2). One 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 3.9.1.2. 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 Project	2006	*May impact individuals but no trend towards federal listing*	Direct Effects
Nantahala*	Locust Gap Prescribed Burn	2003	*May impact individuals but no trend towards federal listing*	Direct and Indirect Effects
Nantahala**	Mulberry Road DOT	2003	*May impact individuals but no trend towards federal listing*	Direct and Indirect Effects
Tusquitee	FY2002 TSI	2002	Possible positive indirect effects	Direct and Indirect Effects
Nantahala**	County Line TS	2002	*May impact individuals but no trend towards federal listing*	Direct and Indirect Effects
Nantahala**	Onion Mountain DOT	2002	*May impact individuals but no trend towards federal listing*	Direct and Indirect Effects

*formerly the Highlands Ranger District
**formerly the Wayah Ranger District

The analysis area contains no ongoing or foreseeable USFS or private actions that may impact *Calystegia*. Two ongoing projects on the Nantahala (formerly Wayah) Ranger District, the Ray Branch and Welch Timber and Wildlife Project, may negatively impact roadside populations of *Calystegia* through road maintenance.

Cumulative Effects - Because it would produce no direct or indirect effects, Alternative A would produce no 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, would represent 20% [8 of 41] of the documented populations of *Calystegia* on the national forest.

Determination of Effect - Because the national forest contains at least 20 undisturbed populations of *Calystegia*, the Dylan Project is unlikely to impact the viability of the species across the forest.

(2) American Columbo (*Frasera caroliniensis*)

The Biotics Database 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 - Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Frasera*. Alternative B proposes both two-age and group-selection harvests in areas containing *Frasera*, while Alternative C proposes only two-age harvests in areas containing *Frasera*. Both of these harvest 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 3.9.1.3). 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 3.9.1.3. 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	*May impact individuals but no trend towards federal listing*	Direct Effects
Tusquitee	Chatuge Lake Biking/Hiking Trail	2004	*May impact individuals but no trend towards federal listing*	Direct Effects
Tusquitee	FY2002 TSI	2002	Possible positive indirect effects	Direct Effects
Nantahala*	Onion Mountain DOT	2002	*May impact individuals but no trend towards federal listing*	Direct and Indirect Effects

*formerly the Wayah Ranger District

The Nantahala National Forest also contains one ongoing action, the Welch Timber and Wildlife Project on the Nantahala (formerly the Wayah) Ranger District, and one future project, the Fatback Timber and Wildlife Project on the Nantahala Ranger District, 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 - Because it would produce no direct or indirect effects, Alternative A would produce no 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, would represent 33% [7 of 21] of the documented populations of *Frasera* on the national forest.

Determination of Effect - Because the national forest contains at least 3 undisturbed populations of *Frasera*, and many of these populations, including the population in Compartment 125, are extensive, numbering in the thousands of individuals, the Dylan project is unlikely to impact the viability of the species across the forest.

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 2007 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, identified the animals collected. No forest concern species were collected.

Breeding bird surveys were conducted in May of 2007. 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 (*Celastrina nigra*)	Butterfly	Rich, moist deciduous forest	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 196 acres in Alternative B and 193 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 130 acres of early successional habitat (now 11-20 years old) in the four compartments. 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 would result in cumulative effects of 4%, 5%, 10%, and 7% loss of potential habitat in Compartments 88, 125, 126, and 152, respectively (see Table 3.9.2.1 above). In Alternative C, cumulative effects would result in 4%, 5%, 9%, and 9%, 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.

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 (*Celastrina nigra*)	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 (App. D, 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 thirteen 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 (App. D, Aquatic Attachment 2).

Table 3.9.3.1. Aquatic forest concern species evaluated for the Dylan 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
Cryptobranchus alleganiensis	Amphibian	Rivers and large streams in Tennessee and Savannah systems	May occur in analysis area*
Matrioptila jeanae	Caddisfly	Clay, Macon, Jackson, and Transylvania Co.	May occur in analysis area*
Micrasema burksi	Caddisfly	Clay, Macon, Jackson, and Swain Co.	May occur in analysis area*
Micrasema sprulesi	Caddisfly	Macon	May occur in analysis area*
Somatochlora elongate	Dragonfly	Specifics unknown	May occur in analysis area*
Stylurus scudderi	Dragonfly	Streams and rivers	May occur in analysis area*
Clinostomus funduloides sp. 1	Fish	Little TN River drainage, Jackson and Macon Couties	Known to occur in the analysis area
Luxilus chrysocephalus	Fish	Reported in Little TN River system, Macon Co; Cane River System	Known to occur in the analysis area

Species	Type	Habitat	Occurrence
Notropis lutipinnis	Fish	Savannah and Little TN River systems, Jackson, Macon, and Transyvania Co; Broad River system	May occur in analysis area*
Baetopus trishae	Mayfly	Specifics unknown	May occur in analysis area*
Habrophlediodes spp.	Mayfly	Specifics unknown	May occur in analysis area*
Seratella spiculosa	Mayfly	Mountain streams	May occur in analysis area*
Isoperla frisoni	Stonefly	Mountain streams and rivers; Whiteoak Creek, Macon Co.; Transylvania Co.	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 Aquatic 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 may impact individuals of the aquatic forest concern species because the eroding road in the Bates Branch watershed would not be repaired. This road would continue to be a chronic sediment source. These effects would be limited to those species which are most likely to utilize headwater stream habitats. Alternative B may impact individuals of the aquatic forest concern species within the 75 feet of streams affected by sedimentation during culvert installations. These effects would be limited to those species which are most likely to utilize headwater stream habitats (*Matrioptila jeanae, Micrasema burksi, Micrasema sprulesi, Somatochlora elongate, Stylurus scudderi, Baetopus trishae, Habrophlediodes spp, Seratella spiculosa*, and *Isoperla frisoni*). The effects of the culvert installations would dissipate prior to reaching habitats suitable for the hellbender, rosyside dace, striped shiner, and yellowfin shiner. Alternative C would have no impacts to any forest concern aquatic species because this alternative would not include the installation of new culverts in Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. These effects would dissipate after the next bankfull flow event following construction. There would be no long term negative effects to any aquatic forest concern species. Implementation of any of the alternatives would meet Forest Plan standards by maintaining the existing aquatic resources.

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*, *Matrioptila jeanae, Micrasema burksi, Micrasema sprulesi, Stylurus scudderi, Clinostomus funduloides sp. 1, Luxilis chrysocephalus, Notropis lutipinnis, Baetopus trishae*, *Habrophlediodes* 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**
Cryptobranchus alleganiensis	No impact.	No impact.	No impact.
Matrioptila jeanae	May impact*	May impact*	No impact.
Micrasema burksi	May impact*	May impact*	No impact.
Micrasema sprulesi	May impact*	May impact*	No impact.
Somatochlora elongate	May impact*	May impact*	No impact.
Stylurus scudderi	May impact*	May impact*	No impact.
Clinostomus funduloides sp. 1	No impact.	No impact.	No impact.
Luxilus chrysocephalus	No impact.	No impact.	No impact.
Notropis lutipinnis	No impact.	No impact.	No impact.
Baetopus trishae	May impact*	May impact*	No impact.
Habrophlediodes spp.	May impact*	May impact*	No impact.
Seratella spiculosa	May impact*	May impact*	No impact.
Isoperla frisoni	May impact*	May impact*	No 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 Dylan Project consist of the following watersheds: Commissioner Creek downstream to its confluence with the Little Tennessee River; Mulberry Creek downstream to its confluence with the Little Tennessee River; Bradley Branch downstream to its confluence with Norton Branch; Unnamed tributary of Coweeta Creek and Howard Branch to their confluence with Coweeta Creek; North Fork Coweeta Creek to its confluence with Coweeta Creek; Coweeta Creek to its confluence with the Little Tennessee River; Bates Branch to its confluence with the Little Tennessee River; Black Mountain Branch to its confluence with South Fork Skeenah Creek; South Fork Skeenah Creek; Jones Creek to its confluence with Allison Creek. The riparian areas along perennial streams in several stands proposed as timber harvest units and/or wildlife brushy openings are being 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 will range from 30' to100` 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. There are currently no projects planned in the analysis area for the future. Thus, for all alternatives of this project, there would be no cumulative effects to riparian habitat.

3.10.2. Invasive Species

Boundaries of Analysis

Because non-native, invasive plants generally remain in disturbed areas, analysis areas for direct, indirect, past and cumulative effects to non-native invasive plant species were confined to areas undergoing USFS management activities. In addition, effects to invasive species cannot be correlated with specific projects, so past effects must be summarized by the current condition in the analysis areas, 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*, *Spiraea japonica* and *Rosa multiflora*. In general, these species grew on roadsides leading to the proposed activity areas, a total of approximately four acres in the botanical analysis area.

Effects of Alternatives on Invasive Plant Species

Direct and Indirect Effects - Ground disturbance and the increased light conditions resulting from road construction may increase the amount of acreage suitable for invasive exotic species (Trombulak and Frissell 2000). *Microstegium* and *Spiraea* apparently expands their ranges 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 areas from adjacent areas.

Historically, each mile of USFS road construction and reconstruction can be correlated with 0.4 and 0.1 acres of habitat for invasive plants, respectively. Alternative A would construct or reconstruct no miles of road, producing no direct or indirect effects for non-native, invasive plant species. Alternative B would construct 1.1 miles of road and reconstruct 1.2 miles of road, for a potential increase of 0.56 acres of invasive plants. Alternative C would construct 0.0 miles of road and reconstruct 0.4 miles of road, for a potential increase of 0.04 acres of invasive plants. These estimates, however, are based on former management practices that did not include site-specific control of non-native, invasive species. The application of herbicides along roadsides and inside harvest units should curtail the spread of invasive species.

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

Cumulative Effects - Alternative A would create no suitable habitat, and therefore produce no cumulative effects for invasive plant species. Alternative B would produce an expected direct effect of 0.56 acres, a 14% increase over the existing condition on public lands. Alternative C would produce an expected direct effect of 0.04 acres, a 1% increase over the existing condition on public lands. These effects, however, should be diminished by the use of herbicides to treat invasive plant species throughout the activity areas.

In addition to the direct effects associated with road construction, Alternative B is more likely to increase the amount of non-native, invasive plant species in the activity areas than Alternative C, because the group-selection harvests proposed under Alternative B create proportionately greater amounts of edge habitat than comparable two-age harvests. The quantitative impact of group-selection harvests on the spread of invasives is not known, but if it represents an additional 1% of the activity areas compared to two-age harvests, the 389 acres of group-selection proposed under Alternative B would create an additional 3.9 acres of suitable habitat for non-native, invasive plant species.

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), Saunook gravelly loam (Sb), and Saunook loam (Sc) in the drainages. In addition, there are areas of other soil complexes, including Trimont (Tr), Edneyville-Chestnut (Ed). 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 more ground disturbance than Alternative C due to road construction of 1.1 miles and reconstruction of 1.2 miles, versus zero miles of construction and/or reconstruction in Alternative C. Also, skid roads to the 64 groups in Alternative B would entail more skid road construction than that required for Alternative C. 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 for Alternative B 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, 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 forseeable 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 Dylan 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 Dylan 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. Most stands (5,785 acres, or 85%) are inventoried as aged between 71 and 100 years old (Refer to Appendix E, Age Class Distribution). Stands comprising 2,599 acres (38%) are greater than age 100. Stands aged 0-70 total 1,034 acres, or 15% 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 Jones Creek, Mulberry, Hannah Mountain Salvage, and Poplar Cove Salvage timber sales, ranging from 1994-2000. All regenerated stands have been certified as successfully reforested. Current early successional habitat (stands ages 0-10) exist on 38 acres, or 0.55% of the area.

For the compartments in the project, small old growth patches were selected in previous years, with the exceptions of one area each in Compartments 125 and 126. These have been selected this year, and all areas are displayed on the alternative maps in Appendix A. This selection is not part of the decision to be made for this project. 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 were opposed to the proposal to conduct road reconstruction on a road branching off of FS Road #7293, the Deer Cove Road, in order to access stand 152-33 for 2-aged regeneration harvesting. We are therefore not proposing road reconstruction for this road segment, although stand 152-33 is still proposed for harvesting. We have determined that access for this stand can be achieved with the use of logging forwarders, without damaging the existing roadbeds already in place.

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 approximately 300 acres (9 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 116 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 (45 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 (169 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 without the treatment. 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. In addition, oak preharvest work on approximately 300 acres would enhance the advance regeneration of desired species such as oaks and black cherry, which will benefit from the increased sunlight entering the stands after treatment.

For the group selection areas, approximately one/sixth of each stand would be harvested in small (1-1.5 acres each) groups. Post-harvest, the stands would have new edge habitat around all the groups, as well as increased sunlight in and near the groups. This would encourage the growth of new young seedlings, as well as increased growth of competing vines.

Alternative C - The effects would be the same as those for Alternative B, except that the effects would occur on 143 acres of new stands aged 0-10 instead of 116 acres, and 218 acres of thinning instead of the 45 acres proposed for Alternative B. In addition, with no group selection units proposed, there would be no effects from that treatment for Alternative C.

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 38 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 143 acres of new stands being initiated into the 0-10 year age class instead of 116 acres. Maintained growth and vigor of forest stands as a result of thinning would occur on 173 more 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 rufus-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 more possible displacement of dispersed recreation users than for Alternative B, due to more proposed harvest acres. This displacement would also be temporary. As

in Alternative B, there would be no effects from the proposed actions on the Appalachian Trail or the trail corridor.

Indirect effects as a result of implementing this alternative would be that more new opportunities would be created for dispersed use since more 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 Alternative B would be the creation of recreational opportunities associated with approximately 180 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 185 acres. People recreating on improved roads (hiking, horseback riding, biking) would have 1.1 miles of newly constructed, seeded roads.

Alternative C - The amount of new early successional habitat available for recreational users using that kind of habitat would be approximately 179 acres. Cumulatively, early successional habitat and its associated benefits would be approximately 184 acres. People recreating on improved roads (hiking, horseback riding, biking) would have no newly constructed and/or reconstructed/seeded roads.

3.16. Scenery

Existing Condition

The scenery analysis encompasses the compartments in the project. Visual Quality Objectives (VQOs) for the Management Areas in the project are Modification (M) (MA 3B) and Partial Retention (PR) (MAs 2A and 4D).

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.

For the Applachian 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.

Direct and Indirect Effects

Alternative A

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

Alternative B

Direct and Indirect Effects –As a result of the landscape analysis, the following **design criteria** would be put in place for Alternative B: 1) Stand 126-7 (2 age unit) – place the boundary one tree height below the ridgeline; and 2) Stand 126-47 (2 age unit) – place the boundary one tree height below the ridgeline and retain 20-25 square feet of RBA/acre.

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 – As a result of the landscape analysis, the following **design criteria** would be put in place for Alternative C: 1) Stand 125-46 (2 age unit) – retain 25-30 square feet of residual basal area (RBA) per acre; 2) Stand 126-7 – same as for Alternative B; and 3) Stand 126-47 – same as for Alternative B. With these design criteria 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 - Cumulative effects for Alternative C would be the same short-term changes to the scenery resources as described in the Direct and Indirect effects section for Alternative B 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 2.95 million board feet (MMBF) of hardwood sawtimber and 2,682 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 $60,128.16.

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 2.01 million board feet (MMBF) of hardwood sawtimber and 1,835 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 $-481.35.

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 approximately 1.1 miles of road construction and 1.2 miles of road reconstruction in the analysis area. The new road and the existing roads would serve the needed functions of relatively quick access in case of wildfires, access for proposed current and future work, and seeded linear wildlife openings. Road management practices for all roads would remain the same, and there would be no change in the open road density for this alternative.

Alternative C – As in Alternatives A, 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, 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, Nantahala Ranger District Silviculturist. The Biological Evaluation (BE) was prepared by Doreen Miller, Nantahala National Forest Wildlife Biologist.

4.2. Agencies and Persons Consulted

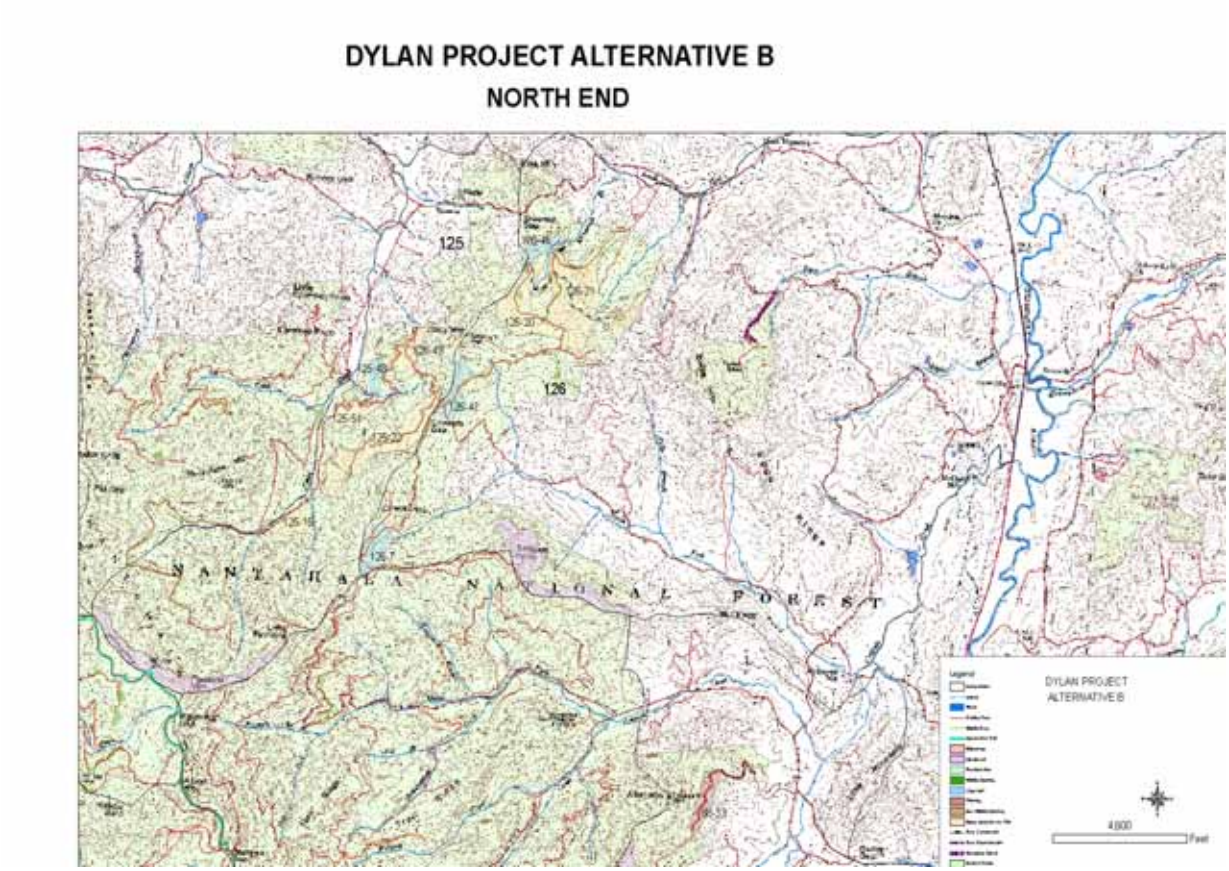
The following additional persons have provided input or participated in the planning and/or analysis of this project:

Mike Bell, Nantahala RD Timber Sale Administrator
David Brook, Deputy State Historic Preservation Officer, NC Department of Cultural Resources
Erik Crews, NFsNC Landscape Architect
Morgan Sommerville, Appalachian Trail Conservancy
Duke Rankin, Nantahala NF Botanist
Jason Farmer, Nantahala NF Fisheries Biologist
Doreen Miller, Nantahala NF Wildlife Biologist
Tim Southard, Nantahala RD Timber Management Assistant
Greg Brooks, Nantahala RD Fire Management Officer

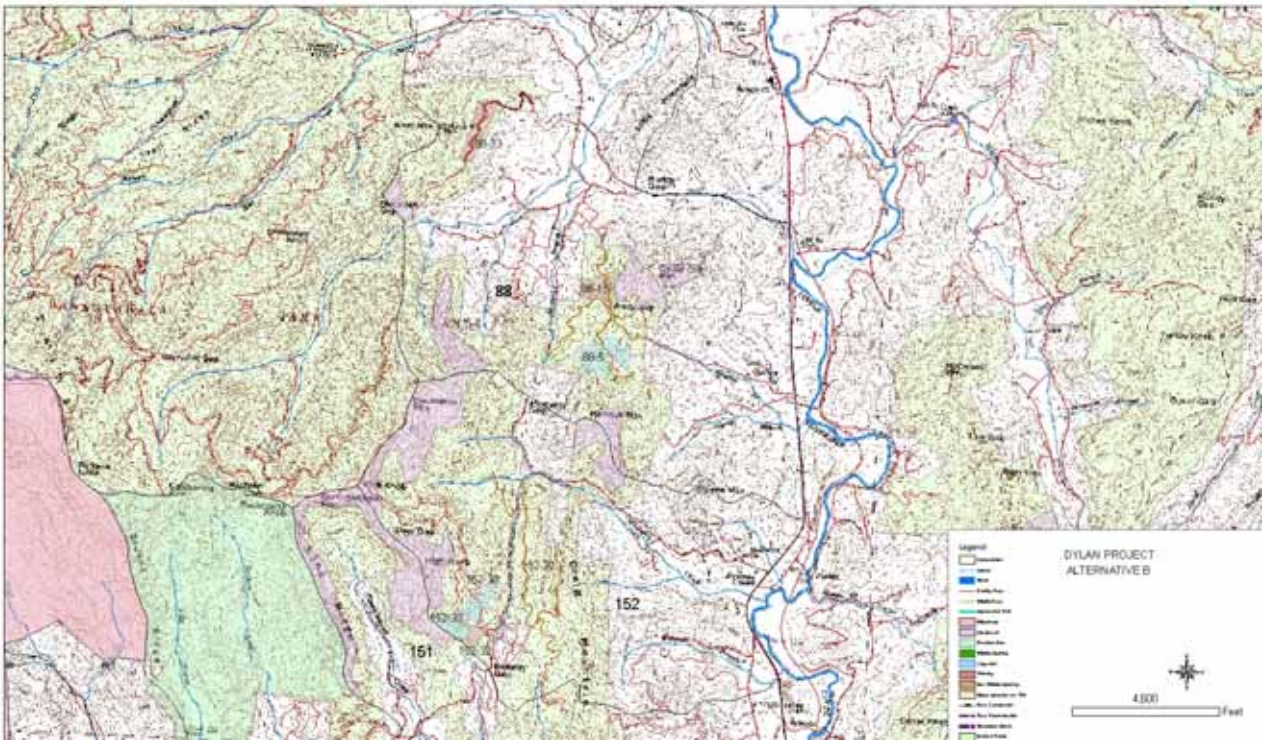
5. APPENDICES

5.1. Appendix A – Alternative Maps

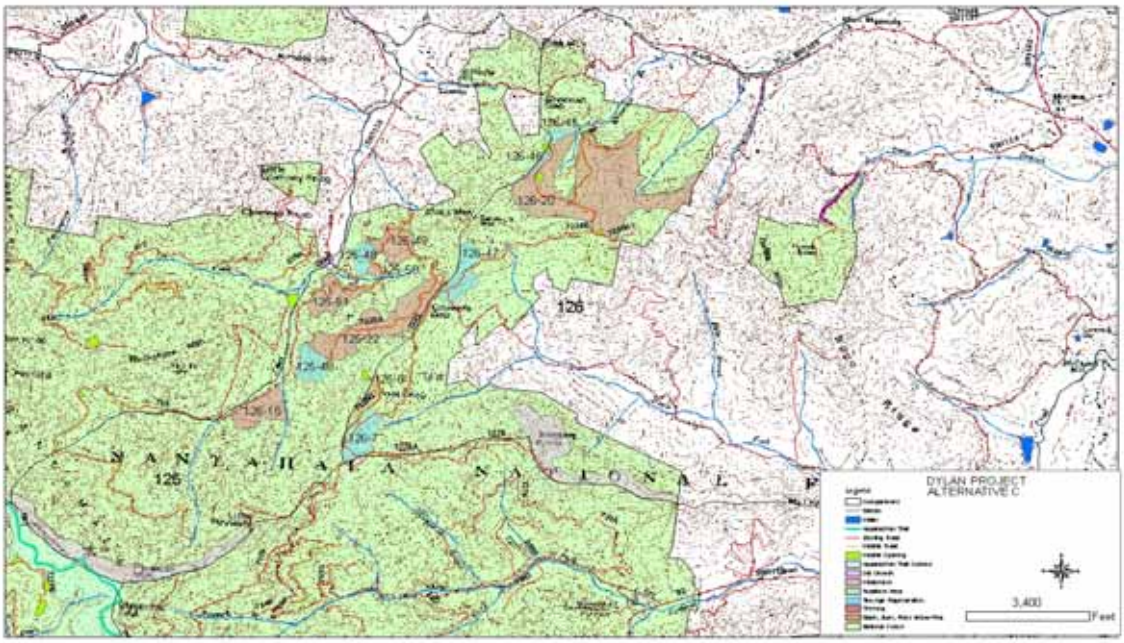
Note: Maps **NOT** to Scale



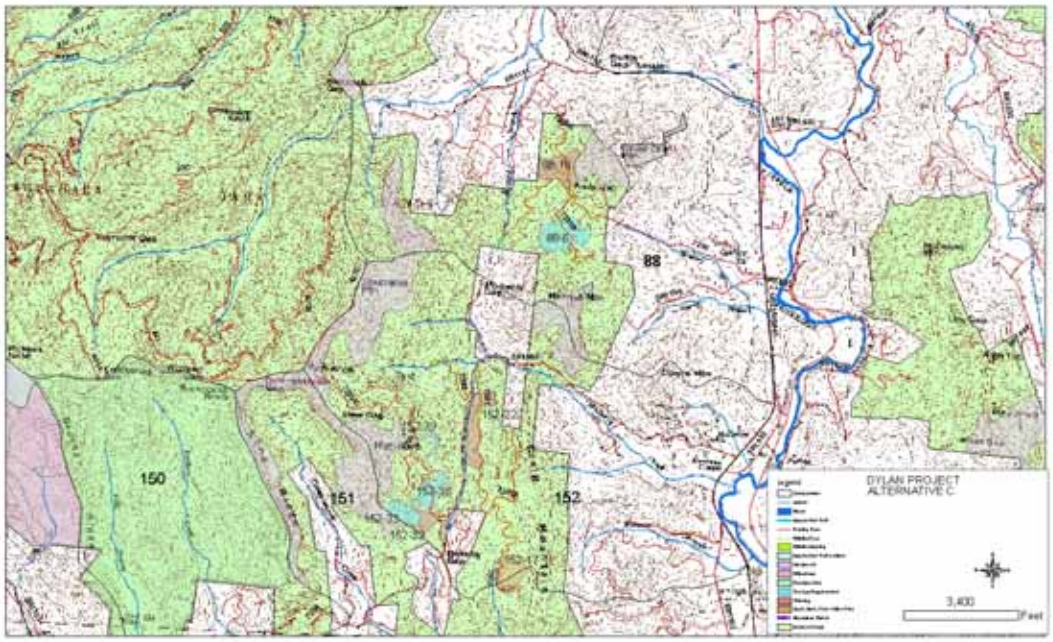
DYLAN PROJECT ALTERNATIVE B
SOUTH END



DYLAN PROJECT ALTERNATIVE C
NORTH END



DYLAN PROJECT ALTERNATIVE C
SOUTH END



5.2. Appendix B – Financial Analysis

NOTES

This Financial Analysis for the Dylan 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, road design (Alternative B only), 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.

In using the "Quicksilver" software program for the Fatback project financial efficiency analysis, several items are to be noted. These are as follows:

1) The Base Year for calculations is 2008. This year is figured in the calculations as Year 1. The discount rate used for all calculations is 4% and the inflation rate for costs and revenues is 4%.

2) Although a regular timber sale contract exists for a three-year period, it is not possible to determine exactly how much revenue would be incoming in each individual year of the contract. Thus, we have used a timber sale start date of 2013, with the expected middle year of the contract (2014) being used for the timber revenue.

The revenue has been shown to occur one time, rather than a partial amount occurring periodically. The same has been done for sale administration costs for a three-year contract.

3) While the Present Net Value (PNV) analysis shows a small negative PNV for Alternative C, it should be taken into consideration that landscape-scale projects such as this are not planned for their financial returns; rather, as stated in the Fatback Purpose and Need (Chapter 1), natural resource needs in the analysis area drive the proposed project actions.

ECONOMIC RETURNS REPORT

USFS ***A*** **Discount Rate:** 4.000

Cash Flows (number)	1
PV-Costs ($)	-$60,096.15
PV-Benefits ($)	$0.00
Present Net Value ($)	-$60,096.15
B/C Ratio	0.00
Investment Length (years)	1
Net Annual Equivalent ($)	-$62,500.00
Composite Rate of Return (percent)	NA
Internal Rate of Return (percent)	NA

USFS ***B*** **Discount Rate:** 4.000

Cash Flows (number)	12
PV-Costs ($)	-$167,057.35
PV-Benefits ($)	$227,185.51
Present Net Value ($)	$60,128.16
B/C Ratio	1.36
Investment Length (years)	9
Net Annual Equivalent ($)	$8,086.82
Composite Rate of Return (percent)	7.61
Internal Rate of Return (percent)	12.97

USFS ***C*** **Discount Rate:** 4.000

Cash Flows (number)	10
PV-Costs ($)	-$157,983.43
PV-Benefits ($)	$157,502.09
Present Net Value ($)	-$481.35
B/C Ratio	1.00
Investment Length (years)	9
Net Annual Equivalent ($)	-$64.74
Composite Rate of Return (percent)	3.96
Internal Rate of Return (percent)	3.89

B/C Ratio	1.00
Investment Length (years)	9
Net Annual Equivalent ($)	-$64.74
Composite Rate of Return (percent)	3.96
Internal Rate of Return (percent)	3.89

TRANSACTION DETAILS

COST ***USFS***

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

Alternative: *B*	*Category*		*Year(s)*	*Quantity*	*Value*	*Rate(%)*
EA	Cost	One time	1	1.00 Each	$65,000.00	4.00
Notes: Environmental Analysis						
Road Design	Cost	One time	4	1.00 Each	$5,000.00	4.00
Notes: Road Design						
Sale Admin	Cost	One time	7	1.00 Each	$9,000.00	4.00
Notes: Sale Admin						
Sale Prep	Cost	One time	5	4,420.00 MBF	$10.00	4.00
Notes: Sale Prep						
Site Prep	Cost	One time	9	143.00 Acre	$240.00	4.00
Notes: Site Prep						

Alternative: *C*	*Category*		*Year(s)*	*Quantity*	*Value*	*Rate(%)*
EA	Cost	One time	1	1.00 Each	$65,000.00	4.00
Notes: Environmental Analysis						
Sale Admin	Cost	One time	7	1.00 Each	$9,000.00	4.00
Notes: Sale Admin						
Sale Prep	Cost	One time	5	3,023.00 MBF	$10.00	4.00
Notes: Sale Prep						
Site Prep	Cost	One time	9	180.00 Acre	$240.00	4.00
Notes: Site Prep						

BENEFIT ***USFS***

Alternative: *B*	*Category*		*Year(s)*	*Quantity*	*Value*	*Rate(%)*
Mixed Hardwood	Benefit	One time	7	525.00 MBF	$51.42	4.00
Notes: Mixed Hardwood						
NRO	Benefit	One time	7	186.00 MBF	$110.21	4.00
Notes: Northern Red Oak						
Pulpwood	Benefit	One time	7	1,475.00 MBF	$14.52	4.00
Notes: Pulpwood						
Scarlet Oak	Benefit	One time	7	25.00 MBF	$27.41	4.00
Notes: Scarlet Oak						
W0-CO	Benefit	One time	7	74.00 MBF	$90.02	4.00
Notes: White Oak/Chestnut Oak						
White Ash	Benefit	One time	7	25.00 MBF	$58.88	4.00
Notes: White Ash						
Yellow Poplar	Benefit	One time	7	2,110.00 MBF	$58.88	4.00
Notes: Yellow Poplar						

Alternative: *C*	*Category*		*Year(s)*	*Quantity*	*Value*	*Rate(%)*
Mixed Hardwood	Benefit	One time	7	336.00 MBF	$51.42	4.00
Notes: Mixed Hardwood						
NRO	Benefit	One time	7	149.00 MBF	$110.21	4.00

Notes: Northern Red Oak						
Pulpwood	Benefit	One time	7	1,009.00 MBF	$14.52	4.00
Notes: Pulpwood						
Scarlet Oak	Benefit	One time	7	25.00 MBF	$27.41	4.00
Notes: Scarlet Oak						
WO-CO	Benefit	One time	7	78.00 MBF	$90.02	4.00
Notes: White Oak/Chestnut Oak						
Yellow Poplar	Benefit	One time	7	1,426.00 MBF	$58.88	4.00
Notes: Yellow Poplar						

5.3 Appendix C - Biological Evaluation

1.0 AQUATIC RESOURCES

Boundaries of Aquatic Analysis Areas

This analysis addresses project area waters and analysis area waters associated with the Dylan 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 Dylan Project consist of the following watersheds: Commissioner Creek downstream to its confluence with the Little Tennessee River; Mulberry Creek downstream to its confluence with the Little Tennessee River; Bradley Branch downstream to its confluence with Norton Branch; Unnamed tributary of Coweeta Creek and Howard Branch to their confluence with Coweeta Creek; North Fork Coweeta Creek to its confluence with Coweeta Creek; Coweeta Creek to its confluence with the Little Tennessee River; Bates Branch to its confluence with the Little Tennessee River; Black Mountain Branch to its confluence with South Fork Skeenah Creek; South Fork Skeenah Creek; Jones Creek to its confluence with Allison Creek.

Existing Conditions

Coweeta Creek is classified by the North Carolina Department of Environment and Natural Resources (NCDENR) as class B Tr waters. Bates Branch is classified as class C Waters. Commissioner Creek, Mulberry Creek, Skeenah Creek, and Black Mountain Branch are classified as Class C Tr waters. Jones Creek is classified as WS-III Tr waters. Class B waters are waters primarily used for recreation and any other use designated under Class C waters. 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. Class WS-III waters are protected as water supplies which are generally in low to moderately developed watershed and are suitable for all Class C uses.

The analysis area is characterized as containing habitat for coldwater fish species. Analysis area waters also provide extensive habitat for macroinvertebrates. Streams within the Dylan 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).

PET 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 (Attachment 1a). These species were then filtered using habitat information and the availability of these habitats within the aquatic analysis area (Attachment 1a). Based upon the results of this filtering process one proposed, endangered, or threatened species was evaluated for this analysis (Table 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. Although the upper Little Tennessee River is considered critical habitat for the federally threatened spotfin chub, no individuals have been observed upstream of Lake Emory.

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

Species	Type	Habitat	Occurrence
Federally Listed Threatened and Endangered Species			
Erimonax monachus	Fish	Little TN River; French Broad River system	Not likely to occur within analysis area but its designated critical habitat does occur within the analysis area

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 Dylan Project would be implemented to prevent visible sediment from entering analysis area streams.

Effects of Alternatives on Aquatic Species

Direct, Indirect, and Cumulative 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 from implementing any of the alternatives. There would be no cumulative effects resulting from any past ongoing, or foreseeable future actions to any aquatic PET species resulting from implementation of the Dylan Project because there would be no direct or indirect effects of the Dylan Project on any aquatic PET species and because there are no aquatic PET species within the aquatic analysis area. There would be no direct, indirect, or cumulative effects to the designated critical habitat for the spotfin chub because project design features would prevent visible sediment from entering project area streams and the culvert installation in Black Mountain Branch would occur over 4 miles from the Little Tennessee River. Any effects to the aquatic resources at this crossing would dissipate prior to reaching the Little Tennessee River.

Determination of Effect

The Dylan 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. Project design features would prevent visible sediment from entering the project area streams and water temperatures would not be affected because riparian buffers would not be harvested; therefore, there would be no effects to the designated critical habitat for the spotfin chub. Consultation with the U.S. Fish and Wildlife Service is not required.

Table 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			
Erimonax monachus	No Effects	No Effects	No Effects

This project would have **no effects** to any aquatic threatened or endangered species because project design features would prevent visible sediment and herbicides from entering analysis area streams and no federally listed aquatic species occur within the aquatic analysis area.

Sensitive 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 based upon habitat information and the availability of these habitats within the aquatic analysis area (Attachment 1a). Based upon the results of this filtering process two sensitive aquatic species were evaluated in this analysis (Table 1.3). 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 Dylan 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).

Table 1.3: Known and potential sensitive aquatic species in Macon County evaluated for the Dylan Project (see also Attachment 1).

Species	Type	Habitat	Occurrence
2001 Region 8 Regional Forester's Sensitive Species List			
Cambarus georgiae	Crayfish	Streams in Little TN River, Macon Co.	May occur*
Macromia margarita	Dragonfly	Rivers, Macon, Swain, Transylvannia Co.;	May occur*

		Caldwell Co.	

*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, Indirect, and Cumulative Effects.

Alternative A: Alternative A, the no-action alternative, would involve no ground disturbing activities or herbicide applications. No watershed improvements would be done. The existing condition of the road in need of rehabilitation would continue. Sedimentation and turbidity from the damaged road would continue to occur during rain events. This alternative would not improve habitat for the two sensitive aquatic species because it would not eliminate a chronic sediment source. As such, this alternative would not meet the Forest Plan direction for Management Area 18.

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 require construction of a cut and fill slope; therefore, there would be very little ground disturbance that could produce sediment. Skid roads would 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. This alternative would also have beneficial effects to the aquatic resources due to the watershed improvements within the Bates Branch watershed.

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.

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

A small quantity of sediments may enter Black Mountain Branch and an unnamed tributary of South Fork Skeenah Creek during culvert installations; however, these effects would not be measurable approximately 75 feet below the crossings. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installations would be immeasurable at the confluence with South Fork Skeenah Creek because the culvert installation would occur approximately 1.0 mile from the mouth of Black Mountain Branch and unnamed tributary of South Fork Skeenah Creek. Additional culverts may be installed within analysis area waters as needed for drainage. The effects of these culverts would be the same as described for the culvert installations within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek.

Sedimentation from the culvert installations may reduce the quality of the habitat for the sensitive species, *Cambarus georgiae*, within Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek by partially filling pools within the first 75 feet below the crossing. These effects may persist until the next bankfull flow event (the flow event which occurs approximately every 2.5 years).

The road construction and reconstruction proposed for this project may increase sedimentation within the Black Mountain Branch watershed and the unnamed tributary of South Fork Skeenah Creek; however, these effects would be minimized by application of project design features (e.g. out slope drainage, brush barriers, water bars, seeding, sediment traps) to control storm water runoff from road surfaces. Due to the erosion control techniques designed into the project, sedimentation from these roads would be immeasurable at the confluence of Black Mountain Branch with South Fork Skeenah Creek. Sediments from this type of road construction have been shown to be filtered effectively within 20 feet below the fill slope. The majority of the road would be located at least 100 feet from Black Mountain Branch and the unnamed tributary of South Fork Skeenah Creek; therefore, activities within these areas would have no effects on the aquatic resources of either streams except during culvert installations. The road reconstruction within the Coweeta Creek watershed and the Mulberry Creek watershed would not cause an increase in sediment within either of these streams because the roads are located well outside of any riparian zones. Any erosion from road surface runoff would be filtered before reaching any perennial water sources.

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, are being 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 generally be the same as the effects described for Alternative B except there would be no new road construction and 1.16 miles less road 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. There would be no effects of culvert installations because no culvert would be needed in Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. Alternative C would not impact the aquatic sensitive species, *Cambarus georgiae* or *Macromia margarita*, because there would be no culvert installations within Black Mountain Branch or the unnamed tributary of South Fork Skeenah Creek. This alternative would improve habitats for the sensitive aquatic species resulting from the watershed restoration within the Bates Branch watershed.

Impacts of Past, Ongoing and Foreseeable Actions.

Previous activities within the Dylan Project area include timber harvest and road construction (Coweeta Gap Salvage, Firewood Salvage, Mulberry Creek Timber Sale, and Jones Creek Timber sale). There may have been an increase in stream turbidity during culvert installations for previous timber projects. However, these effects where 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 Dylan analysis area. As a result, there are no present effects to aquatic resources in the Dylan 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 11 stream crossings were replaced for storm damage repairs (2004 hurricane damage) within the Jones Creek watershed. These culvert installations may have caused a slight increase in sediment within the streams but these effects have dissipated since project completion. These crossings also improved aquatic passage for the coldwater stream organisms. There are no existing effects to the aquatic resources resulting from these activities.

There are no ongoing activities occurring on federal lands within the Dylan 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 Dylan Project because there would be no effects of the proposed timber management beyond the project area streams. There are no other ongoing activities on private lands affecting the Dylan Project area waters.

The Fatback Project will involve timber management activities within the Jones Creek watershed. There will be no effects to Jones Creek from these activities because the project design features will prevent visible sediment from entering project area streams. There are no other reasonably foreseeable future actions proposed for the Dylan aquatic analysis 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 Dylan Project area waters.

Cumulative Effects

Alternative B: The cumulative effects of Alternative B would include the effects of culvert installations for this project. Alternative B may impact approximately 0.54% of the streams until the next bankfull flow event but this impact would not affect the forest-wide trends for the aquatic sensitive species 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).

Alternative C: The cumulative effects of Alternative C would only include the direct and indirect effects of the Dylan Project. Alternative C of Dylan Project would have no effects to any aquatic resources (see discussion in the Direct and Indirect Effects Section above).

Alternative B may negatively impact individuals of the aquatic sensitive species, *Cambarus georgiae* or *Macromia margarita*, 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. Implementation of Alternative C would have no negative impacts to the aquatic sensitive species. This alternative may have positive impacts to the aquatic sensitive species resulting from the reduction in sedimentation because of the watershed restoration work.

Determination of Effect

The sensitive species *Cambarus georgiae* and *Macromia margarita* 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 these species are common across their range and project design features would minimize impacts to these species by preventing visible sediment from entering the aquatic analysis area streams in measurable quantities.

Table 1.4: 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			
Cambarus georgiae	No impact	May impact[1]	No impact[2]
Macromia margarita	No impact	May impact[1]	No impact[2]

[1]May impact individuals but would not cause a trend to federal listing or a loss of viability.
[2]May improve habitats for species.

This project may impact individuals of sensitive aquatic species but these impacts are not likely to cause a trend towards federal listing or a loss of viability for the species across the national forest. No cumulative effects on species viability across the Forest will result from this project.

2.0 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 considered for this analysis.

Previous Survey Information

The Biotics Database was queried for sensitive plant species growing in the activity areas. It contained no records for any sensitive plant species in the activity areas. The Biotics Database contained records for the sensitive species Biltmore sedge, *Carex biltmoreana*, outcrop ragwort, *Packera millefolium*, mountain catchfly, *Silene ovata*, and waterfan, *Hydrothyria venosa*, within one mile of the activity areas.

New Surveys or Inventories Conducted

Field surveys for endangered, threatened and sensitive plant species were conducted in April, May, June and August, 2007, 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 microhabitats were detected (Goff, *et al*. 1982). Field surveys located no sensitive species in the activity units.

Species Undergoing Analysis for Effects

Because no endangered or threatened plant species were located during the field surveys, and the Biotics Database contained no records for endangered or threatened species in the activity areas, there should be no direct or indirect effects to any endangered or threatened species. As a result, no endangered or threatened species underwent further analysis for effects (Table 2.1).

Table 2.1. Summary of endangered and threatened plant species undergoing effects analysis for the Dylan Project (see Attachment 2 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

Because *Silene ovata* 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 (Table 2.2). *Hydrothyria venosa* is an aquatic species restricted to mountain streams. The habitat is present at stream crossings leading to activity areas, and could be impacted by road construction and maintenance. As a

result, the species will be assumed to be present, and will undergo further analysis for effects. Both *Carex biltmoreana* and *Packera millefolium* are confined to rock outcrops. Because this community is not located in any of the activity areas, it is very unlikely either species is located in any of the activity areas. As a result, neither species underwent further analysis for effects.

Table 2.2. Summary of sensitive plant species undergoing effects analysis for the Dylan Project (see Attachment 2 for a complete list of species evaluated).

Status	Species	Habitat	Reason for Effects Analysis
Sensitive	*Hydrothyria venosa*	Steams	Assumed to be present due to local records and suitable habitat near activity areas.
Sensitive	*Silene ovata*	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 Biotics Database contains over 70 records for *Hydrothyria venosa* in western North Carolina, primarily on the Pisgah and Nantahala National Forests. *Hydrothyria* grows in mountain streams. No populations of *Hydrothyria* 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.

Direct and Indirect Effects – Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Hydrothyria*. 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 (Jason Farmer, personal communication). 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 found within 75 feet of a stream crossing 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 2.3).

Table 2.3. Past and ongoing projects on the Nantahala National Forest that may impact populations of *Hydrothyria venosa*.

District	Project	Year	Determination of Effect
Nantahala*	Road Projects Due to Storm Damage	2006	*May impact individuals but no trend towards federal listing*

*formerly the Wayah Ranger District

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

Cumulative Effects - Because none of the alternatives would produce direct or indirect affects to populations of *Hydrothyria venosa*, the project will have no cumulative effects to the species.

Determination of Effect – Because none of the alternatives would produce direct, indirect or cumulative effects to the species, the Dylan Project is unlikely to impact the viability of the *Hydrothyria venosa* across the national forest.

(2) Mountain Catchfly (*Silene ovata*)

The Biotics 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.

Direct and Indirect Effects – Because it proposes no management activities, Alternative A would produce no direct or indirect effects to *Silene ovata*. Alternatives B and C would regenerate rich cove forests, the primary habitat for *Silene*. Alternative B would regenerate cove forests through both 91 acres of two-age harvests as well as 337 acres of group-selection, which, for analysis purposes, will be considered a regeneration harvest over the entire management area (see further analysis in the Biological Assessment, under management indicator species). Alternative C would regenerate 140 acres of rich cove forest through two-age management. 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 at least 20 years following regeneration harvest, the minimal time necessary for understory herbs to recover to pre-treatment levels (see further analysis in the Biological Assessment, under management indicator species).

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.

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 2.4). These two actions, both prescribed burns, may have positively affected populations by opening the forest community, increasing light to the herbaceous layer.

Table 2.4. Past projects on the Nantahala National Forest impacting populations of *Silene ovata*.

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

*formerly the Highlands Ranger District

One ongoing activity on the Nantahala National Forest, the Welsh Timber and Wildlife Project on the Nantahala (formerly Wayah) Ranger District, may produce direct, negative effects to a roadside population of the species through road maintenance. One future activity on the Nantahala National Forest, the Fatback Timber and Wildlife Project on the Nantahala (formerly Wayah) Ranger District, may produce direct, negative effects to populations through harvest activities. The analysis area contains no ongoing or future activities on public or private land that may impact populations of *Silene ovata*.

Cumulative Effects - Because it would produce no direct or indirect effects, Alternative A would produce no cumulative effects to *Silene ovata*. The cumulative effects of Alternatives B and C, primarily decreases in the number of plants in the activity areas over a period of 20 years, would represent 7% (3 of 43) of the documented populations of *Silene* on the national forest.

Determination of Effect - Because western North Carolina contains at least 40 undisturbed populations of *Silene*, the Dylan Project is unlikely to 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. 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 2.5).

Table 2.5. Determination of effect of each alternative on the evaluated sensitive plant species.

USFS Status	Species	Alternative A	Alternative B	Alternative C
Sensitive	*Silene ovata*	No impact.	May impact individuals*	May impact individuals*
Sensitive	*Hydrothyria venosa*	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.

3.0 WILDLIFE RESOURCES

Proposed, endangered, and threatened (PET) species considered in this analysis are those currently listed by the U.S. Fish and Wildlife Service. Sensitive species considered in this analysis are those identified by the Regional Forester for which population viability is a concern (August, 2001). All proposed, endangered, threatened and sensitive terrestrial animal species that might occur on the Nantahala National Forest were considered.

Previous Survey Information

Potentially affected species were identified from information on habitat relationships, element occurrence records maintained by the North Carolina Natural Heritage Program, and field data on the project area. Species with only incidental, migrant or historic occurrences in Macon County were not considered further. No sensitive species were known to occur in the project area prior to the surveys undertaken for this project.

Species Undergoing Analysis for Effects

All but one of the proposed, endangered and threatened species, the Indiana bat, was dropped from further consideration due to a lack of suitable habitat in the analysis area or being outside the known range (Attachment 3). All but eight of the sensitive species 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). As a result, one endangered species and eight sensitive species underwent further analysis for potential effects, because they either occur, or may occur, in the analysis area (Table 3.1).

Table 3.1: Known and potential endangered, threatened and sensitive terrestrial wildlife species undergoing further evaluation for the Buffalo Project.

Species	USFS Status	Habitat Description	Likelihood of Occurrence
Indiana bat (*Myotis sodalis*)	Endangered	Hardwood forests, snags	May occur
Northern bush katydid (*Scudderia septentrionalis*)	Sensitive	Treetops at edges of broadleaved forest	May occur
Rock-loving grasshopper (*Trimerotropis saxatilis*)	Sensitive	Lichen covered rock outcrops	May occur
Frosted elfin (*Callophrys irus*)	Sensitive	Open woods and borders, in dry situations	May occur
Diana fritillary butterfly (*Speyeria diana*)	Sensitive	Deciduous and pine woodlands	May occur
Glossy supercoil (*Paravitrea placentula*)	Sensitive	Leaf litter on wooded hillsides and ravines	May occur
S. appalachian salamander (*Plethodon teyahalee*)	Sensitive	Moist forests at all elevations	May occur
Eastern small-footed bat (*Myotis leibii*)	Sensitive	Roosts in hollow trees in summer	May occur
Southern water shrew (*Sorex palustris puntulatus*)	Sensitive	Small streams 12-15' wide above 3000'	May occur

New Surveys or Inventories Conducted

Proposed activity areas were surveyed for the presence of special habitats, such as wetlands, boulderfields, caves or mines that could be adversely affected by project activities. No special habitats were located.

Inventories were not conducted for seven sensitive species potentially occurring in the activity area (Table 3.1), because 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. Surveys were conducted for one sensitive species, the glossy supercoil, because canopy removal could adversely affect the habitat for this species. Surveys for the supercoil were conducted in June, 2007 in all areas proposed for two-age regeneration and shelterwood harvests.

Effects of Alternatives on Terrestrial Wildlife Species

Endangered and Threatened 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 165 acres of suitable habitat by 2-age regeneration and shelterwood. 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. 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, because all standards and guides for the protection of this species, as listed in Amendment 10 of the Land and Resources Management Plan, will be followed. The U.S. Fish and Wildlife Service has concurred with this determination in their Biological Opinion for Amendment 10. This project will have no effect on any other federally proposed or listed terrestrial animal species. Consultation with the U.S. Fish and Wildlife Service **has been completed**.

Sensitive 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 proposed for **Alternative B** and thirteen regeneration units proposed for **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 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 wildlife opening construction and road reconstruction for **Alternatives B and 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 and cause a loss of habitat. The adverse effects to individuals and habitat would be minor, however, considering the status and distribution of the habitat on the national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

(4) 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 **Alternatives B and 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 national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

(5) 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 **Alternatives B and 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 **Alternatives B and 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, but could benefit the habitat. The adverse effects to individuals would be minor considering the status and distribution of the habitat on the national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

(6) 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.

(7) 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 and regeneration activities, which include 132 acres in **Alternative B** and 165 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 in the analysis area by 130 acres over 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. 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, which total 262 acres in **Alternative B** and 295 acres in **Alternative C**. These acres represent less than 15% of the 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 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. Since the species is widely distributed, potentially occupying nearly a half million acres of national forest, 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 limiting the amount of regeneration harvests by compartment, management area and analysis area prevent cumulative effects to this species in any given

area. Because the species is widely distributed, potentially occupying nearly a half million acres of national forest, 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 national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

(8) 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. Under **Alternative B**, tree felling 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, which include 132 acres in **Alternative B** and 165 acres in **Alternative C**. These 165 acres represent less than 10% of the 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 130 acres in the past 20 years. These acres have matured and are no longer desirable feeding habitat. There are no known ongoing or future projects that would affect this habitat.

Cumulative Effects – The actions proposed for **Alternative B** would result in cumulative effects of 132 acres. The actions proposed for **Alternative C** would result in cumulative effects of 165 acres.

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 national forest. Therefore, this project is not likely to cause a trend to federal listing or a loss of viability across the forest.

(9) 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 1 would have no effect. Road improvement across suitable streams could adversely affect individuals through direct crushing and effect habitat through direct loss and sedimentation. Direct loss of habitat should be minimal, however, 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. Herbicide treatments, crop tree release and construction of wildlife ponds should not affect individuals or the habitat.

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 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. 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 past projects, and road improvements for this project. Cumulative direct loss of habitat would be limited to the existing stream crossings. Sedimentation effects from Alternative 2 would be limited to road improvements. 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. These effects would dissipate as they move downstream, and after each subsequent high flow event.

Determination of Effect - This species has been recorded from nine sites on the Nantahala National forest, most of these 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 2 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 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 for Terrestrial Wildlife

This project is not likely to adversely affect the Indiana bat (*Myotis sodalis*). The project will have no effect on any other federally proposed or listed species. Consultation with the U.S. Fish and Wildlife Service **has been completed**.

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*), glossy supercoil (*Paravitrea placentula*), 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 (Table 3.2). This project will not impact any other sensitive species. No cumulative effects on species viability across the forest will result from this project.

Table 3.2: Determination of effect of each alternative on the evaluated endangered, threatened and sensitive terrestrial wildlife species.

Species	USFS Status	Alternative 1	Alternative 2
Indiana bat	Endangered	No impacts	Not likely to
Northern bush katydid	Sensitive	No impacts	May impact*
Rock-loving grasshopper	Sensitive	No impacts	May impact*
Frosted elfin	Sensitive	No impacts	May impact*
Diana fritillary butterfly	Sensitive	No impacts	May impact*
Glossy supercoil	Sensitive	No impacts	May impact*
Southern Appalachian salamander	Sensitive	No impacts	May impact*
Eastern small-footed bat	Sensitive	No impacts	May impact*
Southern water shrew	Sensitive	No impacts	May impact*

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

4.0 EFFECTS DETERMINATION

This project **is not likely to adversely affect** the Indiana bat, because all standards and guides for the protection of this species, as listed in Amendment 10 of the Land and Resources Management Plan, will be followed. The U.S. Fish and Wildlife Service has concurred with this determination in their Biological Opinion for Amendment 10. This project will have no effect on any other federally proposed or listed species. Consultation with the U.S. Fish and Wildlife Service **has been completed**.

The project may impact individuals of *Cambarus georgiae, Macromia margarita, Silene ovata*, the northern bush katydid (*Scudderia septentrionalis*), rock-loving grasshopper (*Trimerotropis saxatilis*), frosted elfin (*Callophrys irus*), Diana fritillary butterfly (*Speyeria diana*), glossy supercoil (*Paravitrea placentula*), 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.

5.0 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.

6.0 PREPARER(s)

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5.4 Appendix D – Biological References

Aquatic

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

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

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

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

Attachment 1b: PETS species evaluated for the Dylan Timber Project. The analysis includes known and potentially occurring rare aquatic species from 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.

Rare Species Analysis For: Bu

Analysis Date:

Known and Potentially Occurring* Rare Aquatic Species
Macon County, North Carolina
Little Tennessee River System

Type	Name	USFS Status	Likelihood of Occurrence in Analysis Area
Threatened and Endangered Species			
Mollusk	*Alasmidonta raveneliana*	E	Not likely to occur[1]
Mollusk	*Pegias fabula*	E	Not likely to occur[1]
Fish	*Erimonax monacha*	T	Not likely to occur[1]
Sensitive Species			
Crustacean	*Cambarus chaugaensis*	S	Not likely to occur[1]
Crustacean	*Cambarus georgiae*	S	May Occur[2]
Dragonfly	*Macromia margarita*	S	May Occur[2]
Fish	*Etheostoma vulneratum*	S	Not likely to occur[1]
Fish	*Percina squamata*	S	Not likely to occur[1]
Mollusk	*Alasmidonta varicose*	S	Not likely to occur[1]
Mollusk	*Fusconaia barnesiana*	S	Not likely to occur[1]

[1] Recent survey data within or downstream the aquatic analysis area (<5 yrs old)
[2] Historical survey data within or downstream the aquatic analysis area (>5 yrs old)
[3] Vicinity records (within or downstream the analysis area, not necessarily within project area)
[4] Suitable habitat present, but no vicinity records
[5] No suitable habitat present or vicinity records within analysis

Attachment 1c: Aquatic resources in the Little Tennessee River watershed contained in the Dylan Project area. The **B** classification denotes waters designated for primary recreation and any other usage specified by the C classification. The **C** classification denotes waters designated for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. The **WS-III** classification denotes waters protected as water supplies which are generally in low to moderately developed watersheds. The **Tr** classification denotes waters suitable for natural trout propagation and maintenance of stocked trout.

Stream Name	Compartment/ Stand	Kilometers in Project Area	Kilometers in Analysis Area	Classification
Jones Creek[1]	125/15,22,47,48 ,49,50,51	0.77	8.37	WS-III Tr
Unnamed tributary (UT) Jones Creek 1	125/47	0.84	0.84	WS-III Tr
UT 2 Jones Creek	125/48,49,50	0.92	0.92	WS-III Tr
UT 3 Jones Creek	125/15	0.46	1.00	WS-III Tr
South Fork Skeenah Creek	126	-	5.15	C Tr
UT South Fork Skeenah Creek	126	0.24	1.61	C Tr
Black Mountain Branch	12620,45,46	1.60	1.60	C Tr
North Fork Coweeta Creek	126/7,47	1.57	5.95	B Tr
Coweeta Creek[2]	88,126,153	-	7.64	B Tr
UT Coweeta Creek	88/33	-	4.28	B Tr
Howard Branch	88/15	-	2.25	B Tr
Mulberry Creek[3]	152/22,32,33,38 ,39	0.80	4.34	C Tr
Commissioner Creek	151,152	-	6.46	C Tr
UT Commissioner Creek	152/32,33	0.77	0.77	C Tr
Bates Branch	126	0.49	3.38	C
Bradley Branch	88/5,15	-	1.93	C

Notes:

[1] Jones Creek is adjacent to FS 763. The average width of this stream is 3.5 meters. The riparian overstory vegetation consists of cucumber tree, yellow poplar, birch, and hemlock. The understory vegetation consists of red maple, alder, and yellow poplar. The substrate of Jones Creek consisted of boulder (20%), cobble (40%), large gravel (15%), small gravel (20%), and sand (5%). The gradient, which is a measure of the slope of the stream channel, was 4%.

[2] Coweeta Creek is adjacent to SR 1114 (downstream of Coweeta Hydrological Laboratory). The average width of this stream is 5 meters. The substrate of Coweeta Creek consisted of boulder (10%), cobble (40%), gravel (30%), and sand (20%). This stream received an excellent bioclassification in 1994, 1999, and 2004 (NCDENR 2005).

[3] Mulberry Creek is adjacent to SR 1104. The average width of this stream is 3 meters. The riparian overstory vegetation consists of birch and basswood. The understory vegetation consists of rhododendron. The substrate of Mulberry Creek consisted of boulder (5%), cobble (40%), large gravel (10%), small gravel (20%), and sand (25%). The gradient was 5%.

Attachment 2: Endangered, threatened and sensitive plant species, Pisgah and Nantahala National Forests.

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

Attachment B1: Endangered, threatened and sensitive plant species, Pisgah and Nantahala National Forests.

USFS Status	Species	Habitat/Distribution
Endangered	*Geum radiatum*	High Elevation Rocky Summit
	Gymnoderma lineare	High Elevation Rocky Summit, Moist Rock Outcrop in Acidic Cove in Gorge
	Houstonia montana	Grassy Bald, High Elevation Rocky Summit
	Isotria medeoloides	White Pine Forest, Mesic Oak-Hickory
	Sagittaria fasciculata	Southern Appalachian Bog, Streamside, Swamp Forest-Bog Complex
	Sarracenia jonesii	Southern Appalachian Bog
	Sarracenia oreophila	Southern Appalachian Bog
	Sisyrinchium dichotomum	Montane Oak Woodland, Mafic Rock, Escarpment
Threatened	*Helonias bullata*	Southern Appalachian Bog, Swamp Forest-Bog Complex
	Hexastylis naniflora	Rich Cove Forest, Mesic Oak-Hickory
	Hudsonia montana	High Elevation Rocky Summit, Pine-Oak/Heath Forest
	Liatris helleri	High Elevation Rocky Summit, Montane Acidic Cliff
	Solidago spithamaea	High Elevation Rocky Summit
	Spiraea virginiana	Riverside Scour Zone
Sensitive	*Aconitum reclinatum*	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Rich Cove Forest
	Acrobolbus ciliatus	Spruce-Fir Forest, Spray Cliff
	Allium cuthbertii	Low Elevation Granitic Dome
	Aneura maxima	Spray Cliff
	Anzia americana	Gorge, Acidic Cove
	Arabis patens	Montane Mafic Cliff, Montane Calcareous Cliff
	Aspiromitus appalachianus	Stream
	Asplenium X ebenoides	Montane Calcareous Cliff
	Bartramidula wilsonii	Spray Cliff, Moist Montane Acidic Cliff, Gorge
	Bazzania nudicaulis	Spruce-Fir Forest
	Berberis canadensis	Rich Cove Forest, Glade, Mafic Rock
	Botrychium jenmanii	Rich Cove Forest
	Brachydontium trichodes	Spruce-Fir Forest
	Bryocrumia vivicolor	Spray Cliff, Moist Montane Acidic Cliff, Gorge
	Buckleya distichophylla	Hemlock Hardwood Forest, Acidic Cove Forest,
	Buxbaumia minakatae	Rotting Logs
	Calamagrostis cainii	High Elevation Rocky Summit
	Campylopus paradoxus	High Elevation Rocky Summit
	Cardamine clematitis	Boulderfield Forest, Northern Hardwood Forest, Spruce-Fir Forest, High Elevation Seep
	Carex biltmoreana	High Elevation Granitic Dome, Montane Cedar-Hardwood Forest, Montane Acidic Cliff
	Carex communis var. amplisquama	Rich Cove Forest, Mafic Rock
	Carex misera	High Elevation Rocky Summit, Montane Acidic Cliff, High Elevation Granitic Dome
	Carex radfordii	Rich Cove Forest, Escarpment Gorge

	Carex roanensis	Rich Cove Forest, Montane Oak-Hickory
	Carex schweinitzii	Southern Appalachian Bog, Swamp Forest-Bog Complex
	Cephalozia macrostachya ssp australis	Rock Outcrop in Acidic Cove Forest in Gorge
	Cephaloziella massalongi	High Elevation Rocky Summit
	Cheilolejeunea evansii	Acidic Cove, Oak-White Pine Forest, Escarpement Gorge
	Chelone cuthbertii	Southern Appalachian Bog
	Cleistes bifaria	Pine-Oak/Heath Forest, Pine-Oak Woodland
	Coreopsis latifolia	Rich Cove Forest, Northern Hardwood Forest
	Danthonia epilis	High Elevation Granitic Dome, Seep
	Delphinium exaltatum	Rich Cove Forest, Grassy Bald, Glade, Montane Oak-Hickory, Mafic Rock
	Desmodium ochroleucum	Openings, Xeric Woodlands
	Diervilla rivularis	Streamside, Acidic Cove Forest
	Diplophyllum apiculatum var. taxifolioides	Roadbank
	Diplophyllum obtusatum	Spruce-Fir Forest
	Ditrichum ambiguum	Acidic Cove Forest, High Elevation Red Oak
	Drepanolejeunea appalachiana	Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest
	Entodon concinnus	Moist Montane Calcareous Cliff
	Ephebe americana	High Elevation Rocky Summit
	Euphorbia purpurea	Northern Hardwood Forest, Rich Cove Forest, Mesic Oak-Hickory Forest
	Eurybia avita	Rock Outcrops
	Fissidens appalachiensis	Streams at High Elevations
	Fothergilla major	Pine-Oak/Heath Forest, Montane Oak Woodland, Roadside
	Frullania appalachiana	Spruce-Fir Forest
	Frullania oakesiana	Spruce-Fir Forest
	Gentiana austromontana	Grassy Bald, High Elevation Red Oak Forest, Northern Hardwood Forest
	Geum geniculatum	Boulderfield Forest, High Elevation Seep
	Glyceria nubigena	Northern Hardwood Forest, Boulderfield Forest, High Elevation Seep, Spruce-Fir Forest
	Grammitis nimbata	Spray Cliff
	Hasteola suaveolens	Montane Alluvial Forest
	Helianthus glaucophyllus	Rich Cove Forest, Northern Hardwood Forest, High Elevation Red Oak Forest, Mesic Oak-Hickory Forest, Roadside
	Heuchera longiflora var. aceroides	Rock Outcrops in Rich Cove Forest, Mafic Rock
	Hexastylis contracta	Acidic Cove Forest
	Hexastylis rhombiformis	Acidic Cove Forest, Hemlock Hardwood Forest, Montane Alluvial Forest
	Homaliadelphus sharpii	Dry Montane Calcareous Cliff
	Hydrothyria venosa	Stream
	Hygrohypnum closteri	Stream
	Hymenophyllum tayloriae	Spray Cliff, Grotto, Gorge
	Hypericum graveolens	High Elevation Seep, Wet Meadow
	Hypericum mitchellianum	High Elevation Seep, Wet Meadow
	Hypotrachyna virginica	High Elevation Forest

	Ilex collina	Northern Hardwood Forest, Boulderfield Forest, Southern Appalachian Bog, Swamp Forest Bog Complex
	Juglans cinerea	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial Forest
	Juncus caesariensis	Low Elevation Southern Appalachian Bog
	Lejeunea blomquistii	Spray Cliff
	Leptodontium excelsum	Spruce-Fir Forest
	Leptohymenium sharpii	Spruce-Fir Forest
	Liatris turgida	High Elevation Granitic Dome, Montane Oak Woodland
	Lilium grayi	Northern Hardwood Forest, High Elevation Seep, Grassy Bald, Wet Meadow
	Lophocolea appalachiana	Spray Cliffs, Wet Rocks Near Mountain Streams
	Lysimachia fraseri	Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove Forest, Acidic Cove Forest, Roadside
	Malaxis bayardii	Southern Appalachina Bog, Wet Meadows
	Mannia californica	Dry Montane Acidic Cliff
	Marshallia grandiflora	Southern Appalachian Bog
	Marshallia trinervia	Moist, Rocky Stream Banks
	Marsupella emarginata var. latiloba	Spray Cliff
	Megaceros aenigmaticus	Stream
	Metzgeria fruticulosa	High Elevation Forest
	Metzgeria furcata var. setigera	Spruce-Fir Forest, Acidic Cove Forest in Gorge
	Metzgeria uncigera	Acidic Cove Forest
	Monotropsis odorata	Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory, Pine-Oak/Heath Forest
	Nardia lescurii	Peaty Soil over Moist Rocks
	Packera millefolia	Rock Outcrops
	Pellia X appalachiana	Rock Outcrops Near Spray Cliffs
	Penstemon smallii	Rock Outcrops, Woodlands
	Physcia pseudospeciosa	High Elevation Granitic Dome
	Plagiochasma intermedium	Streamside Limestone Rock
	Plagiochasma wrightii	Streamside Limestone Rock
	Plagiochila austinii	Moist Montane Acidic Cliff
	Plagiochila caduciloba	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge
	Plagiochila echinata	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest in Gorge
	Plagiochila sharpii	High Elevation Rocky Summit, Rock Outcrop in Acidic Cove Forest in Gorge
	Plagiochila sullivantii var spinigera	Spray Cliff
	Plagiochila sullivantii var sullivantii	Spray Cliff, Spruce-Fir Forest
	Plagiochila virginica var caroliniana	Spray Cliff, Rock Outcrop in Acidic Cove Forestin Gorge
	Plagiochila virginica var virginica	Limestone Outcrops
	Plagiomnium carolinianum	Rock Outcrop in Acidic Cove Forest in Gorge, Streambank
	Plantahera integrilabia	Southern Appalachian Bog, Swamp Forest-Bog Complex
	Platyhypnidium pringlei	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge

	Poa paludigena	Southern Appalachian Bog
	Polytrichum appalachianum	Rocky Summits, Mid to High Elevation
	Porella japonica ssp appalachiana	Spray Cliff
	Porella wataugensis	Rock Outcrop in Acidic Cove Forest in Gorge
	Porpidia diversa	High Elevation Rocky Summit
	Porpidia herteliana	High Elevation Rocky Summit
	Prenanthes roanensis	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside, High Elevation Red Oak Forest
	Pycnanthemum beadlei	Rock Outcrops, Woodlands
	Pycnanthemum torrei	Xeric Oak-Hickory, Glade
	Radula sullivantii	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge
	Radula voluta	Spray Cliff
	Rhachithecium perpusillum	Hardwood Trees
	Rhododendron vaseyi	Northern Hardwood Forest, High Elevation Seep, Southern Appalachian Bog, Meadow, Roadside
	Riccardia jugata	Rotten Logs in Acidic Cove Forest in Gorge
	Robinia viscosa	High Elevation Granitic Dome
	Robinia viscosa var. hartwegii	High Elevation Granitic Dome, Woodlands
	Rudbeckia triloba var pinnatiloba	Rich Cove Forest, Montane Mafic Cliff, Mafic Rock
	Rugelia nudicaulis	Spruce-Fir Forest
	Sabatia capitata	Glade, Pine-Oak Woodlands
	Saxifraga caroliniana	Northern Hardwood Forest, Montane Acidic Cliff, High Elevation Rocky Summit
	Schlotheimia lancifolia	Oak-Hickory Forest, Acidic Cove Forest, Hemlock Hardwood Forest, Highlands Plateau, Gorge
	Scopelophila cataractae	Copper-rich Soils, Roadsides
	Scutellaria altamaha	Rock Outcrops, Woodlands
	Scutellaria arguta	Boulderfield Forest
	Scutellaria pseudoserrata	Rock Outcrops, Woodlands
	Scutellaria saxatilis	Northern Hardwood Forest, Boulderfield Forest, Rich Cove Forest
	Shortia galacifolia var. brevistyla	Acidic Cove Forest, Streambank, Gorge
	Shortia galacifolia var. galacifolia	Acidic Cove Forest, Streambank, Gorge
	Silene ovata	Rich Cove Forest, Mesic Oak-Hickory, Roadside
	Solidago simulans	High Elevation Granitic Dome
	Sphagnum flavicomans	Seeps on Rock or Spray Cliffs
	Sphenolobopsis pearsonii	Fraser-Fir Forest
	Splachnum pennsylvanicum	Southern Appalachian Bog
	Stachys clingmanii	Northern Hardwood Forest, Boulderfield Forest
	Sticta limbata	High Elevation Forest
	Taxiphyllum alternans	Spray Cliff, Mafic Rock
	Thalictrum macrostylum	Serpentine Woodland, Serpentine Forest
	Thaspium pinnatifidum	Southern Appalachian Bog
	Thermopsis fraxinifolia	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-Oak/Heath
	Tortula ammonsiana	Moist Montane Mafic Cliff
	Trillium pusillum var. pusillum	Rich Cove Forest

	Trillium rugelii	Rich Cove Forest at Low Elevation
	Trillium simile	Rich Cove Forest
	Tsuga caroliniana	Carolina Hemlock Forest, Montane Acidic Cliff, Pine-Oak/Heath, High Elevation Rocky Summit
	Viola appalachiensis	Serpentine Woodland, Serpentine Forest, Rich Cove Forest, Mesic Oak-Hickory
	Waldsteinia lobata	Acidic Cove Forest, Mesic Oak-Hickory, Gorge
	Xanthoparmelia monticola	High Elevation Rocky Summit

Attachment 3. Proposed, endangered, threatened, and sensitive terrestrial animal species considered.

*	Common Name	Scientific Name	U.S.	N.C.	NCNHP
Endangered and Threatened Species					
N	Noonday globe	*Mesodon clarki nantahala*	T	T	G?T?(G2T1)S1
	cool, wet areas under vegetation and leaf litter in the Nantahala Gorge				
N/P	Bog turtle	*Clemmys muhlenbergii*	T/SA	T	G3 S2
	sunlit, marshy meadows, bogs, wet pastures				
N/P	Carolina n. flying squirrel	*Glaucomys sabrinus coloratus*	E	E	G5T1S1
	large areas of mature spruce-fir and/or northern hardwoods above 4,000 feet				
N	Indiana bat	*Myotis sodalis*	E	E	G2 SUB
	roosts in hollow trees, under loose bark of trees in riparian areas and uplands; western Graham and northern Cherokee counties; west of Hwy. 19				
Sensitive Species					
N/P	A tiger beetle	*Cicindela ancocisconensis*	--	W3	G3 S3
	sand and silt deposits along streams and rivers				
P	A ground beetle	*Trechus carolinae*	--	W3	G1?S1?
	beneath rocks and moss in spruce-fir forest in the Black Mountains of Yancey County				
N	A ground beetle	*Trechus luculentus unicoi*	--	SR	G2T2?S2?
	under moss covered rocks in wet ravines and near seeps and springs above 3000'; apparently endemic to the Unicoi mountains of Graham county				
P	A ground beetle	*Trechus mitchellensis*	--	W3	G1?S1?
	beneath rocks and moss in spruce-fir forest; Mount Mitchell and Black Mountains				
N/P	A ground beetle	*Trechus rosenbergi*	--	W3	G1?S1?
	beneath rocks and moss in spruce-fir forest; Plott Balsam and western Great Balsam Mtns, Haywood and Jackson counties; known from Richland Balsam, Waterrock Knob				
P	A ground beetle	*Trechus satanicus*	--	W3	G1?S1?
	beneath rocks and moss in spruce-fir forest near Devil's Courthouse				

N/P	Divergent melanoplus	*Melanoplus divergens*	--	SR	G2G3S1S3
	grassy glades and balds, 1800' – 4717'; Jackson (Jones Knob), Henderson, Haywood counties				
N	Serrulate melanoplus	*Melanoplus serrulatus*	--	SR	G1G3S1S3
	grassy areas in valleys and lower slopes, Nantahala Mountains; e. Graham County				
N/P	Northern bush katydid	*Scudderia septentrionalis*	--	SR	G3? SH
	mature oak, hickory, maple forests				
N/P	Rock-loving grasshopper	*Trimerotropis saxatilis*	--	SR	G2G3S1S2
	lichen-covered rock outcrops, ¼ acre or more in size				
N/P	Frosted elfin	*Callophrys irus*	--	SR	G3 S2
	open woods and borders, usually in dry situations; host plants – lupines (*Lupinus*) and wild indigos (*Baptisia*)				
N/P	Diana fritillary butterfly	*Speyeria diana*	FSC	SR	G3 S3
	deciduous and pine woodlands, larvae feed on violets				
P	Regal fritillary butterfly	*Speyeria idalia*	FSC	SR	G3 SH
	large short to medium grass fields at low elevations				
N/P	Fraser fir angle	*Semiothisa fraserata*	FSC	SR	G2?S1S3
	spruce-fir forests with fraser fir				
P	A lampshade spider	*Hypochilus coylei*	--	SR	G3?S3?
	vertical or overhanging surfaces of rock outcrops and boulders near streams in deciduous or mixed forest; Buncombe, Henderson, Rutherford, Polk counties				
P	A lampshade spider	*Hypochilus sheari*	--	SR	G3G3S2S3
	vertical or overhanging surfaces of rock outcrops and boulders near streams in deciduous or mixed forest; Yancey, Buncombe, McDowell counties				
N	Lost Nant. cave spider	*Nesticus cooperi*	FSC	SR	G1G2S1
	fissure caves and other rocky habitats in and around the Nantahala Gorge				
P	A cave spider	*Nesticus crosbyi*	--	SR	G1?S1?
	high elevation rocky fissures in the Mt. Mitchell and Black Mountain areas				
P	A cave spider	*Nesticus mimus*	--	SR	G2S2?
	north-facing high elevation rock fissures in the Linville Gorge and Grandfather Mountain areas				
N	A nesticid spider	*Nesticus sheari*	--	SR	G2?S2?
	rocky coves; n-facing rocky slopes, also rich cove forest at all aspects; apparently endemic to Graham county (other sites south to Georgia); no specific records				
N/P	A nesticid spider	*Nesticus silvanus*	--	SR	G2?S2?
	rocky coves; n-facing rocky slopes, also rich cove forest at all aspects; apparently endemic to s. mountains of NC; (other sites along the B.R.P.); no specific records				
P	Tallus coil	*Helicodiscus triodus*	--	SR	G2S1?
	moist leaf litter				
N/P	Black mantleslug	*Pallifera hemphilli*	--	SC	G3 S2
	high elevation forests, mainly spruce-fir; Jackson, Swain counties; one site at Mt. Mitchell				

N/P	Glossy supercoil	*Paravitrea placentula*	--	SC	G3 S2
	leaf litter on wooded hillsides and ravines, Madison?, Mitchell, Swain; possibly throughout				
P	Bidentate dome	*Ventridens coelaxis*	--	SC	G3 S2
	moist leaf litter				
N/P	Santeetlah dusky sal.	*Desmognathus santeetlah*	--	SR	G3QS2S3
	stream headwaters and seepage areas; s.w. mtns.; hardwood, cove hardwood and spruce-fir; Great Smoky, Unicoi, Cheoah and Great Balsam Mountains				
N	Junaluska salamander	*Eurycea junaluska*	FSC	SC(PT)	G3QS2
	wider portions of streams below 2395'; Tululah, Snowbird and Santeetlah creeks, Cheoah River and tributaries; also new sites in Cherokee county				
N	Tellico salamander	*Plethodon aureolus*	--	SR	G2G3QS2
	hardwood forests in Unicoi Mountains with fallen logs, leaf litter and organic soil; far western Cherokee and Graham counties				
N/P	S. Appala. salamander	*Plethodon teyahalee*	--	W3	G2G3QS2
	moist forests, in southwestern mountains at all elevations; everywhere west of the French Broad				
P	Weller's salamander	*Plethodon welleri*	--	SC	G3S2
	hardwood forests above 3500 feet; only Flat Top Mountain, Mitchell County				
N/P	Peregrine falcon	*Falco peregrinus*	--	E	G4 S1B
	large vertical rock cliffs with ledges for nesting w/adequate bird prey				
N/P	Bald eagle	*Haliaeetus leucocephalus*	FSC	T	G5 S3B
	nests in large, open grown trees near lakes and rivers; three known nests				
N/P	Migrant loggerhead shrike	*Lanius ludovicianus migrans*	FSC	SC	G4T3QSUB
	large fields and pastures				
N/P	Appalachian bewick's wren	*Thryomanes bewickii altus*	E	FSC	G5T2QSHB
	woodland borders or openings, farmlands or brushy fields, at high elevations				
N/P	Rafinesque's big-eared bat	*Corynorhinus rafinesquii*	FSC	SC(PT)	G3G4 S3
	old buildings, caves, mines, bridges				
N/P	Southern rock vole	*Microtus chrotorrhinus car.*	FSC	SC	G4T3S3
	rocky areas (1/2 acre or more in size) in spruce-fir, n. hwds and grassy balds, above 2500'; Plott Balsams - GSMNP, Roan & Mt. Mitchell				
N/P	E. small-footed myotis	*Myotis leibii*	FSC	SC	G3SUB
	hemlock forests, rock crevices, caves, mines or buildings; possibly throughout				
N/P	Southern water shrew	*Sorex palustris punctulatus*	FSC	SC	G5T3S2
	small streams up to 12-15' wide w/ rhododendron cover above 3000'				

E, T, SC, SR - listed as endangered, threatened, special concern or significantly rare;

5.4 Appendix E – Age Class Distribution

R8 FSVeg - Age Class Distribution

Date Of Report: **September 11, 2008, 1:57 pm EST**

R8 FSVeg Home Main Menu Reports Menu

Admin Forest: 11 - North Carolina, District: 11 - Wayah

Acres for Suitable and UnSuitable Lands by Forest Type as of 2008.

Admin NF: **11** - North Carolina District: **11** - Wayah Compartments: **88,125,126,150,151,152**

This query will return Number of Stands = '194'.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
FT	**0**	**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**	**131-140**	**141-150+**	**Total**	**Percent**
3			21	54													75	2 %
8									72								72	2 %
10		6		40													46	1 %
41				22	28												50	1 %
45									21	10		20					51	1 %
50								30	126	36							192	3 %
52												20	15				35	1 %
53	13		25	221	16		16		148	368	336	448	494	393	497	6	2,981	44 %
55			2													17	19	1 %
56	38		131	219	117		15		633	892	404	225	267	48			2,989	44 %
59											92						92	2 %
60								20		5	43	65	43			41	217	4 %
Grand Totals																		
AC	51	6	179	556	161		31	50	1,000	1,311	875	778	819	441	497	64	6,819	**Total**
%	1	1	3	9	3		1	1	15	20	13	12	13	7	8	1	100	**Percent**

This report had 1 of 194 stands with Stand Condition Class= NonStocked and Land Class= UnSuitable for a total of 39.0 acres.

Note: Stands with Stand Condition Class of **01 In Regeneration** or **14 Seedling & Sapling Inadequately Stocked** are assigned to Age Class "0".
Stands with Stand Condition Class **15 Non-Stocked** are assigned to Age Class "0" for Suitable stands and not summarized for Un-Suitable stands.

Number of stands processed for this report = 194

List of Forest Types or Management Types used in this Report:

Code	Name
3	White pine
8	Hemlock-hardwood
10	White pine-upland hardwood
41	Cove hardwood - white pine - hemlock
45	Chestnut oak-scarlet oak-yellow pine
50	Yellow poplar
52	Chestnut oak
53	White oak-northern red oak-hickory
55	Northern red oak
56	Yellow poplar-white oak-northern red oak
59	Scarlet oak
60	Chestnut oak-scarlet oak
99	Brush species

Note: Stands with Stand Condition Class of **01 In Regeneration** or **14 Seedling & Sapling Inadequately Stocked** are assigned to Age Class "0".
Stands with Stand Condition Class **15 Non-Stocked** are assigned to Age Class "0" for Suitable stands and not summarized for Un-Suitable stands.

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