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

File Code: 1950
Date: November 29, 2007

Dear Interested Members of the Public and Forest Users:

Enclosed is the environmental assessment (EA) for the Macedonia Project on the Pisgah Ranger District, Pisgah National Forest. The project is located in Transylvania County. Four alternatives have been developed and are currently being analyzed; Alternative A – No Action, Alternative B – Proposed Action, Alternative C, and Alternative D. While Alternative C has been identified as the preferred alternative, a final decision has not been made yet. I am seeking your input before I reach a decision.

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

In accordance with 36 CFR 215.6(2)(4), comments must be postmarked or received within 30 days beginning the day after publication of this notice in *The Asheville Citizen-Times*. Oral or hand-delivered comments must be received within our normal business hours of 8:00 a.m. to 4:30 p.m. Comments may be mailed electronically, in a common digital format, to: comments-southern-north-carolina-pisgah-pisgah@fs.fed.us; regular mail to: Appalachian Ranger District, Attn: Michael Hutchins, P.O. Box 128, Burnsville, NC 28714; or faxed to 828-682-9179.

I encourage your participation during this 30-day notice and comment period on the EA. Following this 30-day notice and comment period, I will be publishing a decision. Pursuant to 36 CFR 215.11(a) and 215.15(a), my decision will initiate a 45-day appeal period.

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

Sincerely,

/s/*Randy Burgess*
RANDALL BURGESS
District Ranger

Enclosure

United States Department of Agriculture

Forest Service

November 2007

Environmental Assessment

Macedonia Project

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

Macedonia Project

Environmental Assessment

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

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CHAPTER 1 – PURPOSE AND NEED

1.1 Background

This proposal is located in the 6,994-acre Forest Plan Analysis Area (AA) Number 14, which includes Compartments 108, 109, 110, 111, 115, 116, 126, and 127 (project area) and is about 10 miles southwest of the Pisgah Ranger Station, Transylvania County (see Vicinity Map at end of document). Access to the project area is primarily via US Highway 64; North Carolina Highway 215; and State Roads 1324, 1325, 1326, and 1379.

1.1.1 Project Record

This environmental assessment (EA) tiers (40 CFR 1502.20) to the Final Environmental Impact Statement (FEIS) for the Forest Plan. This EA also incorporates by reference (1502.21) the project record. The project record contains specialist resource reports and other technical documentation used to support the analysis and conclusions in this EA. The specialist reports provide additional detailed analysis. This EA incorporates by reference the Nantahala and Pisgah Management Indicator Species (MIS) Report. This report along with Monitoring and Evaluation Reports for the National Forests in North Carolina contains the most current information about forest population trends for MIS species.

1.2 Proposed Action – Alternative B

The Proposed Action (Alternative B) was developed to meet the Purpose and Need (Section 1.3 below). Maps of the proposal are located at the end of the EA.

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

Table 1-1: Proposed Action – Alternative B

Stand	Acres (GIS)	Proposed Treatment	Logging System
Regeneration Harvest[1]			
111-04	16	Two Aged Regeneration[1]	Tractor
111-09	14	Two Aged Regeneration	Tractor
111-13	33	Two Aged Regeneration	Tractor
111-15	20	Two Aged Regeneration	Tractor
111-19	16	Two Aged Regeneration	Tractor
115-03	16	Two Aged Regeneration	Tractor
115-09	18	Two Aged Regeneration	Skyline
115-15	29	Two Aged Regeneration	Skyline
115-20	12	Two Aged Regeneration	Tractor
115-21	27	Two Aged Regeneration	Tractor
116-05	20	Two Aged Regeneration	Tractor
116-19	15	Two Aged Regeneration	Tractor
116-20	31	Two Aged Regeneration	Tractor
116-21	22	Two Aged Regeneration	Tractor
126-18	16	Two Aged Regeneration	Skyline
126-19	14	Two Aged Regeneration	Tractor
Total Regeneration	**319**		

Stand	Acres (GIS)	Proposed Treatment	Logging System
Intermediate Thinning[2]			
111-05	21	Intermediate Thinning[2]	Tractor
117-06	18	Intermediate Thinning	Tractor
Total Thinning	**39**		
Timber Stand Improvement			
111-03	19	Timber Stand Improvement	n/a
111-02	19	Timber Stand Improvement	
111-07	18	Timber Stand Improvement	
111-10	29	Timber Stand Improvement	
111-11	7	Timber Stand Improvement	
111-12	6	Timber Stand Improvement	
115-10	35	Timber Stand Improvement	
115-14	27	Timber Stand Improvement	
116-08	19	Timber Stand Improvement	
116-09	45	Timber Stand Improvement	
126-12	30	Timber Stand Improvement	
Total TSI	**254**		
Wildlife Habitat Improvement			
Access to 111-7	0.9	Linear Wildlife Opening	n/a
Access to 111-13	0.7	Linear Wildlife Opening	
Access to 116-05	0.5	Linear Wildlife Opening	
Total Wildlife Habitat	**2.1**		
Watershed Improvement			
111-05 & 111-04	7.0	Tucker Creek Stream Rehab	n/a
Total Watershed Improv.	**7.0**		

1 15-20 ft^2 residual basal area per acre. Harvesting would include developing about 15 acres total of log landings and skid roads within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested). Existing log landings and skid roads would be used where available. Skid roads and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction.

2 Treat white pine stumps with Sporax to control/manage annosus root rot

In addition, Alternative B would:

- Site prepare for natural regeneration with herbicide and hand tools on the 319 acres of two-aged harvest using Triclopyr ester and amine formulations with the cut stump and streamline application methods to ensure establishment of a satisfactory stand within 5 years after final harvest. All regenerated stands would be monitored for desired stocking density and species variety with a stocking survey conducted 3 – 5 growing seasons following site preparation.
- Release natural regenerated hardwoods on 319 acres with a 20% Triclopyr ester formulation by streamline application method 1 – 3 years following site preparation to control stump sprouts and nonnative invasive plants.
- Selectively apply herbicides to control/manage non-native invasive plant species along Forest Service roads (about 5 acres total; see also Table 2-3, Chapter 2).
- Construct approximately 0.7 miles of new system road; reconstruction and alignment of approximately 5.0 miles of existing Forest System Roads (FSR); construct 1.0 mile of temporary roads; and improve and add approximately 3.1 miles of existing old “woods” (non-system) roads to the Forest Road System to provide access for timber management

within Management Area (MA) 3B. These roads added to the transportation system would be improved and maintained to service level D standards (RMO D1 and D5) and would be closed to public vehicular use when management activities are complete. The current access management of the roads to be reconstructed would remain when management activities are completed. The temporary roads would be disked and seeded following management activities.

- Designate stands 111-22, 115-06, 115-19, 116-16, 117-03, and 126-04 as small patch old growth (338 acres).
- Develop approximately 2.1 acres of linear wildlife fields on the access roads to 111-7, 111-13, and 116-05 – access roads would be closed to motorized vehicles following project implementation.
- Perform Timber Stand Improvement (TSI) on 254 acres of natural hardwood regeneration to ensure desired stocking density, species variety and to control nonnative invasive species in 11 stands with hand tools and herbicide using Triclopyr amine and ester formulations applied with the cut surface and streamline applications to release crop trees.
- Reconstruct approximately 0.3 miles of existing fire line around Stand 12 in Compartment 111 for protection of a white pine progeny test. To provide protection to the progeny (young trees) area from wildfire. The existing fire line was constructed when the progeny test was established and is in need of refurbishment for it to be effective.
- Stabilize about ½ mile of stream channel within the Tucker Creek drainage in Stands 111-05 and 111-04. Stream rehabilitation is needed in Tucker Creek because of excessive levels of stream bank erosion and the lack of large wood in section of the proposed reach of stream.
- Repair damage near the drain on an earthen dam on a tributary to Tucker Creek near Stand 111-9—erosion of the dam is occurring around the outflow.

1.3 Purpose and Need

There is a need to develop between 5%-15% early-successional (0-10 year age class) wildlife habitat in the project area because there is currently no 0-10 year wildlife habitat (Forest Plan, page III-31). The purpose of the approximately 319 acres of two-age harvesting is to develop early-successional wildlife habitat in the project area and increase the amount of hard mast producing tree species (oaks and hickories), thus moving the AA towards the Forest Plan's desired future condition. The Macedonia area is the next area the Pisgah Ranger District has identified to ensure each compartment suitable for timber harvesting is scheduled for management analysis at a 10-year interval. Related to harvesting for wildlife habitat development, there is also a need to provide for a sustainable supply of timber products from within MA 3B designated lands because the last timber harvest project in the project area was more than 18 years ago.

There is a need to thin white pine stands within Compartments 111 and 117. The purpose of thinning the approximately 39 acres of white pine in Compartments 111 and 117 is to improve the vigor and growth of the residual so they are less susceptible to the attack of forest pests (Forest Plan, pages III-52 & III-75). Thinning removes damaged, suppressed, and unhealthy trees from the stand. The stumps of the harvested trees would be treated with Sporax (borax) to prevent new infections and slow the spread of annosus root rot. Harvesting approximately 358 acres by two-age and thinning would produce timber products for local and regional economies.

There is a need to effectively and efficiently control/manage competing vegetation in existing regeneration harvest stands and stands proposed for regeneration harvest with this proposal because competing vegetation reduces vigor and amount of desired tree species. The purpose of using hand tools and herbicides is to reduce competing vegetation within regenerated stands and improve vigor and growth of desired tree species, especially the oak and hickory hard mast species (Forest Plan, pages III-35 – III-37).

There is a need to efficiently and effectively control/manage populations of non-native invasive plants, especially near Tucker Creek because they have been found in the project area. The purpose of the herbicide treatment of non-native invasive plants is to reduce potential for spread of them in the project area (Forest Plan, page III-52).

There is a need to improve water quality and fish/wildlife (wetland) habitat along Tucker Creek and a tributary to Tucker Creek because there is a lack of large woody debris, erosion of stream banks, and encroachment of white pine upon a mountain bog. The purpose of improving habitat along Tucker Creek and a tributary Tucker Creek is to improve water quality, stream bank stability, and aquatic species habitat (Forest Plan, page III-42).

There is a need to designate small patch old growth communities in Compartments 111, 115, 116, 117, and 126 because no small patch old growth communities are currently designated in them. The purpose of designating small patch communities in Compartments 111, 115, 116, 117, and 126 prior to harvesting is to ensure there is a network of old growth communities across the Forest (Forest Plan, page III-27).

There is a need to develop additional acres of permanent grass/forb wildlife habitat in the project area because there are currently three acres of permanent grass/forb wildlife habitat. The purpose of the additional 2.1 acres of linear wildlife grass/forb wildlife habitat is to move the AA towards the desired condition of about 35 acres (Forest Plan, page III-23).

1.3.1 Forest Plan Direction

This proposal was developed to address management opportunities identified for timber, wildlife, and other forest resources within the project area. Management opportunities were identified through a comparison of existing conditions with desired current and future conditions defined by the General Direction and Standards for Management Areas in the Land and Resource Management Plan, Amendment 5, for the Nantahala and Pisgah National Forests (Forest Plan, USDA March 1994). The proposal is within Forest Plan AA 14, which includes the following management areas (MAs): 2C, 3B, 4A, 4C, and 18; however, timber harvest and stream/bog restoration would only be implemented within MAs 3B and MA 18 so they are described further.

The general direction and goals for **MA 3B** is to: *emphasize sustainable supply of timber with few open roads* while providing access for timber harvesting and to manage: *habitat needs of wildlife such as wild turkey, deer, a variety of small mammals, and other species that will benefit from a managed forest through regulating the growth and removal of trees through time* (Forest Plan, page III-71). Embedded within other MAs is **MA 18**; which: *consists of the aquatic ecosystem, riparian ecosystem and closely associated plant and animal communities* and is: *actively managed to protect and enhance, where possible, the distinctive resource values and characteristics dependent on or associated with these systems* (Forest Plan, page III-179).

Management Area 3B Forest Plan direction prescribes needed stand treatments to emphasize quality hardwood sawtimber as the primary product (Forest Plan, page III-75) and by applying

appropriate timber harvest methods to produce a continuous (sustainable) supply of sawtimber and other wood products (Forest Plan, page III-71).

There are no North Carolina Natural Heritage Areas, Forest Plan Special Interest Areas, Inventoried Roadless Areas, wilderness areas, or wild and scenic river designations in AA 14.

1.4 Public Involvement

A scoping package explaining the Macedonia Project was mailed to over 149 members of the public on August 21, 2007. An open house meeting was hosted by USDA Forest Service employees on September 4, 2007, at the Balsam Grove Community Center/Fire Hall to provide information and receive comments from members of the public. The proposal was listed in the Schedule of Proposed Actions in January, April, July, and October 2007.

Using comments received from the public, agencies, and organizations as well as internal review, the interdisciplinary team (IDT) developed a list of issues to address, alternatives to analyze, and developed a new preferred alternative that responds to these issues.

1.5 Issues

Issues are defined as a point of discussion, debate, or dispute about environmental effects. The Forest Service separated issues into two groups: significant and non-significant. Significant issues are used to develop alternatives or mitigation. All comments received during scoping have been reviewed and a determination on significance was made.

1.5.1 Water Quality (significant)

Constructing roads and stream crossings may impact water quality

- Number/type of stream crossings developed

1.5.2 Wetlands Habitat (significant)

Removing the existing dam may be better for the environment than repairing it

- Acres of wetlands restored

1.5.3 Prescribed (broadcast) Burning (significant)

The proposal does not use prescribed burning to improve wildlife habitat

- Considered but eliminated from detailed study because prescribed burning can be achieved under a separate analysis and extensive private lands in the analysis area reduce potential for effective implementation.

1.5.4 Old Growth (significant)

The proposal does not designate the most productive stands to small patch old growth

- Considered but eliminated from detailed study because proposed designations meet Forest Plan standards and coincide with proposed State natural heritage areas.

1.5.5 Non-native Invasive Plants/Herbicides (signifiant)

Eliminating autumn olive and multi-flora rose reduces songbird/small game habitat. Herbicide use may have adverse effects to the environment.

- Considered but eliminated from detailed study because national policy is to reduce non-native invasives. Herbicides are needed to effectively and efficiently manage/control non-native invasive plants

1.5.6 Cultural Resources (significant)

Constructing and reconstructing roads and logging related activities may impact cultural resources

- Acres harvested
- Miles of road added to the transportation system

1.5.7 Early Successional Habitat (ESH)

The proposal may not develop enough early successional wildlife habitat

- Non-significant because the proposal meets Forest Plan standards and guidelines for ESH—additional ESH is not needed to meet Forest Plan standards and guidelines.

1.5.8 Scenery Resources

Logging related activities may impact scenery resources

- Non-significant because the proposal would meet Forest Plan visual quality objectives (VQOs). Timber management activities are within modification VQOs.

1.5.9 Threatened, Endangered, Sensitive, Forest Concern, and Management Indicator Species

Proposed activities may impact TES, FC, or MIS flora and fauna

- Non-significant because the proposal would meet Forest Plan standards, policy, regulation, and law for these types of species.

1.5.10 Other Areas of Concern

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

- Non-significant – project does not propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment.

CHAPTER 2 – ALTERNATIVES

2.1 Range of Alternatives

The range of alternatives developed and analyzed by the interdisciplinary team (IDT) was driven by the purpose and need underlying the proposal (Chapter 1, Section 1.3), and by the issues responding to the proposal. An alternative should (1) reasonably respond to the purpose and need, and (2) address one or more significant issues. The only exception is the No Action Alternative, which is required by regulation [40 CFR 1502.14(d)].

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

2.2 Alternatives Considered in Detail

2.2.1 Alternative A – No Action

Under this alternative the actions the proposed actions (Chapter 1, Section 1.3) would not occur. This alternative serves as the environmental baseline for analysis of effects.

2.2.2 Alternative B – Proposed Action

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

2.2.3 Alternative C

This alternative was developed to address concerns with potential impacts to heritage resources and the development of new roads.

Table 2-1: Alternative C

Stand	Acres (GIS)	Proposed Treatment	Logging System
Two Aged Regeneration[1]			
111-04	6	Two Aged Regeneration[1]	Tractor
111-09	14	Two Aged Regeneration	Tractor
111-13	33	Two Aged Regeneration	Tractor
111-15	20	Two Aged Regeneration	Tractor
115-03	15	Two Aged Regeneration	Tractor
115-09	17	Two Aged Regeneration	Skyline
115-15	29	Two Aged Regeneration	Skyline
115-20	12	Two Aged Regeneration	Tractor
115-21	27	Two Aged Regeneration	Tractor
116-05	20	Two Aged Regeneration	Tractor
116-19	15	Two Aged Regeneration	Tractor
116-20	28	Two Aged Regeneration	Tractor
116-21	15	Two Aged Regeneration	Tractor
126-18	16	Two Aged Regeneration	Skyline
126-19	14	Two Aged Regeneration	Tractor
Total Regeneration	**281**		
Intermediate Thinning[2]			

Stand	Acres (GIS)	Proposed Treatment	Logging System
111-05	20	Intermediate Thinning[2]	Tractor
117-06	18	Intermediate Thinning	Tractor
Total Thinning	**38**		
Timber Stand Improvement			
111-03	19	Timber Stand Improvement	n/a
111-02	19	Timber Stand Improvement	
111-07	18	Timber Stand Improvement	
111-10	29	Timber Stand Improvement	
111-11	7	Timber Stand Improvement	
111-12	6	Timber Stand Improvement	
115-10	35	Timber Stand Improvement	
115-14	27	Timber Stand Improvement	
116-08	19	Timber Stand Improvement	
116-09	45	Timber Stand Improvement	
126-12	30	Timber Stand Improvement	
Total TSI	**254**		
Wildlife Habitat Improvement			
Access to 111-13	0.7	Linear Wildlife Opening	n/a
Access to 116-05	0.5	Linear Wildlife Opening	
Total Wildlife Habitat	**1.2**		
Watershed Improvement			
111-05 & 111-04	7.0	Tucker Creek Stream Rehab	n/a

1 15-20 ft^2 residual basal area per acre. Harvesting would include developing about 13 acres total of log landings and skid roads within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested). Existing log landings and skid roads would be used where available. Skid roads and log landings would be constructed using North Carolina Forest Practices Guidelines (FPGs) and Forest Plan standards (best management practices or BMPs). Following harvest activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction.

2 Treat white pine stumps with Sporax to control/manage annosus root rot

In addition, Alternative C would:

- Site preparation for natural regeneration with herbicide and hand tools on the 281 acres of Two-Aged harvest using Triclopyr ester and amine formulations with the cut stump and streamline application methods to ensure establishment of a satisfactory stand within 5 years after final harvest. All regenerated stands would be monitored for desired stocking density and species variety with a stocking survey conducted 3 – 5 growing seasons following site preparation.
- Release natural regenerated hardwoods on 281 acres with a 20% Triclopyr ester formulation by streamline application method 1 – 3 years following site preparation to control stump sprouts and nonnative invasive plants.
- Selectively apply herbicides to control/manage non-native invasive plant species along Forest Service roads (about 5 acres total; see also Table 2-3 below).
- Construct approximately 0.7 miles of new system road; reconstruction and alignment of approximately 5.0 miles of existing Forest System Roads (FSR); construct 0.8 mile of temporary roads; and improve and add approximately 2.5 miles of existing old “woods” (non-system) roads to the Forest Road System to provide access for timber management

within Management Area 3B. These roads added to the transportation system would be improved and maintained to service level D standards (RMO D1 and D5) and would be closed to public vehicular use when management activities are complete. The current access management of the roads to be reconstructed would remain when management activities are completed. The temporary roads would be disked and seeded following management activities.

- Designate stands 111-22, 115-06, 115-19, 116-16, and 117-03, 126-04 as small patch old growth (338 acres).
- Develop approximately 1.2 acres of linear wildlife fields on the access roads to 111-13, and 116-05 – access roads would have an RMO D5 and would be closed to motorized vehicle, horses and bicycles following project implementation.
- Perform Timber Stand Improvement (TSI) on 254 acres of natural hardwood regeneration to ensure desired stocking density, species variety and to control nonnative invasive species in 11 stands with hand tools and herbicide using Triclopyr amine and ester formulations applied with the cut surface and streamline applications to release crop trees.
- Reconstruct approximately 0.3 miles of existing fire line around Stand 12 in Compartment 111 for protection of a white pine progeny test. To provide protection to the progeny (young trees) area from wildfire. The existing fire line was constructed when the progeny test was established and is in need of refurbishment for it to be effective.
- Stabilize about ½ mile of stream channel within the Tucker Creek drainage in Stands 111-05 and 111-04. Stream rehabilitation is needed in Tucker Creek because of excessive levels of stream bank erosion and the lack of large wood in section of the proposed reach of stream.
- Repair and restore bog habitat near Stand 111-9 by pulling the existing and failing earthen dam back far enough to preclude further silt entry into the stream (10' minimum). This task would require hand tools or a small machine (Dingo, Bobcat, etc.) to accomplish. Place several log structures into the lower reach of the stream so that water flow would exit into the wetlands and create improved habitat for wetlands plant species present and increase potential for bog turtle (*Clemmys muhlenbergii*) utilization.

2.2.4 Alternative D

This alternative was developed to address comments received during scoping and IDT involvement.

Table 2-2: Alternative D

Stand	Acres (GIS)	Proposed Treatment	Logging System
Two Aged Regeneration[1]			
111-04	6	Two Aged Regeneration[1]	Tractor
111-15	20	Two Aged Regeneration	Tractor
115-09	17	Two Aged Regeneration	Skyline
115-21	27	Two Aged Regeneration	Tractor
116-05	20	Two Aged Regeneration	Tractor
116-19	15	Two Aged Regeneration	Tractor
116-20	28	Two Aged Regeneration	Tractor
116-21	15	Two Aged Regeneration	Tractor
126-18	16	Two Aged Regeneration	Skyline
126-19	14	Two Aged Regeneration	Tractor
Total Regeneration	**178**		

Stand	Acres (GIS)	Proposed Treatment	Logging System
Intermediate Thinning[2]			
111-05	20	Intermediate Thinning[2]	Tractor
Total Thinning	**20**		
Timber Stand Improvement			
111-03	19	Timber Stand Improvement	n/a
111-07	18	Timber Stand Improvement	
111-10	29	Timber Stand Improvement	
115-10	35	Timber Stand Improvement	
115-14	27	Timber Stand Improvement	
116-08	19	Timber Stand Improvement	
116-09	45	Timber Stand Improvement	
126-12	30	Timber Stand Improvement	
Total TSI	**222**		
Watershed Improvement			
111-05 & 111-04	7.0	Tucker Creek Stream Rehab	n/a

1 15-20 ft^2 residual basal area per acre. Harvesting would include developing about 8 acres total of log landings and skid roads within harvest units (about 1 acre of log landings and skid roads for each 25 acres harvested). Existing log landings and skid roads would be used where available. Skid roads and log landings would be constructed using North Carolina FPGs and Forest Plan standards (BMPs). Following harvest activities, unsurfaced skid roads and log landings would be disked and seeded with an appropriate seed mix to reduce potential for sedimentation and compaction.

2 Treat white pine stumps with Sporax to control/manage annosus root rot

In addition, Alternative D would:

- Site prepare natural regeneration with herbicide and hand tools on the 178 acres of Two-Aged harvest using Triclopyr ester and amine formulations with the cut stump and streamline application methods to ensure establishment of a satisfactory stand within 5 years after final harvest. All regenerated stands would be monitored for desired stocking density and species variety with a stocking survey conducted 3 – 5 growing seasons following site preparation.
- Release natural regenerated hardwoods on 178 acres with a 20% Triclopyr ester formulation by streamline application method 1 – 3 years following site preparation to control stump sprouts and nonnative invasive plants.
- Selectively apply herbicides to control/manage non-native invasive plant species along Forest Service roads (about 5 acres total; see also Table 2-3 below).
- Reconstruct and realign approximately 5.0 miles of existing FSRs and construct 1.1 miles of temporary roads. The current access management of the roads to be reconstructed would remain when management activities are completed. The temporary roads would be disked and seeded following management activities.
- Designate stands 111-22, 115-06, 115-19, 116-16, and 117-03, 126-04 as small patch old growth (338 acres).
- Perform TSI on 222 acres of natural hardwood regeneration to ensure desired stocking density, species variety and to control nonnative invasive species in 8 stands with hand tools and herbicide using Triclopyr amine and ester formulations applied with the cut surface and streamline applications to release crop trees.

- Stabilize about ½ mile of stream channel within the Tucker Creek drainage in Stands 111-05 and 111-04. Stream rehabilitation is needed in Tucker Creek because of excessive levels of stream bank erosion and the lack of large wood in section of the proposed reach of stream.
- Repair damage near the drain on an earthen dam on a tributary to Tucker Creek near Stand 111-9—erosion of the dam is occurring around the outflow.

2.3 Alternatives Considered but Eliminated from Detailed Study

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

2.3.1 Alternative 1 – Prescribe (broadcast) Burn within the Analysis Area

This alternative proposed to prescribe burn within the analysis area (AA). It was eliminated from detailed study because prescribed burning is not necessary to meet the purpose and need for the proposal. A separate analysis could be completed in the future that authorizes prescribed burning.

2.3.2 Alternative 2 – Increase Amount of Wildlife Openings

This alternative proposed to increase the amount of wildlife openings than currently exists in the AA. It was eliminated from detailed study because the North Carolina Wildlife Resources Commission is concerned about managing any additional wildlife fields due to unauthorized all-terrain-vehicle (ATV) use in the area.

2.3.3 Alternative 3 – Retain Autumn Olive/Multi-flora Rose and Do Not Use Herbicides for Non-native Control/Management

This alternative proposed to retain non-native invasive autumn olive and multi-flora rose for wildlife species and did not propose to use herbicides to control/manage non-native invasive species in the AA. It was eliminated from detailed study because it does not comply with Forest Plan and national direction for reducing the spread of non-native invasive plants. Herbicides are needed to effectively and efficiently control/manage non-native invasive plants. Use of herbicides would be pursuant to product labels, material data safety sheets (MSDSs), and pesticide risk assessments (see also Section 3.4, Chapter 3 below).

2.3.4 Alternative 4 – Designate New Small Patch Old Growth Locations

This alternative proposed to locate small patch old growth in different locations than the areas proposed in Alternatives B, C, and D. It was eliminated from detailed study because the existing proposal meets Forest Plan direction and overlaps with a State proposed natural heritage area. Designating different areas for small patch old growth than those proposed is difficult in the AA due to fragmentation between NFS lands and private lands.

2.3.5 Alternative 5 – Decommission System and Non-system Roads Not Needed for Long-term Transportation/Forest Management

This alternative proposed to decommission existing roads in the AA not needed for long-term transportation management. It was eliminated from detailed study because existing road system is needed for long term management of the area and therefore no potential for decommissioning current system roads exists. There is potential for decommissioning a non-system road adjacent

to an un-named tributary in Compartment 111, stands 1 and 5 (about ¾ miles) that may not be needed for long-term management. These actions would be analyzed in a separate NEPA document.

2.4 Project Design Features and Monitoring Common to Action Alternatives

2.4.1 Project Design Features

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

1. Directionally fell trees to reduce potential for them to fall across stream channels. Where trees accidentally fall across stream channels (that prevent or block stream flow), they would removed (pulled). These removals would be perpendicular to the stream channel whenever possible to minimize stream bank disturbance. Bare soil would be seeded and mulched if native vegetation does not start to recolonize the area by the time timber removal from the unit is complete.
2. Skid roads should avoid stream crossings and paralleling perennial channels within designated riparian areas.
3. Landings and skid roads would be vegetated within two weeks after use to avoid off-site soil movement.
4. Temporary roads (if needed) would be constructed to avoid runoff into area streams. In addition, silt fence, straw bales, or brush barriers would be placed along the length of the road where it parallels or crosses a stream as needed to control runoff and stream sedimentation.
5. Exclude a portion of Stand 126-19 from road construction and timber harvest to protect the Forest Concern plant species *Canoparmelia amablis*.
6. For hard mast, marking guidelines would include the following priority residual tree species: white oak, red oak, hickory, black oak, and chestnut oak, where they occur. For soft mast, retain two 12" or greater diameter black gum trees every 10 acres. In addition dogwood, service berry, and holly trees would be retained where these species occur.
7. Establish irregular shaped openings and avoid straight lines or geometric forms except where necessary along landlines.
8. Limit linear distance of created openings adjacent to open roads to a 500-foot maximum. In stand 111-04, this would be achieved by retaining groups of mid-story hardwood trees where possible along SR 1325.
9. Burn or lop and scatter slash to within 4 feet of the ground for 50 feet beyond edge of open roads.
10. Where possible, do not locate landings adjacent to open roads. Where seen within 1,000 feet from open roads, scatter residual logging debris around log landings within 4 feet of ground, or accomplish through firewood utilization.
11. Screen or blend in visible landings, system roads, temporary roads, skid roads, and skid trails, through seeding, planting, or maintaining existing vegetative screen.

2.4.2 Monitoring

The following monitoring is specific to the action alternatives:

1. Areas would be identified to monitor control efforts as part of our efforts to meet national objectives of reducing impacts from invasive species and improving the effectiveness of treating selected invasive species on the Nation's forests and grasslands. Survey areas would be identified before treatment, checked during treatment, and after treatment. A post-treatment evaluation report would be completed and filed in the project file. Based on the monitoring results, follow-up treatments may be needed to meet objectives.

2.5 Summary Comparison of Actions by Alternative

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

Table 2-3: Management Activities by Alternative

Activity	Alternative[1]			
	A	B	C	D
Two-age harvest	0	319	281	178
Intermediate thinning harvest	0	39	38	20
Total Harvest	**0**	**358**	**319**	**198**
Site preparation of regenerated stands with herbicide	0	319	281	178
Release natural regenerated hardwoods with herbicide	0	319	281	178
Timber stand improvement by herbicides and manual methods (if needed)	0	254	254	222
Treat white pine stumps with Sporax (borax)	0	39	38	20
Control/manage existing non-native invasive plant species along haul routes and haul routes adjacent to existing and proposed harvest stands with herbicide. Prior to harvest, treat non-native invasive plants along FSRs adjacent to harvest stands with herbicides and/or manual methods.	0	5	5	5
Designate small patch old growth	0	338	338	338
Temporary roads converted to linear wildlife openings	0	2.1	1.2	0
Reconstruct existing fire line around Stand 111-12 (miles)	0	0.3	0.3	0
Stabilize about ½ mile of stream channel within Tucker Creek drainage in Stands 111-4 and 111-5 (includes bog restoration)	No	Yes	Yes	Yes
Repair damage near drain on an earthen dam on a tributary to Tucker Creek	No	Yes	No	Yes
Remove earthen dam on a tributary to Tucker Creek	No	No	Yes	No
Reconstruct existing system roads (miles)	0	5	5	5
Construct new system road (managed as closed following project implementation) (miles)	0	0.7	0.7	0
Improve non-system roads and add them to the Forest Transportation System (miles)	0	3.1	2.5	0
Construct temporary roads (ripped, seeded, and closed following harvest activities) (miles)	0	1	0.8	1.1

1 Measurements are in acres unless specified otherwise

CHAPTER 3 – ENVIRONMENTAL CONSEQUENCES

The following table displays past, present, and reasonably foreseeable future actions within and near the Macedonia AA that would be accounted for in cumulative effects as appropriate by resource analysis (parameters for actions were determined by resource specialists for each activity):

Table 3-1: Past, Present, and Reasonably Foreseeable Future Actions within the Macedonia AA

Activity	Description
Timber Harvesting	No timber harvesting in more than 18 years
Road Maintenance	Periodic general maintenance (i.e. blading, ditch clearing, culvert cleaning) on about 9.2 miles of open system roads and about 10.3 miles of closed system roads
Private Lands	Increased development over the past 20+ years (rural home sites, farmlands, woodlands)
	Pisgah Astronomical Research Institute (PARI) in Compartment 116
Wild Fires	No wild fires in more than 8 years
Non-native and/or Invasive Species	Unauthorized release of wild pigs in the AA, especially Compartment 116
	Continued spread of non-native invasive plants
Special Uses	Outfitter-guides on North Fork French Broad River
Prescribed Burning	No prescribed burning in the past 18 years
Recreation	Unauthorized all-terrain-vehicle (ATV) use
	Hiking/hunting/equestrian use throughout the AA
Wildlife Habitat Improvement	Periodic mowing on about 26 acres of existing grass/forb habitat

3.1 Hydrology and Aquatic Habitat

3.1.1 Existing Condition

Existing data for aquatic resources within the aquatic AA is used to the extent it is relevant to the project proposal. This data exists in two forms: 1) general inventory and monitoring of Forest aquatic resources; and 2) data provided by cooperating resource agencies from aquatic resources on or flowing through the Forest. Both of these sources are accurate back to approximately 1980 and are used regularly in project analyses. Data collected prior to 1980 is used as a historical reference. Project-specific surveys are conducted to obtain reliable data where none exists.

Substrate within the activity area waters (Table 3-2) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for proposed threatened, endangered, and sensitive (TES) species, management indicator species (MIS), as well as other aquatic organisms. Un-named tributaries are listed as (UT).

Table 3-2: Forest Plan Watershed 31 (North Fork French Broad River)

Stream Name	Compartment/ Stand	Miles in Project Areas	Miles in Analysis Area	Classification*
Jake Branch	111 (15), 111 (13)	0.34	0.95	C;Tr
Tucker Creek	111 (5), 111 (4)	0.53	4.39	C;Tr

Stream Name	Compartment/ Stand	Miles in Project Areas	Miles in Analysis Area	Classification*
UT Tucker Creek 1	117 (6)	0.03	0.61	C;Tr
UT Tucker Creek 2	111 (5), 111 (4)	0.19	0.34	C;Tr
Lamance Creek	116 (5)	0.38	2.5	C;Tr
UT Lamance Ck 1	116 (21), 116 (5)	0.11	0.94	C;Tr
UT Lamance Ck 2	116 (5)	0.19	0.53	C;Tr
North Fork of French Broad		0.0	7.23	B
Long Branch	116 (3), 115 (10)	0.38	1.89	C;Tr
UT Long Branch	116	0.5	0.9	C;Tr
Spice Cove	115 (21), 115 (14)	0.34	0.79	C;Tr
UT Spice Cove	115 (20)	0.25	0.5	C;Tr
Diamond Creek	126 (19)	0.15	2.99	C;Tr
Bynum Branch	126 (10)	0.23	0.76	C;Tr
Total		**3.62**	**25.32**	

*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. "Tr" denotes waters that support trout. The "B" classification indicates waters that are primarily for recreation.

In the Macedonia AA, landforms can be characterized as Valley Types I, II, and VIII using the Rosgen (1996) classification. Typical for these valley types, the Macedonia AA has predominantly stable stream types characterized as A, B, C, and E, depending on the valley type that they occur in. Within a reach of Tucker Creek (a tributary to the North Fork French Broad River) stream bank stability is moderate over all within the C4 stream type. In several locations in this reach stream bank erodibility is high, due mostly to the lack of vegetation on stream banks. Where unstable channel conditions occur in Tucker Creek, stream rehabilitation is proposed (within approximately ½ mile of stream) to improve channel stability and aquatic habitat. Implementation of this work is expected to reduce sediment loading from the reach to near background (undisturbed) levels. Rates of erosion from stream banks following this type of work are estimated to decrease by 91 percent, based on forest monitoring of storm recovery work implemented during 2006 and 2007.

Existing old roads and skid roads in the activity areas and the ford in Spice Cove Creek are existing threats to the streams and drainages within the Macedonia AA. Impacts from these sources are limited to down slope movement of sediment from road runoff and culvert fills. In most cases, it is suspected that a majority of sediments from these sources are deposited in the natural vegetative filters before they reach areas of perennial streams. The ford located in Spice Cove Creek is currently stable and has little to no off-site movement of soil entering into the stream.

An existing non-system road that accesses Stand 115-03 has drainage issues that are causing some off-site movement of soil to occur. This access road is not associated with any perennial streams; however, during large storm events, ephemeral drainages have the potential to carry sediments into flowing streams. The action Alternatives B & C would address the issues associated with this road prior to harvesting Stand 115-03. There is one crossing on Long Branch Road (FSR 5074) that was identified as undersized and causing some erosion issues into an un-named tributary to Long Branch. The action alternatives would address the issues associated with this crossing.

3.1.2 Effects Analysis

This discussion assumes all Forest Service timber sale contract clauses, North Carolina BMPs, and any other required management practices relating to water quality would be implemented successfully. Should an implemented contract clause or BMP fail during project implementation, immediate corrective action should be taken to reduce impacts to aquatic resources.

Effects are disclosed below for 1) access on aquatic resources; 2) timber harvest on aquatic resources, water quality, and riparian areas; and 3) effects of other resources (herbicide use, Tucker Creek stream habitat enhancement, fire line reconstruction, and bog enhancement).

3.1.2.1 Effects of Access on Aquatic Resources

Alternative A – No Action

Implementation of the no action alternative would perpetuate the existing condition described above. Aquatic habitat quality, quantity, and populations would continue in their natural dynamic patterns. It is important to note that natural processes include aspects such as extinction of species and loss of habitat types. There would be no impacts upon the one Sensitive species or the eight Forest Concern (FC) species. The existing condition of this road is described above. If the no action alternative is selected, off site movement of soil would continue to cause degradation in the unnamed tributary to Long Branch because of the inadequate stream crossing associated with Long Branch Road.

Alternatives B & C

Alternatives B & C are discussed together because both alternatives require two stream crossing replacements.

Direct Effects: There are two existing stream crossings associated with access in Alternatives B & C (FSR 474 and non-system road accessing Stand 115-20) that need to be replaced. One crossing is on an un-named tributary to Spice Cove Creek which would be replaced with a "squash pipe" or a pipe that would be set into the stream bed to simulate a natural stream bottom within the culvert. The other crossing is an existing 24 inch diameter pipe that is undersized or too small. A flow analysis would be conducted to determine the appropriate size of the replacement pipe. Twenty-six linear feet of stream bed would be directly impacted by the installation of pipes at each of these crossings.

During the culvert installations, there would likely be a temporary fluctuation of turbidity within the un-named tributaries to Spice Cove Creek and Long Branch. Temporary fluctuations of sediment would be up to 48 hours after installation. This turbidity would be minimized by the implementation of Best Management Practices (BMPs) and Forest Practice Guidelines (FPGs). As a result, no measurable direct adverse impacts to aquatic habitat or organisms are expected to occur from the improvement of access into the area.

The road drainage on all temporary roads within the activity area would be designed so water flows off the road bed and enters into vegetation rather than directly into activity area streams. Following harvest activities, all unsurfaced temporary roads, skid roads, and log landings would be disced and seeded.

Indirect Effects: A small quantity of sediment may enter UT Spice Cove Creek and UT Long Branch during culvert installation; however, these effects would not be measurable

approximately 75 feet below the crossing. The effects of the culvert installations would be minor because any disturbed soil would be seeded and mulched within one working day of completion of construction; therefore, very little sediment is expected to enter the streams. Effects from the culvert installation would be immeasurable at the confluence with Spice Cove Creek and Long Branch respectively because the culvert installations would occur several hundreds of feet above the confluence. Additional culverts may be installed within AA waters as needed. The effects of these culverts would be the same as described for the culvert installations within UT Spice Cove Creek and UT Long Branch.

Sedimentation from the culvert installations may reduce the quality of the coldwater stream's habitats within the above mentioned tributaries by partially filling pools. These effects may persist until the next bank full flow event (the flow event which occurs approximately every 2.5 years). These effects would affect approximately 0.06 miles of the approximately 24 miles (1.4%) of coldwater streams within the aquatic AA.

If soil disturbance occurs during skidding operations, temporary stream crossings should be used across ephemeral channels to avoid the potential for sedimentation of aquatic resources down slope. These crossings could include the use of temporary bridges (e.g. simple log stringers or pre-fabricated decking), culverts, or channel armor (e.g. stone or brush). There may be off-site movement of soil into activity area waters from temporary road construction and drainage culvert placements.

Turbidity and sediment loading can cause mortality by injuring and stressing individuals or smothering eggs and juveniles. Available habitat, including the interstitial space within substrate used as spawning and rearing areas, may temporarily be covered with sediments. This loss of individuals would be so minimal within the entire analysis area that it would not cause the decline of population trends and would not be a cause for viability to change on National Forests. The project design for the Macedonia Project minimizes sedimentation therefore; less mobile species that are affected by the implementation of this project would recolonize. Episodic fluctuations in turbidity may occur after soil disturbance ends because sediments deposited within the stream bed may be re-suspended during high flow events (Swank *et al*. 2001). Larger, more mobile aquatic species, such as fish are able to temporarily escape the effects of sedimentation by leaving the disturbed area. Over time, these species would recolonize areas as habitat conditions improve. This usually occurs after vegetation has reestablished and sediments are flushed through the system by storm events.

Alternative D

Direct & Indirect Effects: The discussion above would be the same for Alternative D except no culvert installation would be required to access Stand 115-20 because this stand would not be harvested. Alternative D would have less potential to impact aquatic habitat than Alternatives B & C because this crossing would remain undisturbed.

3.1.2.2 Effects of Timber Harvest on Aquatic Resources, Water Quality, and Riparian Areas

Alternative A – No Action

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

Alternatives B, C, & D

Direct & Indirect Effects: Action Alternatives B, C, and D have been discussed together in regards to impacts to aquatic resources because riparian buffers have been delineated so that no impact to aquatic habitat would occur from harvest activities. In general, the greatest risk to aquatic resources is associated with access to the stands, which has been discussed above.

There is slightly more potential for impacts from timber harvesting in Alternative B than Alternatives C or D because Alternative B harvests 39 more acres than Alternative C and 160 more acres for than Alternative D. Alternative C has slightly more potential for impacts from timber harvesting than Alternative D because Alternative C harvests 121 more acres than Alternative D. However, North Carolina Forest Practices Guidelines (NC-FPGs) and Forest Plan standards (BMPs) would be implemented during harvest activities. Applications of Forest Plan standards are intended to meet performance standards of the state regulations. Visible sediment derived from timber harvesting, defined by state regulations, should not occur unless there is a failure of one or more of the applied erosion control practices. Should any practice fail to meet existing regulations, additional practices or the reapplication of existing measures would be implemented as specified by state regulations. According to the NC Forestry BMP Implementation survey 2000 thru 2003: [i]*mplementation of BMPs is critical in protecting water quality*. Monitoring of the BMP structures on the English White Pine Project (on the Pisgah National Forest) occurred during a two inch rain event in the summer of 2007. Straw bales, mulching and seeding had been installed two weeks prior to the event. The stream adjacent to the activity area was flowing clear and void of sediment from the associated activities; indicating that effective implementation of NC-FPGs and BMPs greatly reduces potential for adverse impacts on streams.

Within white pine stands 111-04 and 111-09, it was determined by an interdisciplinary team (IDT) that the riparian areas would benefit from removal of the majority of the white pine to within 30 feet of the associated streams (Forest Plan, page III-181). Hardwood leaf litter is more beneficial to aquatic organisms, including fish, because the leaf litter provides more nutrients into the aquatic ecosystem (Benfield and Webster, 1985). According Patricia Fleebe, USDA Forest Service Aquatic Research Scientist, [p]*ine needles are slow to break down and are of poor quality for decomposers, so they don't really benefit fish. Ideal is to have a mix of species that provide food sources throughout the year* (personal communication, 2007).

Other than in the white pine stands, there is no plan to harvest within any 100 foot riparian area of perennial streams within the Macedonia Project area. According to the Forest Plan: *Under these conditions, no increase in water temperature is anticipated under any of the alternatives. Since riparian-area treatment is not expected under any alternatives, availability of woody debris would be positively influenced if there was no harvest anywhere within the riparian zone on each streambank* (Vol. 1, page IV-36). All of the culvert installations for this project are associated with existing roads and therefore would not cause any disturbance to the existing riparian vegetation.

Water quality is not expected to be adversely affected because Forest Plan standards (BMPs) and NC-FPGs are followed, and timber sale contract clauses are implemented. Stream temperatures would not be adversely affected because adequate shade would be maintained along perennial and intermittent streams. In the past, the implementation of NC-FPGs and BMPs have protected streams during similar past actions. Long-term adverse impacts from these similar past actions

have not been apparent. When failure of any BMP or NC-FPG has occurred it has been corrected immediately.

3.1.2.3 Effects of Other Activities

Alternative A

Herbicide Use: Non-native invasive plants would likely continue to invade riparian vegetation without treatment of these species within the Macedonia AA.

Tucker Creek Stream Enhancement: Under this alternative, channel stabilization actions would not occur. Erosion of the river's stream banks would continue to contribute sediment to the Tucker Creek, negatively affecting aquatic habitat. With Alternative A, pool habitat enhancement would not occur. White pine would continue to be the dominant overstory. Over time, large woody debris would contribute to habitat when the white pine declined because of age or disease.

Fire Line Reconstruction: No fire line reconstruction would take place with Alternative A.

Bog Habitat Enhancement: No bog habitat enhancement would occur as a result of Alternative A. Eventually, the earthen dam that is currently at the outlet of the bog would erode away sending sediment into Tucker Creek. These sediments have the potential to fill interstitial space and thus habitat for aquatic organisms.

Alternatives B, C, & D

Herbicide Use: 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, Triclopyr, or Sporax from reaching the LC_{50} (Lethal Concentration at which 50% of the organisms suffer mortality) for any aquatic species (VM-FEIS) because the pesticides 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 sub lethal effects described above. Activity area streams would be protected by a 30 foot buffer (minimum) which would prevent the concentrations of these herbicides from accumulating within the activity area streams in measurable quantities. There would be no effects to coldwater streams community because the amount of pesticides in activity area waters would be immeasurable.

Tucker Creek Stream Enhancement: The action alternative would have direct short-term ($\leq$1 year) adverse effects on turbidity and fine sediment mobilization, but positive, indirect effects on

hydrology and water quality of the Tucker Creek in the long-term (>1 year). Constructed structures would redirect stream flow away from stream banks, where it is causing erosion, and back into the middle of the channel. Stream banks would be sloped back to a stable angle upstream and downstream of each vane where practical. Stream banks would be seeded, mulched, and planted with native riparian vegetation.

Vane structures would be installed to work with the existing streambed form of the channel. Therefore, location of the vanes would generally coincide with existing riffle and pool habitats. Much of the bed material removed from the channel during construction would be placed on the upstream side of the vanes against the stream bank to enhance the deposition that would naturally occur there. The areas along the bank, both upstream and downstream of the vanes, would fill in after construction as deposition occurs over the years. By doing so, the channel would narrow and generally improve water quality and aquatic habitat. A narrower channel would be deeper and less prone to water temperature warming. Pools and riffles would be well defined and of better quality than currently at the site.

The vanes are not likely to increase peak flow levels or the risk of flooding since they are designed to increase channel efficiency. Following construction of the vanes, the wetted channel width at low flow is expected to narrow by approximately six feet on average and deepen by about 0.2 feet. As a result, stream flow velocity is expected to increase slightly through the reach. Based on the general USGS safety standard (depth x velocity less than six) the summertime average flows would be safe for wading. The need for public river safety education would not increase with this alternative.

Additionally, the proposed vane and the associated bank work would help stabilize the channel of Tucker Creek. Stabilizing the bank would reduce the existing chronic source of sediment, improve aquatic habitat, and establish riparian vegetation. A short-term pulse of sediment created from the construction of the vanes is expected (about 48 hours after installation), but would be outweighed by the long-term benefit of a stable stream channel. Implementation of Forest Plan standards and guidelines requiring erosion control while working in riparian areas would further reduce sediment input.

Fire Line Reconstruction: Action Alternatives B & C include the reconstruction of a 0.3 mile fireline around Stand 111-12. This reconstruction would take place adjacent to a UT to Jake Branch. No sediments are expected to enter into the stream as a result of this reconstruction because water bars would be reshaped and would turn water back into the stand during large rain events. In areas where the reconstruction gets within 30 feet of the unnamed tributary, straw bales, silt fencing or other BMPs would be put in place. Alternative D does not perform this activity.

Bog Habitat Enhancement: The action alternatives include a plan to improve an existing bog located adjacent to Tucker Creek. Repairing or removing the earthen dam in 111-09 may cause a temporary increase in sediments which can be minimized using BMPs such as straw bales within the channel. Once the work to the earthen berm is complete, all exposed soil would be seeded with native grasses or other native plants.

3.1.2.4 Cumulative Effects

Cumulative effects on aquatic species and habitat are the integration of any direct or indirect effects into the existing condition—and include past, present, and future actions, including those not occurring on NFS lands. Most often, cumulative effects are seen as either a degradation or

improvement of an already impacted situation, but they can also be the first step in the degradation or improvement process. Cumulative effects on aquatic habitats and populations from management activities can be positive or negative, depending on the nature of the proposed actions and site-specific conditions.

Alternative A

As there are no direct or indirect cumulative effects with Alternative A, there would be no cumulative effects.

Alternatives B, C, & D

Expected cumulative effects should not be any greater than the direct and indirect effects disclosed above for each alternative and there should be no adverse cumulative effects to AA aquatic resources, based on the project's design features included in this analysis.

Remnants of the past timber activities where access was associated with the projects are in many cases on-going contributors to adverse impacts to aquatic resources. In general, undersized culverts and degraded stream crossings cause constant sources of problems for aquatic resources including unstable stream banks and channelization. Within the AA for Macedonia, solutions to these problems have been addressed. There are places within riparian areas of this project area that have historically been harvested. However, as these areas continue to grow older, conditions should improve as large woody debris input into analysis area streams returns to a more natural state.

Activities on adjacent private lands, downstream of USFS property, have the potential to affect aquatic habitat within the watersheds associated with the Macedonia Project. These include residential development within the Balsam Grove Community which includes agriculture. Many sections of the lower reaches of the analysis area streams have little to no vegetation on the stream banks causing off site movement of soil and degraded habitat availability for aquatic organisms. Existing trout farms are sources of sediments and nutrients into the aquatic analysis area. The proposed action alternatives are not expected to cause long term impacts to the aquatic resources within the area, therefore the Macedonia Project would not further degrade water quality.

Dispersed undesignated and illegal OHV use within the area has been developed by users. In some cases, these trails are causing erosion problems into unnamed tributaries to the analysis area waters. The roads analysis or RAP has identified the areas that need attention from illegal OHV use. Existing trails or roads with problems that are inside cutting units would be addressed with the Macedonia project and roads being added to the system with this project would be repaired.

A recent failure of the fill slope on Pressley Fields Road (SR 1325) has caused sediments to enter into Tucker Creek. Some of the exposed spoil material has healed naturally and due to drought the rest of the exposed area has sustained the summer. The NC Department of Transportation (DOT) has been asked by USFS to temporarily seed and mulch the exposed soil to avoid further sedimentation of Tucker Creek. It is not known how much soil has entered into Tucker Creek as a result of this slide but it has likely degraded habitat within the immediate downstream reach of Tucker Creek. The DOT proposes to repair the slide in the spring of 2008 pending a biological analysis and decision from the USFS.

As a result, the expected cumulative effects should not be any greater than the direct and indirect effects disclosed above and there should be no adverse cumulative effects to the analysis area aquatic resources, based on the project's design features included in this analysis.

3.2 Wildlife Habitat

The wildlife effects were evaluated over Forest Plan AA 14 (6,994 acres). In addition, the proposed thinning in Stand 117-06 in AA 15 was evaluated. Additional wildlife analyses on aquatic are located in Appendix A, [Biological Evaluation (BE)]; Section 3.8 [Management Indicator Species (MIS)], and; Section 3.9 [Threatened, Endangered, Sensitive (TES), and Forest Concern (FC) Species] of this document. The following tables disclose existing forest habitat and age-class distribution in the AA.

Table 3-3: Existing Forest Types within the Macedonia Wildlife AA

Species/Forest Type	Acres (CISC)	% of AA
White Pine	144 ac	2%
White Pine-Hemlock	10 ac	<1%
Hemlock	10 ac	<1%
White Pine–upland hardwood	265 ac	4%
Yellow pine (pitch, shortleaf, Virginia)-oak	268 ac	4%
Yellow pine (shortleaf & pitch)	82 ac	1%
Upland Hardwood – White Pine	[2/]42 ac	<1%
White Oak – Black Oak – Yellow pine	[2/]60 ac	<1%
Chestnut Oak – Scarlet Oak -Yellow Pine	[2/]613 ac	9%
N. Red Oak – Hickory – Yellow pine	[1/]25 ac	<1%
Yellow Poplar	22 ac	<1%
White Oak – N. Red Oak – Hickory	[1/]2,069 ac	30%
Yellow Poplar – White Oak – Red Oak	[2/]982 ac	14%
White Oak	[1/]40 ac	<1%
Northern Red Oak	[1/]12 ac	<1%
Scarlet Oak	[1/]1,104 ac	16%
Chestnut Oak	[1/]219 ac	3%
Chestnut Oak – Scarlet Oak	[1/]1,002 ac	14%
Brush Species	25ac	<1%
Total	**6,994 ac**	**100%**

1 = High level hard mast (2,402 acres)
2 = Medium level hard mast (1,697 acres)

Table 3-4: Existing Age Class Representation in AA 14

Age Class – Habitat Vegetation Component	Acres (CISC)	% of AA
0-10 age – Early Successional	48 ac	<1%
11-20 age – Early Successional	244 ac	3.5%
21-50 age Forest	389 ac	5.6%
51-100 age Forest	6,269 ac	89.6%
101- 140 age Forest	44 ac	<1%
Total	**6,994 ac**	**100%**
Grass/forb habitat[1/]	26 ac	0.37%

1 = Stand inclusions

3.2.1 Effects Analysis

3.2.1.1 Alternative A – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

Under this alternative, the early successional habitat (ESH; 0-10 years) would remain at 0 acres and the grass/forb openings would also remain at 0.37%. The Forest Plan standard for early successional habitat is at least 5% not to exceed 15% in Management Area (MA) 3B (Forest Plan, page III-31). The Forest Plan standard for grass/forb openings is 0.5% in MA 3B (Forest Plan, page III-23). Under this alternative habitat connectivity would be maintained. There would be no adverse cumulative effects with this alternative when combined with other activities listed in Table 3-1 above.

3.2.1.2 Alternatives B, C, & D – Direct, Indirect, and Cumulative Effects on Wildlife Habitat

The following tables disclose the forest types and age class distribution by action alternative (refer to Section 3.8 below for further discussion of effects to wildlife habitat and Appendix B for further discussion on age-class distribution):

Table 3-5: Forest Type Proposed Changes by Action Alternative

Species/Forest Type	Acres (CISC)	% of AA	Alt B	Alt C	Alt D
White Pine	144 ac	2%	[3/]35	[3/]25 ac	[3/]11 ac
White Pine-Hemlock	10 ac	<1%	-	-	-
Hemlock	10 ac	<1%	[3/]5 ac	[3/]5 ac	-
White Pine–upland hardwood	265 ac	4%	16 ac	15 ac	-
Yellow pine (pitch, shortleaf, Virginia)-oak	268 ac	4%	-	-	-
Yellow pine (shortleaf & pitch)	82 ac	1%	-	-	-
Upland Hardwood – White Pine	[2/]42 ac	<1%	-	-	-
White Oak – Black Oak – Yellow pine	[2/]60 ac	<1%	-	-	-
Chestnut Oak – Scarlet Oak -Yellow Pine	[2/]613 ac	9%	40 ac	40 ac	40 ac
N. Red Oak – Hickory – Yellow pine	[1/]25 ac	<1%	-	-	-
Yellow Poplar	22 ac	<1%	-	-	-
White Oak – N. Red Oak – Hickory	[1/]2,069 ac	30%	56 ac	56 ac	27 ac
Yellow Poplar – White Oak – Red Oak	[2/]982 ac	14%	34 ac	33 ac	33 ac
White Oak	[1/]40 ac	<1%	-	-	-
Northern Red Oak	[1/]12 ac	<1%	-	-	-
Scarlet Oak	[1/]1,104 ac	16%	16 ac	-	-
Chestnut Oak	[1/]219 ac	3%	-	-	-
Chestnut Oak – Scarlet Oak	[1/]1,002 ac	14%	117 ac	107 ac	67 ac
Brush Species	25ac	<1%	-	-	-
Total	**6,994 ac**	**100%**	**319 ac**	**281 ac**	**178 ac**

1 = High level hard mast (2,402 acres)
2 = Medium level hard mast (1,697 acres)
3 = 5 acres within activity area with another forest type designation

Table 3-6: Age Class Representation and Proposed Change by Action Alternative

Age Class – Habitat Vegetation Component	Acres (CISC)	% of AA	Alt B	Alt C	Alt D
0-10 age – Early Successional	48 ac	<1%	+319 ac (4.6%)	+281 ac (4.0%)	+178 ac (2.5%)

Age Class – Habitat Vegetation Component	Acres (CISC)	% of AA	Alt B	Alt C	Alt D
11-20 age – Early Successional	244 ac	3.5%	-	-	-
21-50 age Forest	389 ac	5.6%	-	-	-
51-100 age Forest	6,269 ac	89.6%	-319 ac (85%)	-281 ac (85.6%)	-178 ac (2.5%)
101- 140 age Forest	44 ac	<1%	-	-	-
Total	**6,994 ac**	**100%**			
Grass/forb habitat[1/]	26 ac	0.37%	+2.1 ac (0.4%)	+1.2 ac (0.39%)	-
Open road (mi/mi^2)[2/]	1.7 mi/mi^2				

1 = Stand inclusions
2 = State and private roads entirely (only 0.1 miles of Forest Service roads in AA are managed as open)

Creation of ESH and Soft Mast Production

Alternative B creates about 319 acres of ESH, which equates to about 4.6% of the wildlife analysis area (AA). Alternative C creates about 281 acres of ESH, which equates to about 4% of the AA. Alternative D creates about 178 acres of ESH, which equates to about 2.5% of the AA. Development of ESH moves habitat in the AA towards the desired future condition for white tailed deer, eastern wild turkey, ruffed grouse, and other wildlife species dependent on ESH. Alternative B creates about 38 more acres of ESH than Alternative C and about 141 more acres than Alternative D. Alternative C creates about 103 more acres of ESH than Alternative D. Since Alternative B creates the most ESH, it best moves the AA towards the Forest Plan's desired future condition for ESH.

Creation of Grass/Forb Habitat

Alternative B would create about 2 additional acres of grass/forb habitat, which equates to about 0.4% of the AA when combined with the existing 26 acres of grass/forb habitat. Alternative C would create just over 1 additional acre of grass/forb habitat, which equates to about 0.39% of the AA when combined with the existing 26 acres of grass/forb habitat. Alternative B better moves the AA towards the Forest Plan's desired condition for grass/forb habitat than Alternatives C and D. Alternative C better moves the AA towards the Forest Plan's desired condition for grass/forb habitat than Alternative D because Alternative D does not create any additional grass/forb habitat.

Hard Mast Production

The creation of ESH has the effect of setting back the age of the stands treated. Alternatives B, C, and D regenerate mature forest – Alternative B regenerates about 38 additional acres over Alternative C, and 141 additional acres over Alternative D. Alternative C regenerates about 103 additional acres over Alternative D. In the case of hard mast producing forest communities – those with abundant oaks and hickories – hard mast production would be reduced until the young, regenerating trees again reach mast producing age. Hard mast production in the AA would be temporarily reduced on about 319 acres in Alternative B, about 281 acres in Alternative C, and about 178 acres in Alternative D; however, the reduction would be minimized because project design features prioritize retention of available hard mast producing species (Section 2.4.1, Chapter 2).

3.2.1.3 US Fish and Wildlife Service Species of Concern

The US Fish & Wildlife Service (USFWS) has listed bird species of conservation concern within this region. The wood thrush is one such bird species and was found to occur on the southern portion of the AA during bird surveys.

The USFWS did not list the wood thrush as a priority species for conservation need due to high populations recorded within the region. Partners-in-Flight (PIF) identify this species as one to consider dropping from the concern list and not one of local conservation interest.

The wood thrush is found in moist cove forests where deciduous shrubs and saplings occur and the AA exhibits 1,004 acres of this preferred forest type. In addition, there are 463 acres of riparian habitat in the AA which may not always be defined as a cove forest type. Alternative B would harvest about 3.5% of the riparian habitat and Alternatives C & D would harvest about 3.3% of the riparian habitat. The proposed stream stabilization would not directly impact this species and may improve the surrounding riparian habitat. Therefore, the habitat within this AA that is considered important for this species would not be greatly affected.

Recent research (Vitz 2006) found wood thrush was utilizing the interior of clearcuts from 10-22 acres in size during post-breeding. This research tested several widely held theories regarding the mature forest or forest interior bird guilds that resulted in their conclusion that a mosaic of successional stages holds the greatest promise for this bird guild.

3.3 Non-native Invasive Plants

3.3.1 Existing Condition

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

The persistence of most non-native plant species is not considered desirable to natural ecosystem health. There are primarily two ways in which non-native plant species may persist in the forested ecosystems: 1) non-native plant species may persist by the introduction of an “invasive non-native species” to the ecosystem, or 2) by modification of the ecosystem in such a way that an invasive species becomes dominant. Out of the 124 species of non-native plants known to occur on the Pisgah Nantahala National Forest, 25 are currently recognized as having aggressive invasive qualities that can dominate local communities (Danley and Kauffman, Regional Foresters, May 2001, List of Invasive Exotic Plant Species).

Surveys for invasive species were conducted (2007) within the activity areas and around roads to the activity areas. Eleven species on the Regional Forester’s invasive non native plant species are known within the AA (see table below). The invasive plants *Microstegium vinineum*, *Lonicera japonica* and *Allium vineale* (wild garlic) are so well established in parts of the AA that control by any currently known method is entirely impractical. It is not known what affect, if any, this proposal would have on the populations of *Microstegium vinineum*, *Lonicera japonica* and *Allium vineale* within the AA.

The populations of *Lespedeza cuneata*, *Lolium arundinaceum*, and *Coronilla varia* are not known to be invasive within natural forested communities within the mountains. While *Lespedeza cuneata*, *Lolium arundinaceum*, and *Coronilla varia* may be invasive in Coastal Plain/Piedmont regions and rare natural areas (i.e. serpentine glades), they are not expected to be a concern in this proposal and/or the AA as they are not known to be invasive within natural forested communities within the mountains. Therefore, it is not recommended that these species be controlled.

Table 3-7: Non-native Invasive Species Summary

Species	Regional Category*	Location In Project Area	Recommendation
Ailanthus altissima Tree of heaven	1	Not found	Control/manage populations (if found) prior to disturbance on NFS land
Rosa multifora Multi-floral rose	1	All FS roads and Tucker Creek Bog area	Control/manage populations along FSRs
Celastrus orbiculatas Oriental bittersweet	1	Forest Service Roads (FSRs)	Control/manage populations prior to disturbance on FS land
Lespedeza cuneata Sericea	1	Wildlife Fields, roadsides	This species does not display invasive tendencies. Not recommended to control.
Paulownia tomentosa Princess tree	1	FSRs 188, 4111, 4071	Control/manage populations prior to disturbance on NFS land
Ligustrum sinense Chinese privet	2	Tucker Creek Bog	Control/manage populations prior to disturbance on NFS land
Lolium arundinaceum Tall fescue	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control.
Lonicera japonica Japanese honeysuckle	1	Alluvial Forests, Tucker Creek bog, FSRs	No practical effective control method known. No recommendation to control.
Microstegium vinineum Japanese stiltgrass	1	Mostly in Alluvial Forests and coves. Very well established bottoms.	No practical effective control method known. No recommendation to control.
Miscanthus sinensis Plume grass	2	FSRs	Control/manage population prior to disturbance on NFS land
Allium vineale Field garlic	1	Wildlife Fields	This species does not display invasive tendencies. Not recommended to control
Coronilla varia Crown vetch	2	Found only along system roads	This species does not display invasive tendencies. Not recommended to control

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

3.3.2 Alternative A – Direct, Indirect, and Cumulative Effects

Existing conditions and trends continue. Under this alternative no actions are proposed. There would be no potential increase in non-native invasive plant species as a result of ground disturbing actions. However, there would also be no control measures implemented to reduce the continued spread of these species. It is expected that non-native invasive plant species would continue to increase. There are no other known foreseeable actions in the activity areas that could affect spread or control/management of non-native invasive plants.

3.3.3 Alternatives B, C, & D – Direct, Indirect, and Cumulative Effects

Each alternative proposes to control/manage non-native invasive species on about five acres using both manual and chemical applications (see also Section 1.2, Chapter 1; Sections 2.3.2 and 2.3.3, Chapter 2; and Appendix F for more specific implementation details). Each alternative also proposes to monitor treatment effectiveness to determine if follow-up treatments are necessary.

It is expected that there would be a temporary increase of ruderal (weedy) species of plants under all alternatives. Of the action alternatives, Alternative B would result in about 369 acres of disturbed area for the increase in ruderal species; Alternative C would result in about 326 acres of disturbed area for the increase in ruderal species; and Alternative D would result in about 200 acres of disturbed area for the increase in ruderal species. These species are often prevalent during the initial stages of succession. This is particularly true near constructed roads and log landings. Because Alternative B would use more roads (about 9.8 miles in B to about 9 miles in C and 6.1 miles in D) and have more landings (B harvests 358 acres compared to about 319 acres in C and 198 acres in D), the amount of area exposed to non-native invasive species is higher for Alternative B. A high percentage of these ruderal species are non-native. A temporary increase of non-native plant species in the proposed activity area is expected. Many of these species have benefits for wildlife and erosion control. However, as succession progresses, most ruderal species tend to become much less prevalent and generally do not persist or spread to other areas. Furthermore, the action alternatives include requirements for monitoring and treatment of non-native species as needed to control/manage them in the AA.

Non-native invasive plants persist in the area by continual disturbance. For example, a maintained road shoulder or wildlife field often has persistent ruderal and non-native plant species. These areas are often maintained in an early successional state for wildlife or human benefit. Therefore, it is expected that this proposal could increase the persistence of non-native vegetation in the analysis area. Because it disturbs more acres, Alternative B would have more potential increases than Alternatives C or D; however pre-treatment of existing non-native invasive species along with monitoring and follow-up treatment are expected to keep the actual adverse increases and effects of these plants under control. To further help reduce this effect, native plants would be utilized in wildlife improvement, roadside erosion control plantings, and stream bank stabilization. It is recognized that erosion control and wildlife production are the primary goals of seeding areas and some non-native plant species may be highly beneficial at accomplishing these goals. However, Presidential Executive Order 13112, Title 3 recognizes the need to reduce the impact of non-native species by reducing the amount in which non-native plant species are planted on federal property. Goals of erosion control, wildlife production, and encouragement of native plant species may be met by planting native plant species or a suitable mixture of native and non-native mixture of species.

3.4 Pesticides

3.4.1 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no adverse direct, indirect, or cumulative effects to wildlife, water quality, and humans as related to pesticide use as none would be applied. The existing condition would remain the same; non-native invasive plant species would be expected to continue to spread in the AA. Pesticide use on private lands would continue in the AA. There

are no other known foreseeable actions in the activity areas that could affect resources in the AA due to pesticide use.

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

Herbicides are proposed to control/manage existing non-native invasive plant species along haul routes and haul routes adjacent to existing and proposed harvest stands with herbicide. Treatment would occur prior to harvest and includes non-native invasive plants along FSRs and adjacent to harvest stands. Herbicides would also be used following harvest activities for site preparation and timber stand improvement activities.

The following table displays expected maximum acreages of herbicide (Glyphosate or Triclopyr) and Sporax treatment that may occur – additional treatments within these acres may be necessary as site specific monitoring determines, especially for management of non-native invasives:

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

Pesticide	Alternative A	Alternative B	Alternative C	Alternative D
Triclopyr or Glyphosate (ac)[2]	0 ac	578 ac	540 ac	405 ac
Sporax	0 ac	39 ac	38 ac	20 ac

1 – Not all acreage is treated, i.e. buffers along streams and "non-target" species would not be treated. Herbicides are applied manually and would not be applied aerially (see also Appendix F). Herbicides are primarily applied to stems during release and to foliage on non-native invasives plants.

2 – Acres include treatment for site preparation and non-native invasive plants.

Use of pesticides is not expected to have measurable adverse effects on wildlife, water quality, and humans due to proper application as per Material Safety Data Sheets (MSDSs); product labels; risk assessments; fact sheets; mitigation measures contained in the *Vegetation Management in the Appalachian Mountains* (VMAM) Final Environmental Impact Statement (FEIS), issued in July 1989; design features disclosed in Appendix F; and standards and guidelines from the Forest Plan including *Requirements For Vegetation Management In The Appalachian Mountains* listed in Appendix I of the Forest Plan (pages I-10 – I-14). Any pesticides applied would be done according to the labeling information, at the lowest rate effective at meeting project objectives in accordance with guidelines for protecting the environment, and manually (not aerially). Risks of adverse effects are further reduced by requiring the applicator to be trained in safety precautions, proper use, and handling of pesticides. Other factors reducing risk are the low level of active ingredient per acre and placement of notice signs in areas where herbicides have been applied. The signs include information on the pesticide used, when it was applied, and who to contact for additional information.

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

Impacts of pesticide use to wildlife, water quality, and humans are expected to be low due to proper handling and application. The use of pesticides would have no measurable impact on water quality because according to the VMAM FEIS: *No herbicide is aerially applied within 200 horizontal feet, nor ground-applied within 30 horizontal feet, of lakes, wetlands, or perennial or intermittent springs and streams. No herbicide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled herbicides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them* (VMAM FEIS, page II-67). There would be no adverse effects (direct, indirect, or cumulative) of the usage of pesticides associated with the action alternatives if no spills occur within riparian areas—no pesticide would be applied within at least 30 feet of riparian areas. According to the VMAM FEIS: *The greatest hazards to surface and ground water quality arise from a possible accident or mishandling of concentrates during transportation, storage, mixing, and loading, equipment cleaning, and container disposal phases of the herbicide use cycle*. Pesticides would be mixed at the pesticide storage building at the Pisgah Ranger District Work Center and not in the field, and applicators do not carry concentrated amounts of pesticide in the field. There are no other known foreseeable applications of pesticides on NFS lands in the AA that could affect pesticide use with this proposal—the last measurable pesticide use on NFS lands in the AA was over six years ago in Compartments 109 and 110. The Forest Service is unaware of any large-scale quantities of pesticide being applied on adjacent non-NFS lands within the watershed that could cause adverse cumulative effects. Individual home owners are expected to use pesticides on their properties; however, determining measurable amounts, formulations, locations, frequency, and timing of their use would be speculative. Additional project design features are listed in Appendix F below.

There are no other actions occurring on NFS lands that could cumulatively be added to the Macedonia proposal to cause adverse cumulative effects. There is likely pesticide use occurring on private lands in the AA, but the actions on NFS lands are not expected to cumulatively be added to those uses because of the design of the project (Section 1.2, Chapter 1; Section 2.2.3, Chapter 2; project design features listed in Appendix F; and implementation of BMPs & Forest Plan standards).

3.5 Soil Resources

The following is an analysis of the soils that would be impacted by harvest-related activities in the activity areas. The following table lists the soil map units found by stand number:

Table 3-9: Primary Soil Map Units by Stand and Access Route by Alternative

Primary Soil Map Unit Number, Name & Slope Range[1]	Stands[2]/Access Routes[3]	Alt A (acres)	Alt B (acres)[4]	Alt C (acres)[5]	Alt D (acres)[6]
12 – Rosman-Reddies (B)	111-4	0	4	4	4
14 – Dellwood-Reddies	111-5, 111-9, Tucker Creek Ext	0	5	5	14
82 – Toxaway loam	111-5	0	10	10	10
121 – Saunook loam (C & D)	111-4, 111-5, 111-13, 111-15, 111-19, 115-3, 115-20, 116-19, 116-20, 116-21, 126-19, 126-18,	0	54	49	42

	Jake Branch, Jake Branch Spur, Welding Road, Pressley Fields, Homestead, Spice Cove				
125 – Tate-Brevard (D)	116-5, 117-6, Tucker Creek, Lamance Creek	0	9	9	1
337 – Evard-Cowee (C, D & E)	111-5, 111-9, 111-13, 111-15, 111-19, 115-3, 115-20, 115-21, 116-20, 117-6, 126-19, Jake Branch, Welding Road, Homestead, Spice Cove, Temp A, Temp D	0	53	46	26
393 – Chestnut-Edneyville (D, E & F)	111-13, 111-15, 111-19, 115-9, 115-15, 115-20, 115-21, 116-5, 116-19, 116-20, 116-21, 117-6, 126-19, 126-18, Jake Branch Spur, Welding Road, Tucker Creek, Tucker Creek Spur, Lamance Creek, Spice Cove, NASA, Long Branch, Tucker Creek Ext, Temp A, Temp B, Temp C	0	147	134	84
544 – Dillard loam (B)	111-4, Pressley Fields	0	10	0	0
722 – Chandler loam (D & E)	116-21, Pressley Fields, Temp D	0	6	6	6
737 – Trimont loam (E)	111-19, 115-20, 115-21, Spice Cove, Temp A, Temp D	0	20	11	7
793 – Ashe-Edneyville (E & F)	111-13, 111-19, 115-3, 115-9, 115-15, 115-20, 116-5, 116-20, 117-6, Jake Branch, Welding Road, Tucker Creek, Lamance Creek, Spice Cove, Temp B	0	39	37	18
800 – Sylva-Whiteside	111-9, Tucker Creek Ext	0	11	11	0
Tucker Creek Stream Rehab	111-4, 111-5	0	7	7	7
Total Acres[7]		**0**	**375**	**329**	**219**

1 – Average slope percent ranges are for soil map units from NRCS data and are not necessarily the average slope within the stand (A = 0% - 2%, B = 2% - 8%, C = 8% - 15%, D = 15% - 30%, E = 30% - 50%, and F = 50% - 95%)
2 – Portions of soil map units make up each stand – includes developing landings and skid roads to facilitate harvesting
3 – Includes disking & seeding
4 – Alt B includes 6¼ ac of existing non-system roads, 1.3 ac of newly constructed roads, and 1.1 ac of temporary roads
5 – Alt C includes 6¼ ac of existing non-system roads, 1.3 ac of newly constructed roads, and 0.8 ac of temporary roads
6 – Alt D includes 4 ac of existing non-system roads, 0 ac of newly constructed roads, and <1 ac of temporary roads
7 – Acres include stands harvested (including skid roads & landings) and timber access (haul) routes

The following table displays characteristics of each soil map unit:

Table 3-10: Comparison of Soil Map Units[1]

Soil Map Unit Name	Characteristics
Ashe	The Ashe series consists of moderately deep, somewhat excessively drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and weathered from felsic or mafic igneous and high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Somewhat excessively drained; moderately rapid permeability; medium internal drainage. Runoff

Soil Map Unit Name	Characteristics
	class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Brevard	The Brevard series consists of very deep, well drained soils on gently sloping to steep high stream terraces, foot slopes, benches, fans and coves of the Southern Appalachian Mountains and mesic areas of the Southern Piedmont. They formed in colluvium and alluvium weathered from a mixture of high-grade metamorphic and igneous rocks. Well drained. Permeability is moderate in the subsoil and moderately slow to moderately rapid in the substratum. Runoff class is low on gentle slopes, medium on strong to moderate slopes, and high on steeper slopes.
Chandler	The Chandler series consists of very deep, somewhat excessively drained soils on gently sloping to very steep ridges and side slopes in the Blue Ridge (MLRA 130). Slopes are 2 to 95 percent. They formed in residuum that is affected by soil creep in the upper part, and weathered from high-grade metamorphic rocks high in mica content such as mica gneiss, mica schist, and pegmatite. Somewhat excessively drained. Runoff is slow under forest cover and internal drainage is medium to rapid. Permeability is moderately rapid.
Chestnut	The Chestnut series consists of moderately deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum that is affected by soil creep in the upper part, and weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained; moderately rapid permeability. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest cover is intact. Most of the soil is in forest. Common trees are scarlet oak, chestnut oak, white oak, black oak, hickory, eastern white pine, Virginia pine, and pitch pine. Yellow poplar and northern red oak are common in the northern portions of MLRA 130. The understory species are dominantly rhododendron, mountain laurel, flowering dogwood, sourwood, chestnut sprouts, and buffalo nut.
Cowee	The Cowee series consists of moderately deep, well drained, moderately permeable soils on ridges and side slopes of the Blue Ridge (MLRA 130). They formed in residuum affected by soil creep in the upper part, and weathered from felsic to mafic, igneous and high-grade metamorphic rocks. Well drained; moderate permeability. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Dellwood	The Dellwood series consists of moderately well drained, moderately rapidly to very rapidly permeable soils formed in dominantly coarse-textured alluvium on flood plains in the Southern Appalachian Mountains. These soils are shallow to sandy material that has more than 35 percent by volume of gravel and cobbles. Moderately well drained; the seasonal high water table is at depths of 2 to 4 feet in winter and spring. Runoff is slow. Permeability is moderately rapid in the A horizon and rapid or very rapid in the C horizon. Flooding frequency ranges from occasional to frequent.
Dillard	The Dillard series consists of deep or very deep, moderately well drained soils that have moderately slow permeability. These soils formed in loamy alluvium of Holocene age. They are on narrow, nearly level to sloping stream terraces and toe slopes. Runoff is slow to medium. Dillard soils are moderately well drained. Runoff is slow to medium and permeability is moderately slow. A water table is at a depth of 2.0 to 3.0 feet in winter and early spring.
Edneyville	The Edneyville series consists of very deep, well drained soils on gently sloping to very steep ridges and side slopes of the Blue Ridge. They formed in residuum that is affected by soil creep in the upper part, and is weathered from felsic or mafic igneous or high-grade metamorphic rocks such as granite, hornblende gneiss, granodiorite, biotite gneiss, and high-grade metagraywacke. Well drained, permeability is moderate in the subsoil and moderately rapid in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is

Soil Map Unit Name	Characteristics
	much lower where forest litter has little or no disturbance. Forested to oak, hickory, and pine. Understory of native grasses, wild grape, rhododendron, mountain laurel, and dogwood.
Evard	The Evard series consists of very deep, well drained, moderately permeable soils on ridges and side slopes of the Blue Ridge. They formed in residuum affected by soil creep in the upper part and weathered from felsic to mafic, igneous and high-grade metamorphic rocks. Well drained; permeability is moderate in the subsoil and moderately rapid in the underlying material. Runoff class is low on gentle slopes, medium on strong or moderately steep slopes, and high on steeper slopes. Runoff is much lower where forest litter has little or no disturbance.
Reddies	The Reddies series consists of moderately well drained, moderately rapidly permeable soils on flood plains in the Blue Ridge. They formed in recent alluvium that is loamy in the upper part and is moderately deep to sandy strata containing more than 35 percent by volume gravel and/or cobbles. Moderately well drained; the seasonal high water table is at depths of 2 to 3.5 feet in winter and spring. Runoff is slow. Flooding frequency ranges from rare to frequent. Permeability is moderately rapid in the A and B horizons, and rapid in the C horizon.
Rosman	The Rosman series consists of very deep, well drained to moderately well drained, moderately rapidly permeable soils on flood plains in the Southern Appalachian Mountains. They formed in loamy alluvium. Well to moderately well drained; slow runoff; moderate internal drainage; moderately rapid permeability. Most areas of these soils are subject to occasional to frequent flooding. A few areas are protected by flood control structures and are subject to rare flooding.
Saunook	The Saunook series consists of very deep, well drained, moderately permeable soils on benches, fans, and toe slopes in coves in the Blue Ridge. They formed in colluvium derived from materials weathered from felsic to mafic, igneous and high-grade metamorphic rocks. Well drained; saturated hydraulic conductivity is moderately high or high, permeability is moderate. Surface index runoff is negligible to medium. These soils receive surface and subsurface water from surrounding uplands, and seeps and springs are common.
Sylva	The Sylva series consists of very deep, poorly drained, moderately rapidly permeable soils on nearly level colluvial fans and flats in the Southern Appalachian Mountains. These soils formed in colluvium and alluvium derived from materials weathered from felsic to mafic crystalline rocks such as granite, hornblende gneiss, and mica gneiss. Poorly drained; very slow runoff; moderately rapid permeability.
Tate	The Tate series consists of very deep, well drained, moderately permeable soils on benches, fans, and toe slopes in coves in the Blue Ridge. They formed in colluvium weathered from felsic to mafic high-grade metamorphic rocks. Well drained; saturated hydraulic conductivity is moderately high or high, permeability is moderate in the subsoil and moderately rapid permeability in the underlying material. Index surface runoff is negligible to medium. These soils receive surface and subsurface water from surrounding uplands, and seeps and springs are possible.
Toxaway	The Toxaway series consists of very deep, poorly and very poorly drained soils that formed in loamy alluvial deposits on nearly level flood plains of mountain valleys. Very poorly drained and poorly drained; very slow or ponded runoff; moderate permeability. These soils are subject to common, very brief floods.
Trimont	The Trimont series consists of very deep, well drained, moderately permeable soils on cool north- to east-facing or shaded side slopes and heads of coves in the Blue Ridge. They formed in residuum that is affected by soil creep in the upper part and weathered from felsic to mafic high grade metamorphic rocks. Well drained; saturated hydraulic conductivity is moderately high or high, permeability is moderate. Index surface runoff is high.
Whiteside	The Whiteside series consists of very deep, moderately well drained, moderately

Soil Map Unit Name	Characteristics
	permeable soils on colluvial toe slopes, benches, and fans in coves in the Southern Appalachian Mountains. These soils formed in colluvium and alluvium derived from materials weathered from felsic to mafic crystalline rocks such as granite, mica gneiss, and hornblende gneiss. Moderately well drained; slow runoff; moderate permeability.

1 – Information taken from USDA Natural Resource Conservation Service (NRCS) website

3.5.1 Alternative A – Direct, Indirect, and Cumulative Effects

There would be no adverse effects (compaction) to soils with this alternative because no activities are proposed. However, erosion would still continue in specific places within the AA.

3.5.2 Alternative B – Direct, Indirect, and Cumulative Effects

Direct and Indirect Effects

Any adverse effects to soils with Alternative B are expected to be negligible and short-term (one or two seasons) because the majority of soil types where harvesting is proposed (94%) are moderately to very deep and well drained (reducing potential for compaction); and would have project design features (Section 2.4, Chapter 2), FPGs, and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. The remaining 6% of the harvesting is proposed on soil map series that are very deep but poorly drained. There may be some minor, short-term erosion with the improvement of about 3.1 miles of existing non-system ("woods") roads and development of 1 mile of temporary roads. However, the effects are expected to be short-term (a season or two) and limited in their extent when applied to the total area of operation. All temporary roads developed would be disked and seeded following harvest activities, and existing non-system roads improved would be maintained to the lowest standards and closed to public vehicular use. Harvesting under this alternative would be with both ground-based logging equipment (skidders or caterpillars) and cable logging systems. The ground-based logging systems would be on about 4% of the AA. Harvest-related activities include developing log landings, skid roads, and skid trails – existing log landings and skid roads would be used where available. Forest Plan direction states: *Expose the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). Skid roads and log landings are necessary to meet this direction because they limit the amount of ground disturbed in a harvest stand by concentrating equipment to specific routes/areas instead of throughout the entire stand – about 15 acres total within the 358 acres harvested are expected to be used as skid roads and log landings. Long-term compaction and erosion of soils where skid roads and log landings would be developed is not expected because following harvest activities they would be disked and seeded with an appropriate seed mix.

Cumulative Effects

When added to the effects from past, ongoing, and reasonably foreseeable future actions listed in Table 3-1 above, Alternative B is not expected to cause adverse cumulative effects to soils. This is because the past actions occurred such a long time ago that adverse effects are no longer being experienced; the past, ongoing, or future actions were designed to meet Forest Plan standards (BMPs) reducing potential for adverse effects, or the actions do not have any potential to adversely affect soils (i.e., hunting/hiking). In addition, onsite reviews and evaluations have not identified large-scale or severe adverse effects to soil resources in the AA—specific areas that have experienced small-scale erosion due to past management or natural events are scheduled to

be addressed with this proposal or have been addressed under separate storm-related recovery projects. There are no other known projects in the AA that could cause adverse cumulative effects on soil resources when combined with potential effects of the proposal.

3.5.3 Alternative C – Direct, Indirect, and Cumulative Effects

Direct and Indirect Effects

Effects to soils under Alternative C would be less than Alternative B because Alternative C proposes 39 less acres of harvesting, uses about 0.9 less miles of non-system roads, and develops about 0.2 less miles of temporary roads. Any adverse effects to soils with Alternative C would be negligible because the majority of soil types where harvesting is proposed (94%) are moderately to very deep and well drained (reducing potential for compaction); and would have project design features (Section 2.4, Chapter 2), FPGs, and Forest Plan standards (BMPs) applied to further reduce potential for compaction and long-term damage. The remaining 6% of the harvesting is proposed on soil map series that are very deep but poorly drained. There may be some minor, short-term erosion with the improvement of about 2.5 miles of existing non-system ("woods") roads and development of about 0.8 miles of temporary roads. However, the effects are expected to be short-term (a season or two) and limited in their extent when applied to the total area of operation. All temporary roads developed would be disked and seeded following harvest activities, and existing non-system roads improved would be maintained to the lowest standards and closed to public vehicular use. Harvesting under this alternative would be with both ground-based logging equipment (skidders or caterpillars) and cable logging systems. The ground-based logging systems would be on about 4% of the AA. Harvest-related activities include developing log landings, skid roads, and skid trails – existing log landings and skid roads would be used where available. Forest Plan direction states: *Expose the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). Skid roads and log landings are necessary to meet this direction because they limit the amount of ground disturbed in a harvest stand by concentrating equipment to specific routes/areas instead of throughout the entire stand – about 13 acres total within the 281 acres harvested are expected to be used as skid roads and log landings. Long-term compaction and erosion of soils where skid roads and log landings would be developed is not expected because following harvest activities they would be disked and seeded with an appropriate seed mix.

Cumulative Effects

The cumulative effects for Alternative C would be less than Alternative B because the direct/indirect effects of Alternative C are less. The potential effects of the past, ongoing, and reasonably foreseeable actions would be the same as in Alternative B. When the reduced effects of Alternative C are added to these other effects, the overall cumulative effects would be less than Alternative B.

3.5.4 Alternative D – Direct, Indirect, and Cumulative Effects

Direct and Indirect Effects

Effects to soils under Alternative D would be less than Alternatives B and C because Alternative D proposes 160 and 121 less acres of harvesting respectively and does not propose to construct any new system roads or improve existing non-system roads. Any effects to soils with Alternative D would be negligible because the majority of the soil types where harvesting is proposed (95%) are moderately to very deep and well drained (reducing potential for

compaction); would not be taken out of production through permanent road construction; and would have project design features (Section 2.4, Chapter 2); and FPGs and BMPs applied to further reduce potential for compaction and long-term damage. The remaining 5% of the harvesting is proposed on soil map series that are very deep but poorly drained. There may be some minor, short-term erosion with the development of 1.1 miles of temporary road. However, the effects are expected to be short-term (one season or less) and limited in their extent when applied to the total area of operation—all temporary roads would be disked and seeded following harvest activities. Harvesting under this alternative would be with both ground-based logging equipment (skidders or caterpillars) and cable logging systems. The ground-based logging systems would be on about 2% of the AA. Harvest-related activities include developing log landings, skid roads, and skid trails – existing log landings and skid trails would be used where available. Forest Plan direction states: *Expose the minimum amount of soil practicable at any given time during project implementation* (Forest Plan, page III-42). Skid trails and log landings are necessary to meet this direction because they limit the amount of ground disturbed in a harvest stand by concentrating equipment to specific routes/areas instead of throughout the entire stand – about 8 acres total within the 198 acres harvested are expected to be used as skid trails and log landings. Long-term compaction and erosion of soils where skid trails and log landings would be developed is not expected because following harvest activities they would be disked and seeded with an appropriate seed mix.

Cumulative Effects

The cumulative effects for Alternative D would be less than Alternatives B and C because the direct/indirect effects of Alternative D are less. The effects of the past, ongoing, and reasonably foreseeable actions would be the same as in Alternative B. When the reduced effects of Alternative D are added to these other effects, the overall cumulative effects would be less than Alternatives B and C.

3.6 Cultural Resources

A total of 47 archeological sites were located and recorded during the survey on areas proposed for treatment in the Macedonia proposal. Seven (7) sites are rated Class I and are eligible for inclusion in the National Register of Historic Places (NRHP) under Criteria D (36 CFR 60.4). Two (2) sites are currently unevaluated and may be eligible to the NRHP upon further assessment. The remaining 38 sites are rated Class III and are not eligible to the NRHP.

3.6.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

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

The Class III sites are not eligible to the National Register of Historic Places (NRHP) and may be affected by the proposed activities. There are no expected adverse direct, indirect, or cumulative effects to the Class I and Unevaluated sites with implementation of any of these alternatives as identified cultural sites would be protected by excluding them from ground disturbing activities.

There would be no adverse cumulative effects to cultural resources because the proposed Macedonia project undertaking is not supplementary to past undertakings in the project area.

This conclusion is based on past and present Section 106- National Historic Preservation Act (NHPA) compliant inventory and evaluation (by archaeologists) of all proposed project areas (ground disturbing), and the subsequent completion of a Report-of-Findings that is reviewed by the State Historic Preservation Office (SHPO). All sites identified as eligible to the NRHP in the Macedonia activity areas were assessed on how best to ensure protection during project implementation—in come cases this meant reducing or eliminating stands from the proposal. All NRHP Eligible and Unevaluated sites would be protected by avoidance.

3.7 Scenery Resources

3.7.1 Existing Condition

Macedonia Church project area is west of NC 215 and the North Fork French Broad River. The area is mixed ownership with residential, light agriculture/commercial, and National Forest lands. There are no Forest Service developed recreation facilities, system trails, or open system roads in the area; though gated system roads are used by hunters, horseback riders, mountain bikers, and hikers. The North Fork French Broad River and several streams are used by fishermen.

Scenery in the project area consists of typical mountain landscapes, with dense mixed hardwood and evergreen forests. The area would be classified as "common" in the Southern Appalachian landscape type; except for the North Fork French Broad River corridor, there are no extraordinary geologic features or outstanding scenic qualities. Forest Service lands in the area show evidence of past timber management; while views of private lands include rural residential, farmlands, and light agriculture/commercial uses.

3.7.2 Scenery Analysis

Except for designation of small patch old growth areas, all proposed activities lie in Management Area (MA) 3B. In this MA, all proposed activities visible from analyzed viewpoints must meet Modification (M) Visual Quality Objective (VQO). Under Modification VQO, treatments may dominate the surrounding landscape, but borrow from naturally occurring form, line, color and texture. These objectives must be met within three growing seasons after project completion.

Visibility of proposed activities was assessed using a computer GIS analyzing seen-area on a three-dimensional terrain model, and leaf-off field reconnaissance. Viewpoints considered in the analysis include all public travel corridors, water bodies, and use areas in and around the project area. Portions of the project area are visible from the following viewpoints: SR1322, SR1324, SR1325, SR1326, Tucker Creek, Lamance Creek, Long Branch, and portions of Pisgah Astronomical Research Institute. Though assessment of scenery impacts from specific private residences is not required, proposed activities would be visible from private lands within the analysis area; design features used to meet M VQO from analyzed viewpoints may also be effective in reducing scenery impacts where seen from these private lands.

3.7.3 Alternative A – Direct and Indirect Effects

With this alternative, no change in appearance of the existing landscape would occur. All Visual Quality Objectives would be met.

3.7.4 Alternatives B, C, & D – Direct and Indirect Effects

Proposed commercial thinning and two-age harvest treatments would be visible from state roads and streams listed above. Two-age harvests do not typically create large openings in the canopy, as seen with clear-cut harvest methods. Immediately after harvest, a two-age treatment would reveal some areas of exposed ground in small openings, trunks of mature residual trees would be more visible, and segments of roads and landings may be seen. After one or two growing seasons, under-story vegetation would obscure exposed ground, tree crowns would fill-out, and the canopy would begin to close. Seeded roads and landings would also green-up, and begin to blend in with the surrounding landscape. Thinning treatments would appear even denser than the two-age harvest, and in most cases, thinning treatments would not be noticeable to the average viewer.

Road reconstruction, and temporary road and landing construction activities are usually most noticeable because of contrasts between exposed soil color, gravel, and the surrounding vegetation. In middleground views, contrasts in the form of a linear feature crossing the landscape can also be noticeable. Road reconstruction occurs within an existing prism and is built to system road standards, while temporary roads are constructed to a lower standard. Skid roads and landings are seeded after project completion, which allows them to blend in with the surrounding landscape.

Typically, wildlife habitat improvements, invasive plant species control, and non-commercial silvicultural treatments, such as timber stand improvements, do not create noticeable changes in the landscape, and easily meet Modification VQO. This is true for all wildlife habitat enhancements, and non-commercial treatments proposed in this project.

The following design features are incorporated to meet Modification VQO for all activities visible from open roads:

- Establish irregular shaped openings and avoid straight lines or geometric forms except where necessary along landlines.
- Limit linear distance of created openings adjacent to open roads to a 500-foot maximum. In stand 111-04, this would be achieved by retaining groups of mid-story hardwood trees where possible along SR1325.
- Burn or lop and scatter slash to within 4 feet of the ground for 50 feet beyond edge of open roads.
- Where possible, do not locate landings adjacent to open roads. Where seen within 1000 feet from open roads, scatter residual logging debris around log landings within 4 feet of ground, or accomplish through firewood utilization.
- Screen or blend in visible landings, system roads, temporary roads, skid roads, and skid trails, through seeding, planting, or maintaining existing vegetative screen.

These and other design features allow all proposed activities, in all action alternatives, to meet the assigned Modification VQO.

3.7.4.1 Cumulative Effects

Views from state roads in the project area and from the French Broad River reveal many existing modifications to the scenic landscape in the form of past timber management, and commercial, agricultural, and residential development. In places, existing and future modifications would be

seen in conjunction with Macedonia Church project treatments; examples of possible future landscape modifications include additional private or commercial development.

Cumulative scenery impacts of past, currently proposed, and foreseeable future activities have been considered. It has been determined that the assigned Modification VQO would be met with all proposed activities, in all alternatives; where effects to scenery associated with Macedonia Church project activities would be seen in conjunction with other existing and foreseeable future actions.

3.8 Management Indicator Species

3.8.1 Process

The Forest-wide list of MIS was considered as it relates to the AAs. Only those MIS that occur or have habitat within the AAs and may be affected by any of the alternatives were carried through a site-specific analysis. The documentation below shows which MIS were and were not analyzed along with the reasons.

Consistent with the Forest Plan and its associated FEIS (Volumes I and II), the effects analyses focus on changes to MIS habitat. These project-level effects are then put into context with the Forest-wide trends for populations and habitats. Additional MIS information is within the Wildlife, Aquatics, and Botanical resource reports located in the project record.

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

1) **Table 3-11**: This table displays biological communities and associated MIS, and reasons species were, or were not selected for analysis in the project. The source of these tables is Amendment 17 to the Nantahala and Pisgah Land and Resource Management Plan effective October 1, 2005, and the associated environmental assessment (EA) and project record.
2) **Table 3-12**: This table displays the habitat components and associated MIS, and reasons species were, or were not selected for analysis in the project.
3) **Table 3-13**: This table displays by MIS the Forest-wide population trend along with the associated biological community or habitat component. The information in this table is taken from the MIS Report for the Nantahala and Pisgah National Forests.
4) **Table 3-14**: This table compares effects (expressed as changes in habitat) by alternative to the Forest-wide estimates of habitats for each biological community and habitat component considered in the project-level analyses. This table explains how effects to communities and habitats affect Forest-wide population trends for the species considered.

Table 3-11: Biological Communities, Associated MIS, and why Species were Chosen or Eliminated from Analysis

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	No/1
Xeric yellow pine forests	Pine warbler	No/2

Reservoirs	Largemouth bass	No/1
Riparian forests	Acadian flycatcher	No/2
Coldwater streams	Wild trout (brook, brown, and rainbow); blacknose dace	Yes
Coolwater streams	Smallmouth bass	No/2
Warmwater streams	Smallmouth bass	No/1

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

2 Biological Community and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities because the associated habitat would not be entered by the proposed activities, pursuant to forest plan direction; therefore, there would be no change to forest-wide population trends.

Table 3-12: Habitat Components Associated MIS and why Species were Eliminated from Analysis

Habitat Components	MIS	Analyzed Further/ Evaluation Criteria*
Early successional (0-10 years old)	Rufous-sided (eastern) towhee	Yes
Early successional (11-20)	Ruffed grouse	No/2
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/1
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 Habitat and its represented species do not occur within the project area; therefore, this special habitat would not be affected by any of the alternatives. Given no effects to the habitat, the alternatives in this project would not cause changes to forest-wide trends or changes in population trends of species associated with this habitat.

2 Habitat and its represented species would be protected in accordance with Forest Plan standards and guidelines. Populations would not be affected by management activities; therefore, there would be no change to forest-wide population trends.

Table 3-13: MIS Estimated Population Trend and Biological Community or Habitat Component

Species	Estimated Population Trend	Biological Community and/or Habitat Component
Wild trout (brook, brown, and rainbow); blacknose dace	Static	Coldwater streams
Black bear	Increasing	Old forest communities (100+ years) & Hard mast producing species (>40 yrs)
Rufous-sided towhee	Decreasing	Early successional (0-10 years old)
Ruffed grouse	Static to decreasing	Soft mast producing species & Downed woody debris
White-tailed deer	Static to decreasing	Permanent grass/forb

Table 3-14: Habitat Component, Forest-wide Estimates, and Expected Changes resulting from the Alternatives

Habitat Component	Forest-wide Estimate	Alt A	Alt B	Alt C	Alt D
Coldwater streams	5,060 miles	No change	Two culvert installations on existing crossings on un-named tributaries to Spice Cove Creek and Long Branch – about 52 linear feet of stream channel would be re-disturbed	Two culvert installations on existing crossings on un-named tributaries to Spice Cove Creek and Long Branch – about 52 linear feet of stream channel would be re-disturbed	One crossing to be replaced in UT Long Branch – about 26 linear feet would be redisturbed
Early successional (0-10 years old)	26,800 acres, 5 year average of 2040 ac Forest-wide, downward trend	No change	321.1 acre habitat increase (harvest stands and linear openings)	282.2 acre habitat increase (harvest stands and linear openings)	178 acre habitat increase
Soft mast-producing species	13,144 acres early seral, highest potential on 5,800 ac, downward trend	No change	321.1 acre habitat increase (harvest stands and linear openings).	282.2 acre habitat increase (harvest stands and linear openings).	178 acre habitat increase
Hard mast-producing species (>40 yrs)	681,000 acres, increasing trend	No change	279 ac reduction (marking guidelines would retain white oak, red oak, hickory, black oak, and chestnut oak, where they occur species where available)	251 ac reduction (marking guidelines would retain white oak, red oak, hickory, black oak, and chestnut oak, where they occur species where available)	167 ac reduction (marking guidelines would retain white oak, red oak, hickory, black oak, and chestnut oak, where they occur species where available)
Permanent grass/forb openings	3,000 ac	No change	2.1 ac increase	1.2 ac increase	No change
Downed woody debris	High accumulation small wood: 18,000; Large wood: 386,000; Low accumulation (approximately 600,000)	No change	319 ac increase	281 ac increase	178 ac increase

3.9 Threatened, Endangered, Sensitive, and Forest Concern Species

This section discloses the determination of effects the proposal may have on threatened and endangered (T&E); Regional Forester's sensitive (S); and Forest Concern (FC) aquatic, wildlife,

and botanical species—see Appendix A, Biological Evaluation (BE) for more complete disclosure of surveys, habitat, species, and effects analyses.

There would be no effect to any TES or FC species under Alternative A as no actions are proposed—current conditions would be maintained.

3.9.1 Threatened and Endangered Species

3.9.1.1 Botanical & Aquatic Species

None of the action Alternatives B, C, or D would adversely affect T&E botanical or aquatic species or their habitat as disclosed in the BE. Consultation with the US Fish and Wildlife Service is not required.

3.9.1.2 Wildlife Species

Bog Turtle (*Clemmys muhlenbergii*)

There are no known threatened or endangered species within the proposed project area. However, potential habitat exists for the bog turtle north of Stand 111-09. Wetlands characteristics are expected to be improved (positive indirect impact) by the proposed restoration due to a local higher water table. Because county occurrence records are found within approximately one mile of this site, it is expected the bog turtle population could expand to the restored wetlands once preferred habitat conditions improve (*Sphagnum* mats). Bog turtle is not covered in North Carolina under Section 7 of the Endangered Species Act; therefore, no consultation with USFWS is not required (pers. conv. Allen Ratzlaff, USFWS, 2007).

There are no other wildlife T&E species that could be affected by the proposal.

3.9.2 Sensitive Species

3.9.2.1 Botanical Species

There are no Regional Forester's S botanical species known within any proposed activity area or close enough to be impacted by any action alternative. Therefore, this proposal would not impact any S plant species. *Hexastylis rhombiformis* (heartleaf) is the only known S botanical species to occur within the botanical AA. However, *Hexastylis rhombiformis* is known to occur along riparian areas adjacent to the French Broad River. This is sufficiently far enough away from any proposed activity to have no impact to *Hexastylis rhombiformis* or its habitat.

3.9.2.2 Wildlife Species

Diana Fritillary (Speyeria Diana)

Direct & Indirect Impacts: The proposed action would increase the nectar species habitat within both the newly created early successional habitat and the grass/forb openings developed. Temporary road construction would result in short term nectar species habitat (post-harvest). Because these road openings are generally narrow, the canopy closes relatively quickly therefore eliminating sunlight to the forest floor and herbaceous growth. A small amount of habitat within the riparian area of Tucker Creek would be impacted initially by the proposed stream stabilization work. This work would involve the felling of scattered trees within the riparian area to construct various structures. However, due to the limited and scattered nature of the trees to be cut, impacts to fritillary habitat are not expected to be measurable. Given the open condition of the wetlands area and little or no rhododendron species present, it was determined that utilization of

the wetlands by the fritillary is minimal. The proposed wetlands restoration and Tucker Creek stabilization work is not expected to result in an increase in nectar species beyond what is currently present.

There is currently about 463 acres of riparian habitat within the wildlife AA. Implementation of the proposal is expected to result in optimal Diana fritillary habitat within a year or two. The proposed TSI work planned, both manual and chemical, would not directly impact fritillary habitat as the work is planned on woody stems not nectar stems.

During the next 10 years across the wildlife AA, the proposal is expected to benefit the Diana fritillary and its habitat and is not likely to cause a trend toward federal listing or loss of species viability.

Cumulative Impacts: The hemlock wooly adelgid infestation would not impact the Diana fritillary directly; however, the loss of hemlock trees within the riparian area is expected to create openings. The loss of these trees would indirectly cause habitat to increase for the nectar species while not expected to decrease either the rhododendron or viola species.

Wildfires rarely enter riparian areas and burn at low intensity with low severity impacts within this moist environment. The negative impact to individual larvae or eggs is expected to last one season or generation; while the positive impact of increased nectar species is expected to be of three to five years in duration. Unlike the mobile adult fritillary species which are not likely be impacted by wildfires individual fritillary eggs or larvae could be eliminated. Since it is rare for a wildfire to occur or enter riparian areas, there is a low likelihood of negatively impacting the larval or egg stage of the fritillary. Therefore, the impact to adult fritillary is an increase in habitat for three to five years and minimal negative impacts to larvae or eggs.

Flower gardens surrounding private home sites would provide nectar species and the edge of many small fields and openings on private lands provide a corridor of brushy habitat with nectar species throughout the AA. State, Forest Service roads and private roads and open farm land would continue to provide nectar species habitat.

Adult nectar species habitat has generally been increased by past and on-going activities; however individual larvae and eggs may have been adversely impacted by wildfire. The cumulative loss of individuals and increase in nectar species habitat by past activities together with the proposed action alternatives are not likely to cause a trend toward federal listing or loss of viability across the analysis area.

No additional past or foreseeable future actions would impact Diana fritillary.

3.9.2.3 Aquatic Species

French Broad Crayfish (*Cambarus reburrus*)

Cambarus reburrus could exist within the Macedonia aquatic AA, due to the species' habitat preference "streams." The range for this species is limited to the Horsepasture River (Savannah River Drainage), Little Tennessee River and tributaries to the French Broad River in Buncombe, Henderson, Jackson, Madison, and Transylvania counties in North Carolina. Personal communication with Steve Fraley, NCWRC Non-game Aquatic Biologist, indicates that this particular species is very common within its range but is considered sensitive because the range of this species is small (2007). Surveys were conducted at each of the proposed culvert locations and no crayfish were present. This is likely due to the restricted flow regimes at the location of

these crossings. *Cambarus reburrus* could however exist during the wetter seasons of spring and winter when the area is not in a drought.

Direct Impacts: If the species exists at the stream crossing locations or in Tucker Creek at the stream restoration sites (though none was found during activity area surveys) individuals could be crushed during project activities. If individuals were lost during project activities, no threat to the overall populations or habitat would occur.

Indirect Impacts: Off-site movement of soil could occur during culvert installations and stream restoration on Tucker Creek. Sediment and turbidity could cause a temporary degradation of *Cambarus reburrus* habitat. This degradation would cease as sediments flush through the system during larger storm events (usually 1-2 per year).

Cumulative Impacts: There is one crossing on Long Branch Road (FSR 5074) that was identified as undersized and causing some erosion issues into an unnamed tributary to Long Branch. The action alternatives would address the issues associated with this crossing. The improvement of this crossing may improve habitat for *Cambarus reburrus* by creating more continuity of habitat through the crossing.

No cumulative impacts would occur to *Cambarus reburrus*, or habitat, as a result of the proposal being implemented. No risk to the population viability of *Cambarus reburrus* would occur as a result of the Macedonia Project implementation.

3.9.3 Forest Concern Species

The following Forest Concern (FC) species are not found in the activity areas or their habitat is excluded from proposed actions; therefore, there would be no direct, indirect, or cumulative effects: northern saw-whet owl, yellow-bellied sapsucker, cerulean warbler, Appalachian woodrat, green salamander, *Campanula aparinoides, Carex pendicalata, Diervilla rivularis, Entodon sullanti, Meehania cordata, Oenotheria perennis, Solidago ulinosa, Necturus maculosus, Cymocythere clavata, Waltoncythere acuta, Etheostoma inscriptum, Hybopsis rubrifrons, Micropterus coosae, Notropis lutipinnis, Percina nigrofasciata,* and *Pleurobema oviforme*.

The following table summarizes the FC species that could occur within the AAs along with potential effects by species for the action alternatives:

Table 3-15: FC Species and Potential Effects from Alternatives B, C, and D

Species	Type	Habitat	Potential Effects
Canoparmelia amabilis	Lichen	Pine-Oak Heath. Often occurring on laurel	Because of the rarity of this species and lack of biological information relating to possible impacts, the population would be excluded from proposed road construction and timber harvest activities. With exclusion, this proposal would have no impacts on this species.
Solidago ulinosa	Vascular Plant	Bogs	One Forest population of *Solidaga uliginosa* occurs near Tucker Creek. This population would not be directly (negatively) impacted by this proposal because it is not near the timber harvest (excluded by the riparian buffer) or the stream restoration. This

Species	Type	Habitat	Potential Effects
			proposal may be a positive impact on the open bog habitat needed for *this species.* Implementation of this proposal may increase open wet bog conditions and thus have a positive indirect impact on the species
Stellaria alsine	Vascular Plant	Open gravel bars along streams and rivers. Rocky shore and Bar	Construction of the stream restoration features would directly impact about 50% of the population (estimated) newly found along Tucker Creek. The proposal would have little indirect impacts to the habitat. The habitat of this species would be present after stream restoration occurs in about the same quantity and quality. Thus, this species is expected to recover to currently existing population numbers.
Matrioptila jeanae	Caddisfly	Lotic – streams	This species is known from ten streams and rivers in the Mountains and Piedmont and may be poorly sampled due to occurrence in small streams. If this species occurs in the areas of the crossing replacements, there could be direct effects to individuals and indirect effects to individuals immediately downstream. No cumulative effects are expected to occur. Even if individuals are lost during crossing replacements, no effect to the viability across the Forest would occur as result of the Macedonia Project.
Cryptobranchus alleganiensis	Amphibian	Lotic- large streams and rivers with clean substrates	Hellbenders are mobile organisms that would likely move from the area of stream restoration if they occur within Tucker Creek. Loss of individuals would not affect the viability of the species across the Forest. There would be no direct, indirect or cumulative effects to this species because the culvert replacement locations are in small headwater streams that do not have potential habitat for hellbenders nor would the short-term sediment and turbidity reach stream courses that inhabit hellbenders.
Baetopus trishae	Mayfly	Lotic – streams	This species is listed as a FC species; however, it is no longer tracked by the Natural Heritage Program. This species inhabits lotic habitats and is usually found in riffles. If this species occurs in the Macedonia AA at the two crossing replacement locations, individuals may be crushed or lost. Loss of individuals within the 52 linear feet of stream or in Tucker Creek at the stream restoration sites would not affect the viability of the species across the Forest.
Barbaetis benfieldi	Mayfly	Lotic – streams	The NC Heritage Program notes that this particular mayfly may be under sampled because of its extremely narrow window of "collectibility". If this species exists within the Macedonia Project area, particularly in the

Species	Type	Habitat	Potential Effects
			crossing replacement areas and the stream restoration area, loss of individuals may occur. If individuals are lost, no effect to the viability across the Forest would occur as a result of the Macedonia Project.
Drunella longicornis	Mayfly	Lotic – streams	There is very limited information about this species available and they may be under sampled. This species could occur at crossing replacements or in Tucker Creek at the stream restoration locations however, loss of individuals would not cause a change in species viability across the Forest.
Habrophlediodes spp	Mayfly	Lotic – streams	There is very limited information about this species available and they may be under sampled. This species could occur at crossing replacements or in Tucker Creek at the stream restoration locations however, loss of individuals would not cause a change in species viability across the Forest.
Bolotoperla rossi	Stonefly	Lotic	There is very limited information about this species available and they may be under sampled. This species could occur at crossing replacements or in Tucker Creek at the stream restoration locations however, loss of individuals would not cause a change in species viability across the Forest.
Isoperla frisoni	Stonefly	Lotic	There is very limited information about this species available and they may be under sampled. This species could occur at crossing replacements or in Tucker Creek at the stream restoration locations however, loss of individuals would not cause a change in species viability across the Forest.

3.10 Old Growth Communities

3.10.1 Existing Condition

The Forest Plan describes the purpose of retaining old growth communities: [T]*he desired future condition for old growth across the forest is to have a network of small, medium, and large sized old growth areas, representative of sites, elevation gradients, and landscapes found in the Southern Appalachians and on the Forests, that are well dispersed and interconnected by forested lands. Areas to be managed for old growth would be selected considering the following criteria: 1. Priority consideration for areas currently exhibiting high quality old growth characteristics, including areas in the initial inventory of possible old growth; 2. Areas with unique species diversity; 3. Community, soil type, aspect, and elevation; 4. Other resource concerns and management objectives* (Forest Plan, page III-26).

Currently, there are no acres of Forest Plan initial inventory old growth communities identified in AA 14. The Continuous Inventory of Stand Condition (CISC) stand age and other available data are used for comparison and selection. Stand age can be used to compare old-growth condition and evaluate alternatives. Within the southern Appalachian mountains, most natural

forest communities may have minimum old-growth characteristics at about the 120-140 years old and may be considered for old-growth (Guidelines for Conserving and Restoring Old-Growth Forest Communities on National Forests in Southern Region, USFS). Other disciplines (MIS) may employ slightly different age definitions. In the current condition, the AA has no stands that are mature enough (120-130 years old) to be considered old-growth communities. Fragments (<20 acres) of old-growth communities or individual trees may be scattered throughout the AA. These fragments of mature communities or individual trees are not considered to be an intact community and are of a smaller old-growth community value. Due to existing fragmentation in the AA (private lands), older more mature stands were considered for "potential" old growth. Compartments 111, 115, 116, 117, and 126 would need at least 50 acres of small patch old growth communities (at least 250 acres total) designated respectively to meet Forest Plan standards for small patch old growth communities due to the ground disturbing activities proposed within them (Forest Plan, page III-27). There is no medium patch or large patch Forest Plan old growth communities currently designated in AA 14; however, there is currently 52 acres of small patch old growth community designated in Compartment 110 (stand 33). See also additional analysis on old growth communities disclosed in Appendix C below.

3.10.2 Alternative A – Direct, Indirect, and Cumulative Effects

Under this alternative, there would be no harvesting and the existing condition of not meeting Forest Plan standards for designated small patch old growth community habitat in the two compartments would continue. Existing stands would remain intact. Past, present, and reasonably foreseeable actions listed in Table 3-1 above would not have measurable adverse cumulative effects on old growth communities in the project area because no action is proposed with this alternative that could be cumulatively added to them.

3.10.3 Alternative B – Direct, Indirect, and Cumulative Effects

No adverse effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; 338 acres would be designated as small patch old growth communities and would not be scheduled for future harvest (250 acres is needed to meet minimum Forest Plan standards); and no stands in the Macedonia Project AA averaging greater than 101 years are scheduled for harvesting with this alternative. In addition, about 2,116 acres (30%) of the AA is designated as unsuitable for timber harvesting (MA 2C and MA 4C) and are capable of serving as unfragmented reservoirs of old and mature habitat.

The designation of Stands 111-22, 115-19, 116-16, 117-03, and 126-04 (338 acres) under Alternatives B, C, and D as small patch old growth would have the direct effect of contributing to the AA designated old-growth by the following:

1) The designated are representative of the natural communities within the AA (Table 3-17 below). The proposed stands are mature stands and over the average age of stands within the AA. The designated stands are in juxtaposition of each other providing old-growth community linkage.
2) The designation would contribute to areas with unique species diversity and includes the proposed North Carolina State natural heritage area near Spice Cove.
3) Are in areas that minimize *other resource concerns (conflicts with recreation and timber harvest) or other management objectives* (Forest Plan, page III-26).

Cumulatively, the stands in the AA are maturing faster than harvest levels—there is a net gain in mature forests in the AA over time. If the current proposed rate of harvest were sustained, by the year 2057, 62% of all the stands within the AA would be mature enough to have potential old-growth characteristics. Thus, over time the current proposed action would not appreciably affect old-growth communities. There are no other foreseeable future actions identified in the Macedonia Project AA that could adversely affect old growth communities.

3.10.4 Alternative C – Direct, Indirect, and Cumulative Effects

No adverse effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; 338 acres would be designated as small patch old growth communities and would not be scheduled for future harvest (250 acres is needed to meet minimum Forest Plan standards); and no stands in the Macedonia Project AA averaging greater than 101 years are scheduled for harvesting with this alternative. In addition, about 2,116 acres (30%) of the AA is designated as unsuitable for timber harvesting (MA 2C and MA 4C) and are capable of serving as unfragmented reservoirs of old and mature habitat. Cumulatively, the stands in the AA are maturing faster than harvest levels—there is a net gain in mature forests in the AA over time. There are no other foreseeable future actions identified in the Macedonia Project AA that could adversely affect old growth communities.

3.10.5 Alternative D – Direct, Indirect, and Cumulative Effects

No adverse effects to old growth communities are expected because no Forest Plan designated old growth communities or initial inventory old growth communities would be harvested; 338 acres would be designated as small patch old growth communities and would not be scheduled for future harvest (250 acres is needed to meet minimum Forest Plan standards); and no stands in the Macedonia Project AA averaging greater than 101 years are scheduled for harvesting with this alternative. In addition, about 2,116 acres (30%) of the AA is designated as unsuitable for timber harvesting (MA 2C and MA 4C) and are capable of serving as unfragmented reservoirs of old and mature habitat. Cumulatively, the stands in the AA are maturing faster than harvest levels—there is a net gain in mature forests in the AA over time. There are no other foreseeable future actions identified in the Macedonia Project AA that could adversely affect old growth communities.

The following tables summarize age-classes for the Macedonia Project AA by alternative along with old growth disclosures and natural communities in the AA and small patch old growth designations:

Table 3-16: Age-Class for Macedonia Project in AA 14 by Alternative and Old Growth Communities Disclosures

Measurement	Alternative A current	Alternative B post harvest	Alternative C post harvest	Alternative D post harvest
Acres treated by age-class				
Project Area				
0-10 years old	0 ac (<1%)	319 ac (4.6%)	281 ac (4.1%)	178 ac (2.5%)
11-20 years old	244 ac (3%)	0 ac (0%)	0 ac (0%)	0 ac (0%)
21-50 years old	389 ac (6%)	0 ac (0%)	0 ac (0%)	0 ac (0%)
51-100 years old	6,269 ac (90%)	5,986 ac (86%)	6,022 ac (86%)	6,091 ac (87%)
101-140+ years old	44 ac (<1%)	44 ac (<1%)	44 ac (<1%)	44 ac (<1%)
Acres of existing Forest	0	0	0	0

Measurement	Alternative A current	Alternative B post harvest	Alternative C post harvest	Alternative D post harvest
Plan designated old growth or initial inventory old growth communities proposed for harvest				
Acres of newly designated small patch old growth	0	338	338	338

Table 3-17: Comparison of Existing AA Natural Communities within the AA to Natural Communities within the Proposed Small Patch Old Growth

Natural Community	Est. % of Total in AA	% of Total in Proposed Small Patch
Acidic Cove Forest	46%	52%
Chestnut Oak Forest/Pine Oak Heath	14%	8%
Montane Oak-Hickory Forest	19%	12%
White Pine Forest	21%	28%
Total	**100%**	**100%**

3.11 Other Areas of Concern

3.11.1 Alternative A – Direct, Indirect, and Cumulative Effects

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

3.11.2 Alternatives B, C, & D – Direct, Indirect, and Cumulative Effects

There would be no measurable direct, indirect, or cumulative effects from any of these alternatives because none propose actions within park lands, prime farmlands, wetlands (as per 1977 Executive Orders 11988 and 11990), wild and scenic rivers, or ecologically critical areas. It also would not violate local law or requirements imposed for the protection of the environment. There are no other known foreseeable actions in the activity areas that could adversely affect park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

CHAPTER 4 – CONSULTATION WITH AGENCIES AND OTHERS

The following individuals helped develop this environmental assessment:

4.1 ID Team Members

4.1.1 Core IDT

Scott Ashcraft – Zone Archaeologist
Sandy Burnet – Zone Wildlife Biologist
Erik Crews – Forest Landscape Architect
Dave Danley – Zone Botanist
Michael Hutchins – IDT Leader
Ted Oprean – Project Leader, Silviculturist
Lorie Stroup – Zone Fisheries Biologist

4.1.2 Other Forest Service Personnel Providing Input

Diane Bolt – Resource Assistant, Pisgah RD
Randy Burgess – Pisgah District Ranger
Dennis Danner – Pisgah/Highlands RD Zone Wildlife Biologist
Dave Dyson – Pisgah NF Zone Archaeologist
Barry Jones – Civil Engineer, NFs NC
Patrick Scott – Fire Management Officer, Pisgah RD
Amber Vanderwolf – Pisgah NF Zone GIS Coordinator

4.2 Federal, State, and Local Agencies Providing Input

Brian Cole – USDI Fish and Wildlife Service
Dave McHenry – North Carolina Wildlife Resources Commission
Michael Schafale – North Carolina Department of Environment & Natural Resources

4.3 Others Providing Input

Over 25 members of the public provided comments on the proposal during scoping and at a public meeting in September 2007. A complete list of individuals is located in the project record.

APPENDIX A – BIOLOGICAL EVALUATION

I. INTRODUCTION

The purpose of this biological evaluation (BE) is to provide the decision maker with relevant biological information as to the possible effects and impacts this proposal may have to Federally Threatened, Endangered and Regional Forester's Sensitive species (TES).

This BE documents the possible biological effects and impacts of a proposed timber sale and activities known as the Macedonia Project Environmental Assessment (EA). Included within this preferred alternative proposal (Alternative C) are: developing, using, and maintaining existing roads and skid roads, wildlife plantings, restoring/stabilizing wetlands and stream banks, treatment of non-native invasive species, site preparation and release of harvested areas, regeneration harvest treatment, and small patch old growth designation (see Chapter 2 of the EA for a more complete description of acreage, distances, procedures, and areas).

A detailed description of the proposal is disclosed in Section 1.2, Chapter 1 of the Macedonia Project EA. A list of project design features and monitoring is disclosed in Section 2.4 of the same Chapter. A list of definitions, including analysis areas is located at the end of this BE.

A. LOCATION

The proposed activities are located in Transylvania County, Compartments 111, 115, 116, 117, and 126.

II. METHOD OF EVALUATION AND SURVEYS

Potentially affected/impacted TES species and habitat were identified from the following sources (sensitive species list dated March 19, 2002):

1) Information on TES species and their habitat on the Nantahala and Pisgah National Forests were obtained from the North Carolina Wildlife Resources Commission (NCWRC), U.S. Fish and Wildlife Service (USFWS), and North Carolina Natural Heritage Program (NCNHP) occurrence records.
2) Surveys completed for this analysis, past surveys, and analysis for projects within or near the analysis areas.
3) Consulting with individuals both in the public and private sector who are knowledgeable of the area and its biota.

The results of the above methods yielded 57 TES species known in Transylvania County (see Attachment 1 below); one TES species (*Hexastylis rhombiformis*) known to occur in the AA and three TES species (bog turtle, Diana fritillary, and *Cambarus reburrus*) likely to occur in the AA; and two TES species (Diana fritillary and *Cambarus reburrus*) are likely to occur in the activity areas.

III. SURVEY INFORMATION

A. BOTANICAL SURVEYS

The field surveys were conducted by a meander search pattern to survey all the variation in habitat within the units. The survey was conducted until all of the habitats within the unit were surveyed. After no new plant species were added to the unit species list after a minimum of 20 minute's search was made (timed meander search), the survey was considered complete. Focused attention was given during the surveys to habitats within the units that may be associated with plant TES, species, i.e., rock outcrops, seeps, etc. The intensity of the coverage varied depending on the extent of any likely TES, species habitat, complexity of vegetation, and/or presence of indicator species. Some areas were virtually devoid of herbaceous vegetation and required very little intensive survey while other areas required considerably more time to adequately survey. Although the search was focused on the possibility of occurrences of the TES, plants listed on Table A-1; all TES plant species were searched for during the survey. Some species may have been over looked; however, the survey was conducted so that a TES plant species would not be overlooked due to phrenology or time of the year that the species could reasonably be detected. Table A-2 summarizes the habitats and/or communities in the activity area specified and the occurrence of plant TES species.

The proposed activity areas were surveyed by David M. Danley, Forest Botanist on: April 25, 26; July/August 8, 13; September 18, 24, 25; and October 9, 2007. All proposed units or activity areas were visited at least once during this time.

Other relevant Botanical surveys include the Pisgah Mt. Timber Sale (2005, Transylvania County), the Parker Creek Timber Sale (2000, Transylvania County) and an inventory of the significant natural areas of Transylvania County, North Carolina (in preparation). Of particular importance, was consulting with field Botanist, Karin Heiman who has conducted extensive field surveys with proposed activity areas**.**

A summary of the field surveys are provided in Table A-2. This table lists the habitats, natural communities, and plant TES species found in each activity area.

B. WILDLIFE SURVEYS

Bat surveys within the analysis area were completed on July 31, 2007 and resulted in four common species of bats being caught and/or recorded. Bird surveys were completed on May 9, 2007 by USFS Wildlife Biologist, Dennis Danner. Snail and salamander surveys conducted by USFS Wildlife Biologist, Sandy Burnet, found that only common species occurred within the activity areas. Gabrielle Graeter, North Carolina Wildlife Commission – Non-Game Division (NCWRC-NG) and Sandy Burnet, USFS Wildlife Biologist, surveyed a bog area adjacent to Tucker Creek within Stand 111-9 on October 24, 2007. No bog turtles were found; however, potential bog turtle habitat exists. No spruce/fir habitat (assoicated with the Northern flying squirrell) exists within the activity areas. Field surveys identified no TES listed species or habitat within the activity areas.

C. AQUATIC SURVEYS

Project information was obtained from Ted Oprean, USDA Forest Service (USFS) Forester. Lorie Stroup, USFS Fisheries Biologists and Matt Smith, USFS Technician, conducted fish, aquatic habitat and aquatic macroinvertebrate surveys of the proposed aquatic project and analysis areas in the spring and summer months of 2007. Fish surveys were conducted in cooperation with the District 9 fisheries biologist and fisheries technicians of the NCWRC's Inland Fisheries Division.

The fish surveys were conducted in Jake Branch, Methany Creek, Johnnies Creek, Lamance Creek, and Tucker Creek using an electrofishing back pack shocking device. Other surveys consisted of examining streams within the aquatic activity area, noting habitat quality, quantity, and suitability for rare aquatic species, as well as existing impacts and their source. Aquatic insect surveys were conducted above and below the two proposed stream crossing replacements. Samples were collected by walking stream reaches and sampling various habitats by turning over rocks, investigating leaf packs and using a serber net for depositional habitats.

IV. EXISTING BIOLOGICAL CONDITION

A detailed review of species information and habitat is found within the botanical, aquatic, and, wildlife analyses located in the project record and has been prepared based on the best available information at the present time.

A. BOTANICAL

The botanical analysis area (AA) or "boundary of effects" used for this proposal is defined as: the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element occurrence) of any plant TES species. The botanical AA consists of 12,998 acres. All potential effects (direct, indirect and cumulative) to botanical resources in the botanical AA were analyzed using this "boundary". The botanical AA definition was selected because it is analogous to the Natural Heritage Program and The Nature Conservancy's plant delimitation guidelines of EO.

TES Plant Species

Of the total 46 plant TES species known to occur in Transylvania County, North Carolina (Attachment 1), all but one T & E and eight S plant species (Table A-1) were dropped from further consideration, discussion and analysis for one of the following reasons: 1) lack of suitable habitat for the species in the botanical AA; 2) the species has a well-known distribution that does not include the analysis area; or 3) based on field surveys, no habitat was seen in the activity areas. Habitats, community types and ranges of plant TES species are derived from information in The Classification of the Natural Plant Communities of North Carolina, the Natural Heritage Program's List of Rare Plant of North Carolina or information obtained through other botanist.

One Regional Forester's S species (*Hexastylis rhombiformis*) is known to occur within the botanical AA. The other known 46 TES plant species to occur within the botanical AA would not be adversely affected or impacted by the proposal because they do not exist and/or habitat is

not present within the Macedonia project areas. No other TES botanical species are known to occur within the botanical AA but some may have potential habitat (Table A-1) in the AA.

Based upon habitat model information (Simon 2005), nine TES plant species listed in Table A-1 have apparently suitable habitat[1] and could occur in the analysis area. Other than the species listed in the above paragraph, no other TES plant species are known to occur within the botanical AA. A list of TES plants that occur in Transylvania County is found in Attachment 1. A list of TES plants that potentially could occur in the project or activity areas is listed in Table A-1 and summarizes the list of TES plant species that are: known to occur, or has apparently suitable habitat in the botanical AA.

Table A-1: Potential & Known TES Plant Species in the Macedonia Botanical AA

Species	Type	Natural Community or Habitat	Occurrence
Federally T&E plant species			
Isotria medeoloides	Vascular plant	White Pine Forest, Mesic Oak-Hickory	Not known to occur in AA or activity area.
2002 Region 8 Regional Forester's S plant species			
Carex manhartii	Vascular Plant	Rich Cove Forest, Acidic Cove Forests	Not known to occur in AA or activity areas
Carex ruthii	Vascular Plant	Seeps. In open areas such as roadsides.	Not known to occur in AA or activity areas
Hexastylis rhombiformis	Vascular Plant	Alluvial areas near large rivers (French Broad) within Acidic Cove Forest	Known to occur along riparian areas adjacent to the French Broad River. Not known to occur within proposed activity areas.
Shortia galacifolia var. bristylis	Vascular Plant	Acidic Cove Forests	Not known to occur in AA or activity areas
Thermopsis fraxinifolia	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Not known to occur in AA or activity areas
Trillium rugellii	Vascular Plant	Alluvial areas near large rivers. Rich Cove Forests	Not known to occur in AA or activity areas
Monotropsis oderata	Vascular Plant	Chestnut Oak Forest	Not known to occur in AA or activity areas
Tsuga caroliniana	Vascular Plant	Chestnut Oak Forest, Pine Oak-Heath Forest.	Not known to occur in AA or activity areas

Table A-2: Natural Communities and plant TES Species by Compartment and/or Stand

Compartment/ Stand	Natural Communities or Habitat (Approx. Acres)	Occurrence of Plant TES Species

[1] "Apparently suitable habitat" used within in this document (same as the Natural Heritage program definition) to mean "surveyed or unsurveyed areas not known to be occupied by an element, but which appear capable (under natural conditions) of supporting viable individuals of that element, based on one or more observed or mapped factors (soils, geology, hydrology, vegetation topography, aspect, elevation, etc.) known to delimit or predict other occurrences of the same element.

Compartment/ Stand	Natural Communities or Habitat (Approx. Acres)	Occurrence of Plant TES Species
111/04	White pine (planted) unknown original natural community (30)	No other TES plant species known
111/05 (Thinning)	White Pine (planted) unknown original natural community (21)	No other TES plant species known
111/09	White Pine (planted) unknown original natural community (14)	No other TES plant species known
111/13	Chestnut Oak Forest (15), Acidic Cove Forest (4)	No other TES plant species known
111/15	Chestnut Oak Forest (30), Acidic Cove Forest (3)	No other TES plant species known
111/19	Chestnut Oak Forest (16)	No other TES plant species known
115/03	Acidic Cove Forest (16)	No other TES plant species known
115/09	Acidic Cove Forest (8), Chestnut Oak Forest (10)	No other TES plant species known
115/15	Chestnut Oak Forest (10), Acidic Cove Forest (9), Montane Oak Hickory (10)	No other TES plant species known
115/20	Acidic Cove Forest (2), Chestnut Oak Forest (10)	No other TES plant species known
115/21	Chestnut Oak Forest (22), Acidic Cove Forest(5)	No other TES plant species known
116/05	Chestnut Oak Forest (40)	No other TES plant species known
116/19	Chestnut Oak Forest (26)	No other TES plant species known
116/20	White Pine (31)	No other TES plant species known
116/21	Acidic Cove Forest (2), Chestnut Oak Forest (20) with white pine	No other TES plant species known
126/18	Montane Oak Hickory(16)	No other TES plant species known
126/19	Chestnut Oak Forest (14)	No other TES plant species known
All new temp roads and roads added to the trans system	Various, mostly Chestnut Oak Forest and Acidic Cove Forest four miles	No other TES plant species known
Stream restoration	Acidic Cove/Alluvial Forest	No other TES plant species known
Creation of wildlife fields	Mostly Chestnut Oak Forest (1)	No other TES plant species known

Plant Communities and Habitats Found in the Macedonia Botanical AA

The Macedonia botanical AA can be characterized by mid elevation mountain region plant communities. The area has several southeast to south trending drainages through the analysis area. The major streams for the botanical AA are the North Fork of the French Broad River and the West Fork of the French Broad River. A succession of southeast trending, interlinking ridges are found between these drains. The highest points of these ridges are about 2,800 feet (Spice Cove Mountain and Piney Mountain). The drainage flows downward to about 2,200 feet to the

south towards the North Fork French Broad River. The botanical AA exhibits many typical natural communities of the low to mid elevation southern Appalachian mountains.

Four common community types are characteristic within the botanical AA. These communities are: Pine-oak Heath Forest, Chestnut Oak Forest, White Pine Forest and Acidic Cove Forest. Montane Alluvial Forest and Rocky Shore and Bar communities are associated with the low elevation areas directly adjacent to a major stream but are best developed along the French Broad River tributaries. Small habitat areas such as small rock outcrops and forested seeps and streams can be imbedded within these communities. Natural communities often grade together and definite boundaries are usually difficult to see. However, there is often a pattern to these comminutes on the landscape. Within the botanical AA, the Acidic Cove Forest and White Pine Forest often occupy areas near streams, lower cove slopes and northern aspects. Higher cove slopes, south and western slopes are often dominated by the Chestnut Oak Forest. Pine Oak Heath Community is found on dryer ridges and slopes. The Montane Oak-Hickory Forest, Montane Alluvial Forest and anthropogenic communities have the most diverse herbaceous component of the communities found within the botanical AA. However, overall, the analysis area has very poor herbaceous diversity. All of the communities are very common community types and have a relatively low probability of occurrences for TES plant species (See Schafale and Weakley for a detailed description and discussion of these communities). Therefore, the habitat has a general low potential for plant TES species to occur in the potential activity areas. The primary natural communities affected by this proposal are the Chestnut Oak Forest, White Pine Forest and Acidic Cove Forest.

Using 1) the natural vegetation predictive model (S. Simon, USFS); 2) CISC data (USFS); and field experience, the acres of natural communities are estimated in Table A-3 within the botanical AA.

Table A-3: Estimated Quantity of Communities within Botanical AA

Community	Estimated Acres/ % of Total Habitat in Botanical AA	Acres over 50 years old
Acidic Cove Forest	4,776 acres / 38%	4,222 acres
Chestnut Oak Forest/Pine Oak Heath	2,067 acres/ 16%	1,843 acres
Alluvial Forest (mostly along French Broad River) on private lands converted to pasture	100 acres/ 1%	Unknown
Montane Oak-Hickory Forest	3,232 acres/ 26%	2,052 acres
White Pine Forest	2,430 acres/ 19%	2,046 acres
Totals	**12,605 acres**	**10,163 acres**

State Natural Heritage Areas, Research Natural Areas (RNA) and Special (botanical) Areas

There are no proposed State Natural Heritage Areas, RNAs, or Botanical Special Interest Areas recognized by the current Forest Plan within the botanical AA; therefore, this proposal would have no effect to any of these areas.

Past Actions within the Botanical AA (Considered in Cumulative Effects)

Timber harvest (<50 years old), large wild land fires (> 100 acres), and agricultural conversion are the only sufficient activities to have a measurable effect upon habitat for plant populations. These are summarized in Table A-3.

B. WILDLIFE EXISTING CONDITION

In determining the habitat present and potential occurrence for TES species, the wildlife analysis considered the 6,994 acre Macedonia AA. There is one T, one E, and four S wildlife species recorded within Transylvania County.

Table A-4: Wildlife Species Found within Transylvania County

Species	Type & Status	Potential of Occurrence	Considered in Detail for Macedonia
Bog Turtle	Reptile, T	Potential habitat outside proposed harvest activity area.	No
Carolina northern flying squirrel	Mammal, E	No habitat within proposed activity areas.	No
Rafinesque's big-eared Bat	Mammal, S	Historical county record and not recorded during surveys.	No
Appalachian Bewick's wren	Bird, S	Historical county record, Not recorded during surveys.	No
Peregrine Falcon	Bird, S	No habitat within proposed activity areas.	No
Diana fritillary	Insect, S	County record, No record within AA however may occur	Yes

There is potential habitat for the Bog Turtle, *Clemmys muhlenbergii,* within the wetlands complex north of Stand 111-9. The wetlands was originally created and/or expanded by beaver, which have since left the area. The wetlands were evaluated by Gabrielle Graeter, North Carolina Wildlife Commission – Non-Game Division (NCWRC-NG) and Sandy Burnet, USFS Wildlife Biologist, on October 24, 2007. The Forest Hydrologist considered the proposed wetlands work and a final proposal to restore the wetlands and potential bog turtle habitat is in the project record.

The Diana fritillary, *Speyeria diana,* has been documented within 15 of the 18 western most counties. Over half of the occurrences, greater than 40, are known to occur within the Nantahala or Pisgah National Forest. As a result of all the documentations for this species, the North Carolina Natural Heritage Program no longer formally tracks Diana fritillary (Legrand et al. 2004). The distribution of population sizes of this species in the State is fairly well known. This butterfly likes rich woods with host plants of both *Viola* and rhododendron for the larval stage and adjacent edges or openings with nectar species for the adult stage. Habitat for the Diana Fritillary is found throughout the AA within riparian areas where moist conditions are found. Habitat is also found in early successional forests. Nectar species are found along both State and Forest Service roads within this AA. Although no Diana fritillary were observed during surveys

of the roads—there is suitable habitat present within the activity areas, the protected adjoining streams, and across the AA.

C. AQUATIC EXISTING CONDITION

Substrate within the activity area waters (Table A-5) was evaluated and visually estimated. The three primary types of substrate that exist were documented at each macroinvertebrate sample site. This information is valuable for determining the amount of habitat available for TES species as well as other aquatic organisms.

Table A-5: Forest Plan Watershed 31 (North Fork French Broad River)

Stream Name	Compartment/ Stand	Miles in Activity Areas	Miles in AA	Classification
Jake Branch	111 (15), 111 (13)	0.34	0.95	C;Tr
Tucker Creek	111 (5), 111 (4)	0.53	4.39	C;Tr
Un-named Tributary (UT) Tucker Creek 1	117 (6)	0.03	0.61	C;Tr
UT Tucker Creek 2	111 (5), 111 (4)	0.19	0.34	C;Tr
Lamance Creek	116 (5)	0.38	2.5	C;Tr
UT Lamance Ck 1	116 (21), 116 (5)	0.11	0.94	C;Tr
UT Lamance Ck 2	116 (5)	0.19	0.53	C;Tr
North Fork of French Broad		0.0	7.23	B
Long Branch	116 (3), 115 (10)	0.38	1.89	C;Tr
UT Long Branch	116	0.5	0.9	C;Tr
Spice Cove	115 (21), 115 (14)	0.34	0.79	C;Tr
UT Spice Cove	115 (20)	0.25	0.5	C;Tr
Diamond Creek	126 (19)	0.15	2.99	C;Tr
Bynum Branch	126 (10)	0.23	0.76	C;Tr
Total		**3.62**	**25.32**	

*The NC Department of Environmental Management designates classifications and water quality standards known as "Classifications and Water Quality Standards Applicable to the Surface Waters and Wetlands of North Carolina." The "C" classification denotes waters suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation, and agriculture. "Tr" denotes waters that support trout. The "B" classification indicates waters that are primarily for recreation.

In the Macedonia aquatic AA, landforms can be characterized as Valley Types I, II, and VIII using the Rosgen (1996) classification. Typical for these valley types, the Macedonia area has predominantly stable stream types characterized as "A", "B", "C", and "E", depending on the valley type that they occur. Within a reach of Tucker Creek, tributary to North Fork French Broad River, stream bank stability is moderate overall within the "C4" stream type. In several locations in this reach stream bank erodibility is high, due mostly to the lack of vegetation on stream banks. Where unstable channel conditions occur in Tucker Creek, stream rehabilitation is proposed (within approximately ½ mile of stream) to improve channel stability and aquatic habitat. Implementation of this work is expected to reduce sediment loading from the reach to near background (undisturbed) levels. Rates of erosion from stream banks following this type of work are estimated to decrease by 91 percent, based on forest monitoring of storm recovery work implemented during 2006 and 2007.

Table A-6: Aquatic TES Species in Transylvania County

Species	Type	Habitat	Occurrence
Federally Threatened and Endangered Species			
Alasmidonta raveneliana (Appalachian elktoe)	Mussel	Lotic-fast, clean substrate rivers	Does not occur in AA.
2002 Region 8 Regional Forester's Sensitive Species List			
Cambarus reburrus (French Broad Crayfish)	Crayfish	Lotic-moderately flowing streams in headwaters	Likely to Occur in activity area
Cambarus chaugaensis (Oconee stream crayfish)	Crayfish	Lotic-fast, clean substrate rivers (Horsepasture River in Savannah River Drainage)	Does Not Occur in AA
Macromia margarita (Mountain river cruiser)	Dragonfly	Lotic-streams and rivers	Not Likely to Occur in AA

Aquatic Threatened and Endangered Species

Three aquatic T&E species are either known to occur or may occur on the Pisgah and Nantahala National Forests (Attachment 1). The North Carolina Heritage database was queried for occurrences of T&E species for Transylvania County. One species remained after this initial filter, *Alasmidonta raveneliana.* This species inhabits riverene habitat which exists only in the lower reaches of the aquatic AA in the North Fork of the French Broad River. The document ***Recovery Plan for the Federally Listed Aquatic Species on the National Forests in NC*** stated: *Surveys of the French Broad and its tributaries in Transylvania County failed to locate any specimens of the Appalachian elktoe*. Therefore, *Alasmidonta raveneliana* has been dropped from further analysis.

Aquatic Sensitive Species

Eighteen aquatic S species are either known to occur or may occur on the Pisgah and Nantahala National Forests (Attachment 1). The North Carolina Natural Heritage Database was queried for occurrences of S species in Transylvania County. Three S aquatic species remained after this initial filter. *Cambarus chaugaensis* or Oconee stream crayfish is listed for Transylvania County, but only in the Savannah River Drainage. Therefore, Oconee stream crayfish has been dropped from further analysis for the Macedonia Project.

Cambarus reburrus or French Broad crayfish may occur within the aquatic AA for the Macedonia Project. According to NCWRC Non-game Aquatic Biologist Steve Fraley, this species is very common within the Horsepasture River (Savannah River Drainage) and the upper French Broad watersheds (including the North Fork of the French Broad) but not common anywhere else in the Mountain region, thus the reason for the species' listing. This species could occur throughout the aquatic AA, but would only be impacted if it occurred at or immediately

below the two stream crossings that are to be replaced or within Tucker Creek at the location of the stream restoration.

Macromia margarita, or the Mountain river cruiser, is listed for Transylvania County by the NC Heritage Database as being "historical." This means that the species has either been extirpated from the county or there have not been recent surveys to verify the EO. The habitat for this species is "riverene." The only "riverene" habitat within the aquatic AA for Macedonia is in the North Fork of the French Broad River. Since no impacts are expected to occur to the North Fork of the French Broad, and this species has no current records in Transylvania County, *Macromia margarita* would not be analyzed further for the Macedonia Project.

V. EFFECTS/IMPACTS OF PROPOSED MANAGEMENT ON TES SPECIES

This section and Table A-7 summarize the effects to TES species. Other ecological effects or possible effects to other species may be found within the resource reports.

Table 7: Summary of Effect/Impact to TES Species known or Likely to Occur in Biological AA(s)

Species	Type	Effects/Impacts
Federal T&E Species		
Clemmys muhlenbergii Bog Turtle	Reptile	No direct effects, Positive effects to potential habitat
2002 Region 8 Regional Forester's S Species List		
Diana fritillary, *Speyeria diana*	Insect	Indirect positive impacts by increased nectar habitat
Cambarus reburrus (French Broad crayfish)	Aquatic invertebrate	May impact individuals, no impact to viability across the Forest
Hexastylis rhombaformis	Vascular Plant	No impact. No habitat or populations near activity

A. EFFECTS/IMPACTS TO TES PLANT SPECIES

There are no Federal T&E or Regionally S plant species known within the proposed activity areas or close enough to be affected/impacted by this proposal. *Hexastylis rhombiformis* is the only known Regionally S plant species known to occur within the botanical AA. However, *Hexastylis rhombiformis* is known to occur along riparian areas adjacent to the French Broad River. This is sufficiently far enough away from any proposed activity to have no impact to *Hexastylis rhombiformis* or its habitat. Therefore, this proposal would not affect/impact any TES plant species.

Potential Habitat Cumulative Effects/Impacts

The cumulative effect/impact to potential habitat is the total affect of past, current, and foreseeable actions within the botanical AA that have directly or indirectly affected TES plant

species potential habitat. Within the botanical AA, only timber harvest and controlled burns are thought to have important influence on habitat. All other activities are minor and not analyzed (hurricane and storm road repair, special forest product permits, recreation, etc.).

Past timber harvest and clearing activities greater than 50 years old are thought to be recovered for forest species requiring more mature habitat conditions and unsuitable for species requiring early successional habitat. The following table summarizes these effects of proposed harvest actions and past harvest actions less than 50 years old.

Table A-8: Summary of Cumulative Effects/Impacts of Past & Future Timber Harvest upon Potential Suitable Habitat for TES Plant Species within Known within Botanical AA

Potential Habitat for Regionally Sensitive Plant Species in the action alternative for Macedonia						
Habitat	**Total Acres in AA**	**Associated Species**	**Past impact(s) (<50 years old)**	**Proposed impact(s) in acres**	**Future impact(s)**	**Total Impact/ % of Total Habitat in AA**
Acidic Cove Forest	4,776	None	554	44	None known	598 acres/13%
White Pine Forest	2,440	None	384	82	None known	464 acres/19%
Rich Cove Forest	10	None	10	None proposed	None known	Not affected
Pine Oak Heath/ Chestnut Oak Forest	2,067	None	87	179	None Known	266 acres/13%
Montane Oak Hickory	3,232	None	378	26/	None known	404 acres/13%
Alluvial Forest	<100	*Hexistylis rhombiformis*	Not affected	None proposed	None known	Habitat not affected
Bog/ wetlands	<10 acre	None	Not affected	<0.1	None known	<1%

B. EFFECTS/IMPACTS TO TES WILDLIFE SPECIES

Potential Direct and Indirect Impacts to the Diana Fritillary

The proposed action would increase the nectar species habitat within the newly created early successional habitat and within grass/forb openings developed. Temporary road construction would result in short term nectar species habitat (post-harvest). Because these road openings are generally narrow, the canopy closes relatively quickly therefore eliminating sunlight to the forest floor and herbaceous growth. A small amount of habitat within the riparian area of Tucker Creek would be impacted initially by the proposed stream stabilization work. This work would involve the felling of scattered trees within the riparian area to construct various structures. However, due to the limited and scattered nature of the trees to be cut, impacts to fritillary habitat are not expected to be measurable. Given the open condition of the wetlands area and little or no rhododendron species present, it was determined that utilization of the wetlands by the fritillary is minimal. The proposed wetlands restoration and Tucker Creek stabilization work is not expected to result in an increase in nectar species beyond what is currently present.

There is currently about 463 acres of riparian habitat within the wildlife AA. Implementation of the proposal is expected to result in optimal Diana fritillary habitat within a year or two. The proposed TSI work planned, both manual and chemical, would not directly impact fritillary habitat as the work is planned on woody stems not nectar stems.

During the next 10 years across the wildlife AA, the proposal is expected to benefit the Diana fritillary and its habitat and is not likely to cause a trend toward federal listing or loss of species viability.

Cumulative Impacts to the Diana Fritillary and its Habitat

The hemlock adelgid infestation would not impact the Diana fritillary directly; however, the loss of hemlock trees within the riparian area is expected to create openings. The loss of these trees would indirectly cause habitat to increase for the nectar species while not expected to decrease either the rhododendron or viola species.

Wildfires rarely enter riparian areas and burn at low intensity with low severity impacts within this moist environment. The negative impact to individual larvae or eggs is expected to last one season or generation; while the positive impact of increased nectar species is expected to be of three to five years in duration. Unlike the mobile adult fritillary species which are not likely be impacted by wildfires individual fritillary eggs or larvae could be eliminated. Since it is rare for a wildfire to occur or enter riparian areas, there is a low likelihood of negatively impacting the larval or egg stage of the fritillary. Therefore, the impact to the adult fritillary is an increase in habitat for three to five years and minimal negative impacts to larvae or eggs.

Flower gardens surrounding private home sites would provide nectar species and the edge of many small fields and openings on private lands provide a corridor of brushy habitat with nectar species throughout the AA. State, Forest Service roads and private roads and open farm land would continue to provide nectar species habitat.

Adult nectar species habitat has generally been increased by past and on-going activities; however individual larvae and eggs may have been negatively impacted by wildfire. The cumulative loss of individuals and increase in nectar species habitat by past activities together with the proposed action alternatives are not likely to cause a trend toward federal listing or loss of viability across the analysis area.

No additional past or foreseeable future actions would impact Diana fritillary.

Potential Direct, Indirect, and Cumulative Effects to the Bog Turtle

There is potential habitat for the bog turtle, *Clemmys muhlenbergii,* within the wetlands complex north of Stand 111-9. The wetlands was originally created and/or expanded by beaver, which have since left the area. The wetlands were evaluated by Gabrielle Graeter, North Carolina Wildlife Commission – Non-Game Division (NCWRC-NG) and Sandy Burnet, USFS Wildlife Biologist, on October 24, 2007. The Forest Hydrologist considered the proposed one acre bog enhancement and a final proposal to restore the bog and potential bog turtle habitat is in the

project record. According to Ms. Graeter, improving the bog would increase habitat for the bog turtle. Improving the bog could improve the range of the species if the species utilizes this available one acre of habitat.

No other TES wildlife species or their habitat is located within the activity areas; therefore, no other TES wildlife species or their habitat would be affected/impacted.

C. EFFECTS/IMPACTS TO REGIONAL FORESTER'S SENSITIVE AQUATIC SPECIES

French Broad Crayfish (*Cambarus reburrus*)

Cambarus reburrus could exist within the Macedonia aquatic AA, due to the species' habitat preference "streams." The range for this species is limited to the Horsepasture River (Savannah River Drainage), Little Tennessee River and tributaries to the French Broad River in Buncombe, Henderson, Jackson, Madison, and Transylvania counties in North Carolina. Personal communication with Steve Fraley, NCWRC Non-game Aquatic Biologist, indicates that this particular species is very common within its range but is considered sensitive because the range of this species is small (2007). Surveys were conducted at each of the proposed culvert locations and no crayfish were present. This is likely due to the restricted flow regimes at the location of these crossings. *Cambarus reburrus* could however exist during the wetter seasons of spring and winter when the area is not in a drought.

Direct Impacts: If the species exists at the stream crossing locations or in Tucker Creek at the stream restoration sites (though none was found during activity area surveys) individuals could be crushed during project activities. If individuals were lost during project activities, no threat to the overall populations or habitat would occur.

Indirect Impacts: Off-site movement of soil could occur during culvert installations and stream restoration on Tucker Creek. Sediment and turbidity could cause a temporary degradation of *Cambarus reburrus* habitat. This degradation would cease as sediments flush through the system during larger storm events (usually 1-2 per year).

Cumulative Impacts: There is one crossing on Long Branch Road (FSR 5074) that was identified as undersized and causing some erosion issues into an unnamed tributary to Long Branch. The action alternatives would address the issues associated with this crossing. The improvement of this crossing may improve habitat for *Cambarus reburrus* by creating more continuity of habitat through the crossing.

No cumulative impacts would occur to *Cambarus reburrus*, or habitat, as a result of the proposal being implemented. No risk to the population viability of *Cambarus reburrus* would occur as a result of the Macedonia Project implementation.

VI. REQUIRED MITIGATION MEASURES

Botanical Species

There are no mitigation measures recommended for botanical TES species.

Wildlife Species

There are no mitigation measures recommended for wildlife TES species.

Aquatic Species

There are no mitigation measures recommended for the protection of aquatic TES species. Implementation of project Best Management Practices and Forest Practice Guidelines would protect potential habitat for *Cambarus reburrus*.

VII. DETERMINATION OF EFFECT

Botanical

This proposal would not affect (directly, indirectly, or cumulatively) any proposed or listed Federal T&E plant species. Consultation with USFWS is not required. This proposal would have no known cumulative negative effects to any Federally Listed/Federally Proposed plant species.

This proposal would not impact any Regional Forester's S plant species.

Wildlife

There would be no effect to T&E species or habitat by any alternative considered in the Macedonia EA; formal consultation with USFWS is not required.

There are no known threatened or endangered species within the proposed project area. However, potential habitat exists for the bog turtle north of Stand 111-09. Wetlands characteristics are expected to be improved (positive indirect impact) by the proposed restoration due to a local higher water table. Because county occurrence records are found within approximately one mile of this site, it is expected the bog turtle population could expand to the restored wetlands once preferred habitat conditions improve (*Sphagnum* mats). Bog turtle is not covered in North Carolina under Section 7 of the Endangered Species Act; therefore, no consultation with USFWS is not required (pers. conv. Allen Ratzlaff, USFWS, 2007).

Adult Diana fritillary (*Speyeria Diana*) nectar species habitat has generally been increased by past and on-going activities; however, individual larvae and eggs may have been adversely impacted by wildfire. The cumulative loss of individuals due to wildfire and the overall increase in nectar species habitat by past activities together with the proposed action, is not likely to cause a trend toward federal listing or loss of viability across the analysis area.

No other Regional Forester's S wildlife species or their habitat is located within the activity areas.

Aquatic

No risk to population viability of any aquatic federally listed species across the Forest would occur as a result of the implementation of the Macedonia Project. The project would have no effect on any federally listed aquatic species or their habitat.

No risk to population viability of any aquatic S species across the Forest would occur as a result of the implementation of the Macedonia Project. Surveys of the Macedonia Project area did not find *Cambarus reburrus.* No crayfish (any species) were found at the proposed stream crossing locations or at the site of the stream restoration on Tucker Creek. If this species exists at these activity area locations, individuals could be lost during project implementation. However, no loss to the viability of the species would occur across the Forest. Therefore, the project would have no impact on S aquatic species or their habitat.

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Attachment 1

These lists are a compilation of 1) North Carolina Natural Heritage biological data base; 2) US Fish & Wildlife Service records; or 3) recent occurrence not in data base.

Botanical

Federally Listed T&E Plant Species

Species	Natural Communities	Occurrence
Geum radiatum	High Elevation Rocky Summit	4
Gymnoderma lineare	High Elevation Rocky Summit, Moist Rock Outcrop in Acidic	4
Helonias bullata	Southern Appalachian Bog, Swamp Forest-Bog Complex	4
Isotria medeoloides	White Pine Forest, Mesic Oak-Hickory	4
Sarracenia jonesii	Southern Appalachian Bog	4

Regional Forester's S Plant Species

Species	Natural Communities	Occurrence
Aconitum reclinatum	Northern Hardwood Cove Forest, Boulderfield Forest, High	4
Aneura maxima	Spray Cliff	4
Anzia americana	Gorge, Acidic Cove	4
Aspiromitus appalachianus	Stream	4
Bartramidula wilsonii	Spray Cliff, Moist Montane Acidic Cliff, Gorge	4
Berberis canadensis	Rich Cove Forest, Glade, mafic rock	4
Botrychium jenmanii	Rich Cove Forest	4
Bryocrumia vivicolor	Spray Cliff, Moist Montane Acidic Cliff, Gorge	4
Carex biltmoreana	High Elevation Granitic Dome, Montane Cedar-Hardwood	4
Carex misera	High Elevation Rocky Summit, Montane Acidic Cliff, High	4
Cheilolejeunea evansii	Acidic Cove, Oak-White Pine Forest, Escarpement Gorge	4
Chelone cuthbertii	Southern Appalachian Bog	4
Cleistes bifaria	Pine-Oak/Heath Forest, Pine-Oak Woodland, Shortleaf Pine	4
Drepanolejeunea appalachiana	Acidic Cove, Montane Oak-Hickory, Serpentine Woodland, Serpentine Forest	4
Eurybia avita	Low Elevation Granitic Outcrop	4
Fothergilla major	Pine-Oak/Heath Forest, Montane Oak Woodland, Roadside	4
Glyceria nubigena	Northern Hardwood Forest, Boulderfield Forest, High	4
Hasteola suaveolens	Montane Alluvial Forest	4
Hexastylis rhombiformis	Acidic Cove Forest, Hemlock Hardwood Forest, Montane	2
Hydrothyria venosa	Stream	4
Hypericum graveolens	High Elevation Seep, Wet Meadow	4
Juglans cinerea	Rich Cove Forest, Mesic Oak-Hickory, Montane Alluvial	4
Leptodontium excelsum	Spruce-Fir Forest	4
Lysimachia fraseri	Mesic Oak-Hickory Forest, Montane Oak Forest, Rich Cove	3
Megaceros aenigmaticus	Stream	4
Monotropsis odorata	Rich Cove Forest, Mesic Oak-Hickory, Xeric Oak-Hickory,	3
Nardia lescurii	Acidic Cove Forest, near streams	4
Plagiochila austinii	Moist Montane Acidic Cliff	4
Plagiochila caduciloba	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest	4
Plagiochila echinata	Spray Cliff, Streamside, Rock Outcrop in Acidic Cove Forest	4
Plagiochila sharpii	High Elevation Rocky Summit, Rock Outcrop in Acidic Cove	4

Species	Natural Communities	Occurrence
Plagiochila sullivantii var.	Spray Cliff, Spruce-Fir Forest	4
Plagiochila virginica var.	Spray Cliff, Rock Outcrop in Acidic Cove Forestin Gorge	4
Plagiomnium carolinianum	Rock Outcrop in Acidic Cove Forest in Gorge, Streambank	4
Platyhypnidium pringlei	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge	4
Polytrichum	Rocky Summits, mid to high elevation	4
Prenanthes roanensis	Northern Hardwood Forest, Grassy Bald, Meadow, Roadside,	4
Radula sullivantii	Spray Cliff, Rock Outcrop in Acidic Cove Forest in Gorge	4
Rhododendron vaseyi	Northern Hardwood Forest, High Elevation Seep, Southern	4
Schlotheimia lancifolia	Oak-Hickory Forest, Acidic Cove Forest, Hemlock	4
Shortia galacifolia var.	Acidic Cove Forest, Streambank, Gorge	4
Stachys clingmanii	Northern Hardwood Forest, Boulderfield Forest	4
Thalictrum macrostylum	Serpentine Woodland, Serpentine Forest, moist woods?	4
Thermopsis fraxinifolia	Xeric Oak-Hickory Forest, Montane Oak Woodland, Pine-	3
Trillium rugelii	Rich Cove Forest, low elevation	3
Tsuga caroliniana	Carolina Hemlock Forest, Montane Acidic Cliff, Pine-	3
Waldsteinia lobata	Acidic Cove Forest, Mesic Oak-Hickory, Gorge	4

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

Wildlife

The following table lists those species found within Transylvania County:

Species	Type & Status	Potential of Occurrence
Bog turtle	Reptile, T	Potential habitat outside proposed harvest activity area.
Carolina northern flying squirrel	Mammal, E	No habitat within proposed activity areas.
Rafinesque's big-eared Bat	Mammal, S	Historical county record and not recorded during surveys.
Appalachian Bewick's wren	Bird, S	Historical county record, Not recorded during surveys.
Peregrine falcon	Bird, S	No habitat within proposed activity areas.
Diana fritillary	Insect, S	May occur

Aquatic

Rare Species List - Transylvania County List (Updated 06/13/06)			
Common Name	**Scientific Name**	**Type**	**Likelihood of Occurrence**
T&E Species			
Appalachian elktoe	*Alasmidonta raveneliana*	mussel	Does Not Occur (1)

S Species			
Oconee stream crayfish	*Cambarus chaugaensis*	crayfish	Does Not Occur (1)
French Broad crayfish	*Cambarus reburrus*	crayfish	May occur (4)
mountain river cruiser	*Macromia margarita*	dragonfly	Not Likely to Occur (5)

* **Endangered (E) or Threatened (T):** as listed by the U.S. Fish and Wildlife Service
Sensitive (S): as listed by the U.S. Forest Service (Region 8, 2002)
Locally Rare (LR): as listed by the National Forests in North Carolina, must meet at least **one** of the following:
1. State Rank S1, S2, or S3
2. Federal Species of Concern
3. State Threatened or Endangered

Definitions

Threatened, or Endangered (T&E) is a species that has been listed or is proposed for listing by the United States Fish and Wildlife Service. These species are included in every BE conducted for projects where the species is known to, likely to, or may occur. These species are also included in projects where the species occurred historically but hasn't been found during recent surveys.

Sensitive Species (S) is a species appearing on the Regional Forester's Sensitive Species List for the Southern Region (March 19, 2002). These species are included in every BE conducted for projects within an area where the species is known to, likely to, or may occur.

Known to Occur: those species in which there are records that they exist within a specified area, or it was found in the area during project specific surveys.

Likely to Occur: those species in which there is no documentation of the species occurring in a specified area but are expected to occur based on documentation of very similar habitat to known populations. For purposes of the BE, it should be assumed that the species does occur in specified area until presence/absence of the species is verified.

May (could) Occur: the species probably occurs in a specified area in the broadest sense. Only very general habitat preferences and species distribution are used to determine if a species may occur. This does not imply their existence in an area, but that their general habitat description is found in the area, so therefore the species may occur. See the attached resource reports for "may occur".

Forest Plan Analysis Area (AA): 4^{th} order watersheds as determined by the Forest Plan.

Biological Analysis Area: The maximum geographic boundary where cumulative biological effects of analyses from past, present, and reasonably foreseeable actions are expected to be combined with effects from the proposal. Analysis areas are specific to individual resources and may be different boundaries. The **botanical AA** is the total area within 2 kilometers of any proposed unit (activity area) or known EO (Element occurrence) of any plant T&E, S, and FC species. The botanical AA consists of 12,605 acres. The **wildlife AA** effects were evaluated over is the Macedonia Analysis Area #14 (6,994 acres). The thinning proposed within Stand 117-6 (AA

#15) was also evaluated. The **aquatic AA** encompasses waters downstream that potentially could be impacted by project activities, in addition to activity area waters. The aquatic AA is larger than the activity area.

Management Area: Forest Plan designated areas with specific management objectives, standards, and guidelines.

Project Area: The general location identified by the Responsible Official where actions are proposed.

Activity Area: The geographic boundary where direct effects of the proposal would specifically occur, i.e. specific timber stands, haul routes, temporary roads, linear wildlife fields, trails, prescribed fire, areas where invasive exotic species would be treated, etc. and would change by alternative.

Coldwater Streams: Are usually defined as those with maximum temperatures of 68 degrees F or less. In North Carolina, these streams are largely ground-water fed, have relatively stable flows and generally elevations of 1,100 feet or more. They have gradients that are steep with stable banks. Boulder-rubble dominates their bottoms, and their turbidity is low. Productivity is usually limited.

Coolwater Streams: Represent the transitional community between coldwater streams and warmwater streams. Components of the community may include elements of both coldwater and warmwater habitats.

Warmwater Streams: Are characterized by having annual maximum temperatures greater than 68 degrees F.

Log Landing (deck): Location within a harvest unit or adjacent to a harvest unit where cut logs are temporarily stored for eventual placement on log trucks for hauling to mills. Landings are generally less than an acre in size each, typically require blading, have numerous types of heavy equipment on/near them, and are rehabilitated following harvest activities by disking and seeding. Sometimes following harvest activities they serve as wildlife openings and may have trees favored by wildlife planted on them (apples).

Skid Roads: Access routes within a harvest unit that are developed with the blade of a bulldozer or grader. Timber is then dragged on them with heavy equipment to a log landing. They are used to reduce the overall amount of ground accessed by heavy equipment; however, log trucks do not access them. Routes are identified between the timber purchaser and Forest Service and approved by the Forest Service prior to development. They are rehabilitated following harvest activities by disking and seeding and sometimes serve as wildlife openings.

Skid Trails: Access route within a harvest unit that does not have a blade break new ground. Heavy equipment is used to drag timber on them to a log landing and typically is on top of branches, brush, and other similar vegetation. They are used to reduce the overall amount of ground accessed by heavy equipment; however, log trucks do not access them. They are rehabilitated following harvest activities by brushing and sometimes are mulched and seeded if soil is exposed.

APPENDIX B – AGE CLASS DISTRIBUTION

The Macedonia Church Forest Management Project is located in Pisgah District Analysis Area (AA) 14 (6,994 acres), Compartments 111 (875 acres), 115 (1124 acres), 116 (1023 acres) and 126 (1088 acres). Compartment 117 falls within AA 15 but would have no reforestation treatments and thus would not affect Age Class Distribution so it would not be analyzed. Analysis Area 14 contains Management Areas (MA) 3B, timber emphasis; MA 2C motorized scenery emphasis; and MA 18 embedded within the other management areas consists of aquatic and riparian ecosystems.

Management Area 3B, suitable for timber production (Forest Plan, page III-71) dominates AA 14 (67%) and Compartments 111 (88%), 115 (52%), 116 (69%) and 126 (73%). Inventory data shows that the age-class distribution is unbalanced for MA 3B in Analysis Area 14 and Compartments 111, 115, 116 and 126.

This analysis is to determine the maximum harvest levels for the project area according to the Forest Plan. Both action alternatives would help to balance the age-class distribution to a lesser or greater degree.

Forest Plan Direction for Distribution of Early Successional Habitat

The Forest Plan contains specific desired conditions for the amount of 0-10 year age-class in MAs suitable for timber production: MA 1B and MA 3B - at least 5% not to exceed 15%; MA 2A -at least 5% not to exceed 10%; and MA 4A and MA 4D - not to exceed 10%, (Forest Plan, pages III-29 – III-32). The amount of 0-10 age class is regulated at three geographic scales: the analysis area; the management area within the analysis area; and the compartment(s) within the analysis area. Projects which create 0-10 year age class must meet AA, MA, and compartment standards as directed by the Land and Resource Management Plan (Forest Plan) Amendment 5. Compartment standards typically provide the limiting factor within a timber proposal as they cannot be exceeded to achieve MA or AA standards without amending the Forest Plan.

Table B-1: Suitable/Unsuitable Acres in Analysis Area 14

Compartment	Suitable Acres	Unsuitable Acres	Total Compartment Acres
108	543	53	596
109	719	412	1,131
110	771	221	992
111	773	102	875
115	582	542	1,124
116	701	322	1,023
126	789	299	1,088
127		165	165
Totals	**4,878**	**2,116**	**6,994**

The information below summarizes the existing 0-10 year age-class and regeneration goals for Analysis Area 14 Pisgah Ranger District and for the Macedonia Church Forest Management Project in Compartments 111, 115, 116 and 126. Acres in management areas not suitable for timber management are not considered in the analysis of 0-10 year old regeneration at the analysis area scale.

Analysis Area Analysis

For every analysis area with at least 250 acres in MAs 1B, 2A, 3B, 4A and/or 4D, the amount of 0-10 year age class allowed in the analysis area is calculated as follows:

For MAs 1B, 2A, 3B, 4A and 4D multiply the number of acres in each MA by the maximum percent allowed in Analysis Area 14:

1B & 3B	~ 4,679 acres x 15%	=	702 acres
2A	~ 0 acres x 10%	=	0 acres
4A & 4D	~ 199 acres x 10%	=	20 acres
	4,878 ac		**722 acres (max)**

For Management Areas 1B, 2A, 3B, 4A and 4D multiply the number of acres in each MA by the minimum percent allowed in Analysis Area 14:

1B & 3B	~ 4,679 acres x 5%	=	234 acres
2A	~ 0 acres x 10%	=	0 acres
4A & 4D	~ 199 acres x 0%	=	0 acres
	4,878 ac		**234 acres (min)**

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

Table B-2: AA 14 Acre Calculations 0-10 Year Age-Class (Compartments 108, 109, 110, 111, 115, 116, 126 and 127)

		0-10 Year Age-Class[1]			Harvest Goals	
Pisgah Analysis Area	Suitable Acres 1B, 2A, 3B, 4A & 4D	Min Allowed[1]	Max Allowed[1]	Existing 0-10	Min	Max
14	4,878	234	722	0	234	722

1 – Minimum and maximum 0-10 allowed cannot exceed levels allowed under Compartment analysis, thus the lower number than 5%-15% allowed in each AA. Existing 0-10 age class is based on year 2008 planned year of harvest.

Management Area Analysis

For every MA with at least 250 acres in the AA, the amount of 0-10 year age-class allowed in the MA is calculated by multiplying the number of acres in each MA in the AA by the maximum percent allowed. Each result is the amount of 0-10 year age-class allowed in that MA.

Table B-3: MA Acre Calculations 0-10 Year Age-Class (Compartments 108, 109, 110, 111, 115, 116, 126, and 127)

		0-10 Year Age-Class			Harvest Goals	
MA	Forested Acres	Min Allowed[1]	Max Allowed[1]	Existing 0-10	Min	Max
3B	4,679	234	702	0	234	702
4A, 4D	199	-	20	0	-	20
2C, 4C, 13, 18	2,116	-	-	-	-	-
Totals	**6,994**	**234**	**722**	**0**	**234**	**722**

1 – Minimum and maximum 0-10 allowed cannot exceed levels allowed under Compartment analysis, thus the number lower than 5%-15% allowed in the MA. 0-10 age class is based on 2008, year of planned harvest.

Compartment Area Analysis

For every compartment with at least 250 acres in MAs 1B, 2A, 3B, 4A, or 4D, the amount of 0-10 year age-class allowed in each compartment is calculated by first determining which MA has the most acres in the compartment (1B, 3B, 2A, 4A, or 4D). If 1B and 3B have the most, then

the maximum 0-10 year age-class is 15 percent of all acres in the compartment. If 2A, 4A, or 4D have the most acres, then the maximum amount allowed 0 – 10 year age-class is 10 percent of all acres in the compartment. The following table displays the allowable 0 - 10 age-class by compartment:

Table B-4: Pisgah District AA 14 Compartments 111, 115, 116 and 126 0-10 Year Age-Class

			0-10 Year Age-Class			Harvest Goals	
Compartment	Mgmt. Area	Forested Acres	Min Allowed	Max Allowed	Existing 0-10	Min	Max
111	3B	773	39	116	0	39	116
115	3B	582	29	87	0	29	87
116	3B	701	35	105	0	35	105
126	3B	789	39	118	0	39	118
Totals		**2,845**	**142**	**426**	**0**	**142**	**426**

Note: All suitable acres are in MAs 3B, there is no existing 0-10 yr acreage within the project area. 0-10 age class is based on 2008, planned year of harvest.

Comparison of Alternatives for Early Successional Habitat

The Forest Plan's General Direction for 0-10 age-class distribution states: *Assure a regular and sustained flow of habitats across the Forests through space and time for diversity and viability of plant and animal populations* (Forest Plan III-29).

This analysis compares the action and no-action alternatives to see which alternatives best meet the desired future conditions for early successional habitat (0-10 age class) for acres at the three geographic scales and through time based on a 10 year entry cycle as directed by Forest Plan Standards, Page III-75.

Table B-5 shows the acres of proposed regeneration by alternative with respective % by geographic scale. Both action alternatives meet the minimum percent of 0-10 age class by AA, but Alternative A does not meet the minimum. The minimum percentage of 0 -10 age class is 5% (112 acres) of the MA 3B land base, or 1.14 % of the AA.

Table B-5: Percent of 0-10 age-class Distribution by Alternative of Proposed Timber Harvest (Base Year 2008)

Alt	Proposed Harvest Acres & % 0-10 at Compartment Scale								Acres & % 0-10* at 4A & 3B MA Scale (4,878 ac)		Acres & % 0-10* at AA Scale (6,994 ac)	
	C 111 875		C 115 1124		C116 1023		C 126 1088					
A	0 ac	0.0%	0 ac	0.0%	0 ac	0.0%	0 ac	0.0%	0 ac	0.0%	0 ac	0.0%
B	99 ac	11.3%	102 ac	9.1%	88 ac	8.6%	30 ac	2.8%	319 ac	6.5%	319 ac	4.6%
C	73 ac	8.3%	100 ac	8.9%	78 ac	7.6%	30 ac	2.8%	281 ac	5.8%	281 ac	4.0%
D	26 ac	3.0%	44 ac	3.9%	78 ac	7.6%	30 ac	2.8%	178 ac	3.6%	178 ac	2.5%

The comparison of alternatives in Table B-6 show that Alternatives B and C meet Forest Plan Direction and Standards for regulating the 0-10 age class distribution at three geographic scales. Alternatives A and D do not meet the minimum 0-10 age class distribution at all 3 geographic levels.

Table B-6: Comparison of Alternatives by Age-Class Distribution (Base year 2008)

Alternative	Acres Harvest	Acres of Existing 0-10 in Analysis Area	Total Acres of 0-10 in Analysis Area (including existing 0-10)	Meets Forest Plan Direction for 234 Acres Minimum at AA Scale
A	0	0	0	No
B	319	0	319	Yes
C	281	0	281	Yes
D	178	0	178	No

Age Class Distribution over Time

In addition to meeting Forest Plan Standards for 0-10 age class distribution spatially at 3 geographic scales the project must also meet the 0-10 age class distribution over a time frame. The time frame for maintaining the minimum 234 acres in Management Area 3B is 10 years into the future.

Tables B-7, B-8, and B-9 demonstrate the effects of each alternative on the 0-10 age-class distributions in Analysis Area 14 over a 10 year period.

Table B-7: Alternative A 0-10 Age-Class Distribution Over 10 year Period in AA 14 (Must maintain at least 234 acres or 3.3% of analysis area 14 over a 10 year period)

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % Analysis Area	**0 0.0%**	**0 0.0%**	**0 0.0%**	**0 0.0%**	**0 0%**	**0 0%**	**0 0%**	**0 0%**	**0 0%**	**0 0%**	**0 0%**	**0 0%**
Compartment 108 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 109 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 110 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 111 %Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 115 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 116 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 126 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 127 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

Alternative A does not meet Forest Plan standards for minimum early successional habitat in AA 14.

Table B-8: Alternative B 0-10 Age-Class Distribution Over 10 Year Period in AA 14 (must maintain at least 234 acres or 3.3% of analysis area over a 10 year period)

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % AA	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**0 0.0%**	**0 0.0%**
Compartment 108 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 109 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % AA	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**319 4.6%**	**0 0.0%**	**0 0.0%**
Compartment 110 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 111 %Compartment	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	99 12.7 %	0 0%	0 0%
Compartment 115 % Compartment	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	102 9.1%	0 0%	0 0%
Compartment 116 % Compartment	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	88 8.6%	0 0%	0 0%
Compartment 126 % Compartment	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	0 0%	0 0%
Compartment 127 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

Alternative B meets Forest Plan standards as it would maintain early successional habitat above the Forest Plan Standard minimum of 3.3% for 10 years through 2018 within AA 14.

Table B-9: Alternative C 0-10 Age-Class Distribution Over 10 Year Period in AA 14 (must maintain at least 234 acres or 3.3% of analysis area over a 10 year period)

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % AA	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**281 4.0%**	**0 0%**	**0 0%**
Compartment 108 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 109 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 110 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 111 %Compartment	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	73 8.3%	0 0%	0 0%
Compartment 115 % Compartment	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	100 8.9%	0 0%	0 0%
Compartment 116 % Compartment	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	0 0%	0 0%
Compartment 126 % Compartment	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	0 0%	0 0%
Compartment 127 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

Alternative C meets Forest Plan Standard as it would maintain early successional habitat above the Forest Plan Standard minimum of 3.3% for 10 years through 2018 within AA 14.

Table B-10: Alternative D 0-10 Age-Class Distribution Over 10 Year Period in AA 14 (must maintain at least 234 acres or 3.3% of analysis area over a 10 year period)

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % AA	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**0 0%**	**0 0%**
Compartment 108 % Compartment:	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 109	0	0	0	0	0	0	0	0	0	0	0	0

Future	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total 0-10 Acreage % AA	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**178 2.5%**	**0 0%**	**0 0%**
% Compartment:	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Compartment 110 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Compartment 111 %Compartment	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	26 3.0%	0 0%	0 0%
Compartment 115 % Compartment	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	44 3.9%	0 0%	0 0%
Compartment 116 % Compartment	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	78 7.6%	0 0%	0 0%
Compartment 126 % Compartment	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	30 3.4%	0 0%	0 0%
Compartment 127 % Compartment	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%

Alternative D does not meet Forest Plan standards for minimum early successional habitat in AA 14 as it falls short of the minimum 3.3%.

APPENDIX C – OLD GROWTH COMMUNITIES ANALYSIS

Forest Plan Direction for Old Growth Restoration Patches

The Forest Plan contains specific directions for designating large, medium, and small old growth restoration patches (Forest Plan, pages III-26 – III-28). The Pisgah Ranger District is covered by Old Growth Patch 16 (Forest Plan Amendment 5 Appendix K page K-5). The administrative watershed affected by this project is 74. The requirements for this project are as follows: (1) Check for large old growth patches in Pisgah Analysis Area 14; (2) check for medium old growth patches in Pisgah Analysis Area 14; (3) select small old growth patches for Compartments 111, 115, 116, 117 and 126; and (4) field check stands in the initial inventory of old growth that would be directly affected by this project.

The purpose of the large patches is to serve as permanent reservoir of biological diversity and to provide preferred habitats for forest interior birds across the landscape. The intent is to allow the restoration of functional old growth ecosystems at the sub regional, Forest, and landscape scales.

The purpose of the medium patches is to serve as permanent reservoirs of biological diversity and to allow for the restoration of functioning old growth ecosystems at the landscape and Forest scales.

Large Patch: There are no large old growth patches within Pisgah District Analysis Area (AA) 14,

Medium Patch: There are no medium old growth patches within Pisgah District Analysis Area 14.

Initial Inventory of Old Growth

There are no patches of initial inventory old growth identified by the Forest Plan within AA 14.

Small Patch Old Growth Designation

There is currently one designated small patch within AA 14 in Compartment 110. There are no designated small patches within Compartments 111, 115, 116, 117, and 126.

In each Compartment containing more than 250 acres of National Forest System (NFS) land, select a small patch for future old growth management. If 5% of the compartment acres are already part of a large or medium patch, an additional small patch is not needed. Whenever possible, areas should incorporate some riparian habitat to enhance old growth values.

Select the small patches prior to the first ground disturbing project of at least five acres proposed in the compartment.

Select a contiguous area at least 5% the size of the NFS land in the compartment or at least 50 acres, which ever is greater.

The purpose of the small patch designation is to increase biological diversity and to provide structural components of old growth at the stand and landscape levels.

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

Table C-2: Designated Old Growth Small Patches in Macedonia Church Project Area (Compartments 111, 115, 116, 117 and 126)

Comp.	Comp. Acres	Min. Acres	Selected Acres	Stand No(s)	Age in 2007	FP Initial Inventory	Community Type
111	875	50	50	22	77 yrs	No	Dry-Mesic Oak Forests
115	1,124	56	73	06 & 19	80 & 85 yrs	No	Mixed Mesophytic Forests
116	1,023	51	63	16	87 yrs	No	Dry-Mesic Oak Forests
117	873	50	51	03	127 yrs	No	Dry-Mesic Oak Forests
126	1,088	54	101	04 & 16	85 & 90 yrs	No	Mixed Mesophytic Forests
Total	**4,983**	**261 (5.2%)**	**338 (6.8%)**				

APPENDIX D – APPROPRIATENESS OF HARVEST METHODS

Regeneration methods are discussed at length in Appendix E of the FEIS for the Forest Plan, and on pages E1-E2 in Amendment 5 of the Forest Plan. Choices include shelterwood cutting and clearcutting (even-aged management system), shelterwood with reserves (two-aged system), and group selection (uneven-aged system). At this time, single-tree selection (uneven-aged management) is not being considered as appropriate in meeting long-term regeneration needs to sustain productive stands of desirable tree species except in northern hardwood (beech-birch-sugar maple) or hemlock stands (all shade tolerant species). This is because regeneration objectives would not be met and single-tree selection does not work with the shade intolerant species that occur in the Macedonia Church Forest Management Project Area. Thinning and sanitation cutting may also occur, but they are intermediate treatments and would not establish regeneration.

With any method, there must be enough quantity and quality of timber to be removed to make a sale operable, i.e. economically feasible to log at a given stumpage price (stumpage is the price paid for standing timber). The minimum quantity would generally be three thousand board feet of sawtimber per acre, although markets may develop for lower value products. Sawtimber would be defined as trees that are large enough, less than 25% defect, and of commercially valuable species which could be sawed into grade 3 or better lumber. Some species like scarlet oak seldom contain any grade 3 logs because of defect. Other species like sourwood seldom reach large enough diameter to become sawtimber. Changes in markets may change operability standards in a local area as well as affecting stumpage price.

Operability and stumpage price are also affected by transportation cost, logging cost, and size of the area being logged. Costs of getting logs from the stump to the mill are higher for timber in remote areas, where haul roads must be built, or for timber logged with specialized logging equipment, e.g. with cable systems or with a helicopter. As costs increase, prospective timber purchasers lower their bid prices on stumpage to compensate. If the price they can pay becomes less than the minimum acceptable stumpage price, the timber becomes inoperable (no one would buy it).

Each logging crew, depending on the size of their operation and the value of the timber to be logged, would have a minimum amount of timber that would be economical for them to move in and cut. For instance, in a given stand, it might be economical for a given logging crew to harvest a clearcut as small as 10 acres to obtain 50 MBF. If group selection is chosen, where only about 25 percent of the area is regenerated per entry, 40 acres would be needed to provide the crew with the same amount of sawtimber. Therefore, operability becomes an important factor in determining which regeneration methods are appropriate.

Much concern has been expressed over **clearcutting** as a management tool. Other regeneration methods would be used when management objectives can be met and when the other methods are economically feasible. In a memo to Regional Foresters dated June 4, 1992, the Chief of the Forest Service stated that *"Clearcutting would be limited to areas where it is essential to meet forest plan objectives and involve one or more of the following circumstances:*

1. *To establish, enhance, or maintain habitat for threatened, endangered, or sensitive species.*

2. *To enhance wildlife habitat or water yield values, or to provide for recreation, scenic vistas, utility lines, road corridors, facility sites, reservoirs, or similar development.*
3. *To rehabilitate lands adversely impacted by events such as fires, windstorms, or insect or disease infestations.*
4. *To preclude or minimize the occurrence of potentially adverse impacts or insect or disease infestations, windthrow, logging damage, or other factors affecting forest health.*
5. *To provide for the establishment and growth of desired trees or other vegetative species that are shade intolerant.*
6. *To rehabilitate poorly stocked stands due to past management practices or natural events.*
7. *To meet research needs."*

These circumstances would be referred to on a site-specific basis when showing that clearcutting is optimum for a given stand.

Regeneration using the **group selection** method is appropriate where logging costs are relatively low and where there is enough volume and value in the stands to make selection cutting operable. Group selection is not traditionally done in very small stands or on slopes greater than 40 percent where cable logging is necessary, where timber volume or value is low, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **shelterwood** method of regeneration has been traditionally used where a residual seed source was needed for stand establishment or where new seedlings developed best with partial shade or protection from exposure. In the Appalachian Mountain region, seed from reserve trees (or "leave trees") are usually not needed to establish a new stand, but visual concerns often make shelterwood desirable. Leave trees must be those that would not likely be windthrown after having the adjacent trees cut. The residual overstory of a new shelterwood cut would look more park-like with the biggest and best trees evenly distributed across the landscape, rather than having a denuded appearance like a fresh clearcut might have. Regeneration would become established under the residual overstory. Then, at some later time depending on objectives, all or part of the overstory may be removed so it would not hinder further growth and development of the new stand. Some damage to the regeneration would occur during the overstory removal. Shelterwood is not appropriate on slopes greater than 40 percent where cable logging is necessary unless timber volume and values are very high. Shelterwood is not appropriate in stands where leaving an overstory would make the stands inoperable, or in stands where insect or disease hazards are high and widespread. It is also not appropriate where partial cutting and leaving a white pine seed source would result in conversion of mixed pine/hardwood stands to almost pure pine stands, if the accompanying long-term loss of mast production would be detrimental to local wildlife populations.

The **shelterwood with reserves** is a **two-age** regeneration method that is similar to the shelterwood method except the overstory removal is deferred until mid rotation (40-60 years for cove hardwoods) or indefinitely. In many cases it would remain until a new age class reaches rotation. With the development and growth of a new age class in the understory

along with the continued growth of the overstory, the stand takes on a two-aged structure. Since leave trees would not have to support a future operable sale, they do not have to be merchantable and not as many need to be left. The type of leave trees retained would depend on site-specific objectives. Basal area of leave trees should not exceed 30 sq ft/acre fifteen years following harvest in order not hinder further growth and development of the new stand. More than one harvest entry may be used to reduce basal area to this level. For example, a shelterwood removal could reduce basal area from 35 sq ft/ac to 15 sq ft/ac, thus perpetuating a two-aged stand. The two-age method is appropriate in operable stands on slopes greater than 40 percent and whenever there are enough suitable trees to leave that would live to be a part of the stand for 40-60 years into the future. Two-age would be appropriate to meet objectives other than timber production, e.g. if continuous acorn production is needed within a stand, if den trees are scarce, or if aesthetics is a consideration. Two-age would be appropriate on slopes greater than 40 percent if timber value is high enough to offset increased costs of skyline logging systems, and if visual concerns or wildlife habitat objectives cannot be met by clearcutting. Two-age is not appropriate in stands where leaving an overstory would make the stands inoperable or in stands that require full sunlight for propagation of the management species.

The following table describes factors to be considered in determining appropriateness of regeneration methods for each stand:

Table D-1: Factors Considered in Determining Appropriate Regeneration Methods

Compt/Stand	Acres for Alt B	Acres for Alt C	Acres For Alt D	Vol./ac (CCF)	1/ Timber Quality	2/ Leave Trees	3/ Future Removal	4/ Access	5/ Special Concerns
111/04	16	6	6	35.0	M	Y	N	G	H, I/D
111/05	21	20	20	8.7	M	Y	Y	G	H, I/D
111/09	14	14	14	31.9	M	Y	N	F	I/D
111/13	33	33	33	11.4	L	Y	N	G	
111/15	20	20	20	8.7	L	Y	N	G	V
111/19	16	0	0	11.6	L	Y	N	G	H
115/03	16	15	15	13.0	H	Y	N	G	H, I/D
115/09	18	17	17	11.5	M	Y	N	G	H
115/15	29	29	29	15.1	M	Y	N	G	
115/20	12	12	12	10.9	L	Y	N	G	
115/21	27	27	27	14.1	M	Y	N	G	
116/05	20	20	20	5.4	L	Y	N	G	V
116/19	15	15	15	10.7	M	Y	N	G	H
116/20	31	28	28	16.4	M	Y	N	G	H, I/D
116/21	22	15	15	10.1	L	Y	N	G	H
117/06	18	18	18	6.3	M	Y	Y	G	I/D
126/18	16	16	16	11.5	M	Y	N	G	
126/19	14	14	14	13.3	M	Y	N	G	B

1/ Timber Quality:
- Very High = ave dia > 20" - Northern Red Oak, White Oak, Black Cherry
- High = ave dia > 18" - Northern Red Oak, White/Chestnut Oaks, Yellow-poplar, White Pine
- Medium = ave dia < 18" - Small Diameter Sawtimber, Mixed Oak
- Low = ave dia does not come into play - Small Roundwood, Scarlet Oak, Chestnut Oak

2/ Leave Trees:
- Y = Well distributed, long-lived, meet objectives
- Spotty = Available in clumps; not well distributed
- N = Scarce, scattered, or high mortality risk

3/ Future Removal:	Yes	= Potential for operable removal of overstory
	No	= Removal would not be operable within 10 years
	Cable	= Slopes >40 percent require cable logging systems
4/ Access:	Good	= Less than 0.5 mile from existing haul road
	Fair	= 0.5-1.0 mile from existing haul road
	Poor	= Greater than 1.0 mile from existing haul road
5/ Special Concerns:	Conversion	= Risk that oak component be lost to pine
	Wildlife	= Modify to provide needs for wildlife
	Visual	= Modify to mitigate aesthetic concerns
	Insect/Disease	= High risk of loss due to SPB and/or loss due to oak decline
	Heritage	= High risk, existing sites or mitigate needed
	Botanical	= Modify to mitigate botanical concerns

The following table summarizes appropriate regeneration methods for each stand and what is proposed in each alternative:

Table D-2: Appropriate Regeneration Method by Stand by Alternative

Compt/ Stand	Acres for Alt B	Acres for Alt C	Acres for Alt D	Forest Type	Age	Method Of Logging	Intermediate Thinning	Selection	Two-Age
111/04	16	6	6	White Pine	48	RTS *			Alt B, C & D
111/05	21	20	20	White Pine	48	RTS	Alt B, C & D		
111/09	14	14	0	White Pine	53	RTS			Alt B & C
111/13	33	33	33	Upland Hardwood	91	RTS			Alt B & C
111/15	20	20	20	Upland Hardwood	77	RTS			Alt B, C & D
111/19	16	0	0	Upland Hardwood	77	RTS			Alt B
115/03	16	15	0	White Pine	97	RTS			Alt B & C
115/09	18	17	0	Cove Hardwood	100	Skyline			Alt B & C
115/15	29	29	0	Cove Hardwood	95	Skyline			Alt B & C
115/20	12	12	0	Upland Hardwood	85	RTS			Alt B & C
115/21	27	27	27	Upland Hardwood	97	RTS			Alt B & C
116/05	20	20	20	White Pine-Upland Hardwood	62	RTS			Alt B, C & D
116/19	15	15	15	Upland Hardwood	87	RTS			Alt B, C & D
116/20	31	28	28	White Pine-Hemlock	87	RTS			Alt B, C & D
116/21	22	22	0	Upland Hardwood	87	RTS			Alt B & C
117/06	18	18	0	White Pine-Upland Hardwood	33	RTS	Alt B & C		
126/18	16	16	16	Upland Hardwood	80	Skyline			Alt B, C & D
126/19	14	14	14	Upland Hardwood	80	Skyline			Alt B, C & D

* RTS – Rubber-tired Skidder

Timber Cutting Methods Considered

The following is a list of timber cutting methods which were considered in this analysis. A brief description is provided to help the reader understand these terms as they are used in this document:

Cutting for Even-aged or Two-aged Regeneration

Clearcutting

Regeneration or harvest method that removes essentially all the trees in a single operation to establish a new stand in a fully exposed microclimate. All merchantable trees on an area are harvested, and remaining trees are treated in site preparation. This method would be used only when no other method is feasible.

Shelterwood Cutting

The cutting of most trees, leaving those needed to produce sufficient shade to produce a new age class in a moderated microenvironment. Removal of the overwood is done in a sequence of treatments that can include three types of cuttings: (a) an optional preparatory cut to enhance conditions for seed production, usually 50-60 square feet per acre of basal area is left after this cut, (b) an establishment cut to prepare the seed bed and to create a new age class, usually 20-40 sq ft/acre of basal is left, and (c) a removal cut to release established regeneration from competition with the overwood. Normally, only healthy, wind-firm trees are left as overwood. The usual time frame for the preparatory cut, establishment cut to the removal cut falls within a 10 year period.

Two-Age Cutting

Similar to shelterwood cutting except fewer overstory trees are left in place, and they are not subsequently removed, so that two distinct ages of trees are maintained on the same site. Trees left as overwood should be long-lived since they may be expected to live 120 years or more (Beck 1986).

Cutting for Uneven Aged Regeneration

Uneven-aged (selection) methods regenerate and maintain a multi-aged structure by removing some trees in all size classes either singly, in small groups, or in strips. (*The Dictionary of Forestry, 1998).*

Group Selection Cutting

Cutting small openings between 0.2 and 1.0 acre each, distributed over a stand size area, with the intent to establish three or more distinct age-classes within a prescribed rotation. Width of an individual opening would be 1.5 - 2 times the average height of trees adjacent to the opening. Small trees having good growth potential may be left standing within openings, and priority for openings would be where mature timber occurs. The number of openings would depend on the size of the area where selection would be used, the frequency of timber sale entry, and the desired age of the oldest trees. Intermediate harvests to improve the condition of the residual stand or to establish advance regeneration may be done between openings when needed.

Intermediate Harvest

Cutting to anticipate mortality and improve the growth and vigor of the remaining trees without regard for the establishment of regeneration

Free Thinning

The removal of trees that are crowding desirable trees without regard to crown position as in selection thinning. The best trees in terms of species, size or quality are left to grow. Some minimum basal area is usually set using this type of cultural treatment.

Sanitation Thinning

Cutting trees that have been attacked or appear in imminent danger of attack from injurious agents (such as disease or insects) other than competition between trees. The best trees in terms of species or vigor are left to grow. No minimum basal area is set using this type of cultural treatment.

Selection or Crown Thinning

The removal of trees from the dominant and co-dominant crown classes in order to improve the growth of the remaining trees, but leaving enough desirable, healthy trees to recapture the potential of the site and develop into larger merchantable trees themselves in a reasonable time. This may be done with yellow-poplar on a good site, but only once during a rotation (Beck 1988).

Other Terms Used

Advance Reproduction

Young trees, usually seedlings and saplings, growing in the understory of existing stands.

Rotation

The time between regeneration and final harvest.

Stand

A community of trees sufficiently uniform in composition, age, site productivity, spatial arrangement, or condition to be distinguishable from adjacent communities, thereby forming a silvicultural or management entity.

APPENDIX E – FINANCIAL EFFICIENCY

Purpose

The purpose of the financial efficiency analysis is to present the estimated costs and revenues of the alternatives considered in the Environmental Analysis for the Proposed Macedonia Church Forest Management Project on the Pisgah Ranger District, Pisgah National Forest. As per Forest Service Handbook 2409.18, each timber sale in the project proposal expected to exceed $100,000 in advertised value requires a financial analysis to determine financial efficiency.

Assumptions

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

1. Discount Rate is 4%.
2. Inflation rate is 0% throughout the analysis period (60 years plus).
3. Estimated timber revenues for pine and poletimber were calculated using base prices from the Pisgah and Nantahala National Forests 1st Quarter Adjustment Sheet for Fiscal Year 2007 and base prices for hardwood species from the Base Price Calculation Worksheet dated 09/07/2007 prepared by Forest Timber Staff at the Supervisor's Office National Forests in North Carolina, Asheville, North Carolina.
4. Sale preparation costs and timber harvest administration costs were obtained from Fiscal Year 2007 budget figures for the National Forests in North Carolina. Sale preparation costs (layout, cruising and marking) are funded at $9.30/CCF and $2,400.00 per sale package prepared. Timber harvest administration costs are funded at $7535.00 per year of Sale (generally sales run 1-3 years depending on size and complexity).
5. Reforestation treatment costs are taken from current KV Plans that are similar in size and type of reforestation activities. Current overhead cost (Washington, Regional and Supervisors Offices) of 64.45% is included in this figure.
6. Road construction is estimated at and average of $75,000/mile and road reconstruction costs at an average of $35,000/mile. These are based on current road repair costs.
7. A 60-year long-term projection was used for comparison basis only. Many of these stands would be carried for a longer rotation period.

Limitations of Analysis

Any financial analysis must draw limitations on the amount of data to be included or the entire process would quickly become a mix of different alternatives and expected yields or losses. For instance, inflation rate is assumed to be 4% over the entire analysis period; a situation rarely encountered in the real world. The differences between the economic values of the alternatives remain the same, regardless of the inflation rate, so constant dollars were used for comparisons between alternatives. The following tables are an estimate of total project costs directly associated with a timber sale (sale preparation, essential reforestation and logging costs) and are used to determine timber sale financial efficiency.

Financial Analysis Worksheets

Table E-1: Sale Revenue Estimates for all Alternatives

Alternative	Timber Volume (CCF)	Revenues
A	0	$0
B	4,774	$643,007
C	4,087	$526,279
D	2,385	$308,424

Table E-2: Sale Cost Estimates – Alternative B

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	4774	9.30	$44,398
Harvest Administration	Year	3	$7,535	$22,605
Site Preparation Natural– Herbicide & Handtools	Acres	319	$340	$108,460
Road Engineering and Design Construction	Miles	0.7	$75,000	$52,500
Road Engineering and Design Reconstruction	Miles	5.0	$35,000	$175,000
Road Engineering and Design Add Roads to System	Miles	3.1	$35,000	$108,500
Temporary Road Construction	Miles	1.0	$25,000	$25,000
Total Costs				**$536,463**

Table E-3: Benefit Cost Ratio – Alternative B

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$643,007	$536,463	$106,544	1.20
60	4%	$25,720	$21,459	$4,262	1.20

PNV – present net value
BCR - benefit cost ratio

Table E-4: Sale Cost Estimates – Alternative C

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	4,087	$9.30	$38,009
Harvest Administration	Year	3	$7,535	$22,605
Site Preparation Natural – Herbicide & Handtools	Acres	218	$340	$95,540
Road Engineering and Design Construction	Miles	0.7	$75,000	$52,500

Activity	Units	Number	Cost/Unit	Total Costs
Road Engineering and Design Reconstruction	Miles	5.0	$35,000	$175,000
Road Engineering and Design Add Roads to System	Miles	2.5	$35,000	$87,500
Temporary Road Construction	Miles	0.8	$25,000	$20,000
Total Costs				**$491,154**

Table E-5: Benefit Cost Ratio – Alternative C

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$526,279	$491,154	$35,125	1.07
60	4%	$21,051	$19,646	$1,405	1.07

PNV – present net value
BCR - benefit cost ratio

Table E-6: Sale Cost Estimates – Alternative D

Activity	Units	Number	Cost/Unit	Total Costs
Sale Preparation	CCF	4,087	$9.30	$38,009
Harvest Administration	Year	3	$7,535	$22,605
Site Preparation Natural – Herbicide & Handtools	Acres	218	$340	$95,540
Road Engineering and Design Construction	Miles	0.7	$75,000	$52,500
Road Engineering and Design Reconstruction	Miles	5.0	$35,000	$175,000
Road Engineering and Design Add Roads to System	Miles	2.5	$35,000	$87,500
Temporary Road Construction	Miles	0.8	$25,000	$20,000
Total Costs				**$491,154**

Table E-7: Benefit Cost Ratio – Alternative D

Year	Discount Factor	Revenue	Cost	PNV	BCR
0	0	$526,279	$491,154	$35,125	1.07
60	4%	$21,051	$19,646	$1,405	1.07

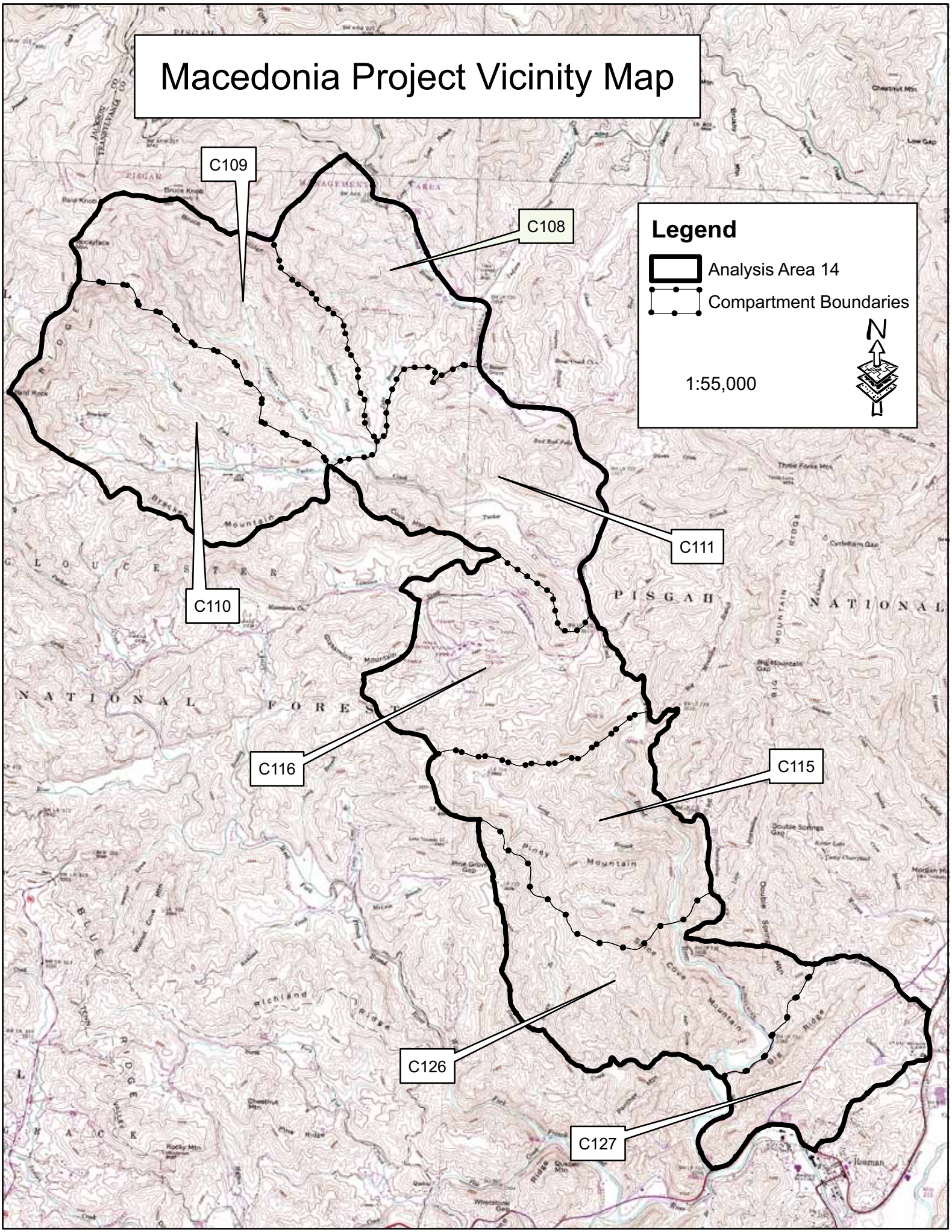
PNV – present net value
BCR - benefit cost ratio

APPENDIX F – PROJECT DESIGN FEATURES FOR PESTICIDE USE

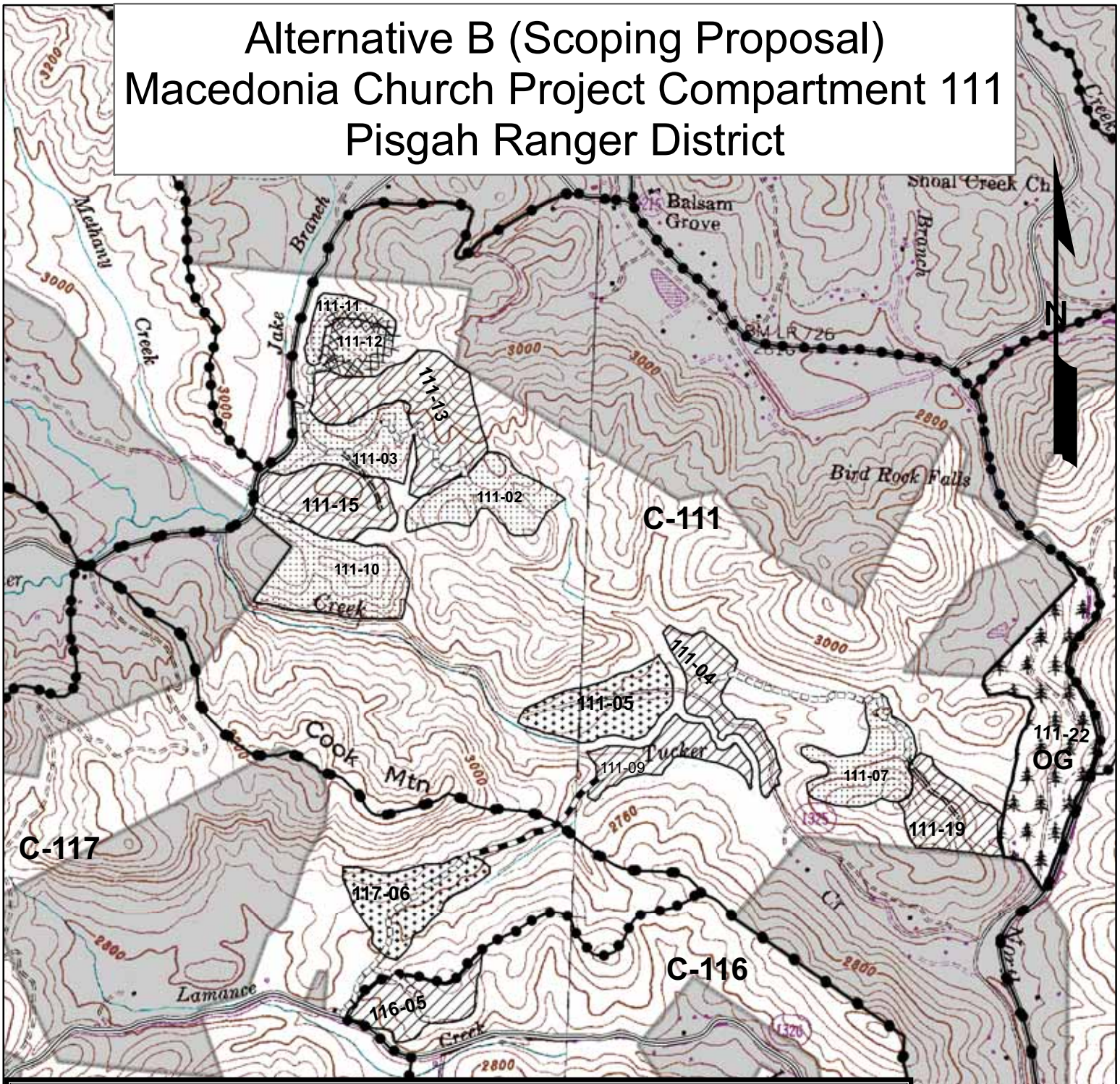
Pesticide Application Project Design Features (see also Forest Plan, Appendix I, pages I-10 – I-14)

1. Pesticides are applied according to labeling information and the site-specific analysis done for projects. This labeling and analysis are used to choose the herbicide, rate, and application method for the site. They are also used to select measures to protect human and wildlife health, non-target vegetation, water, soil, and threatened, endangered, proposed, and sensitive species. Site conditions may require stricter constraints than those on the label, but labeling standards are never relaxed.
2. Only pesticide formulations (active and inert ingredients) and additives registered by EPA and approved by the Forest Service for use on National Forest System lands are applied.
3. Public safety during such uses as viewing, hiking, berry picking, and fuel wood gathering is a priority concern. Method and timing of application are chosen to achieve project objectives while minimizing effects on non-target vegetation and other environmental elements. Selective treatment is preferred over broadcast treatment.
4. Areas are not prescribed burned for at least 30 days after pesticide treatment.
5. A certified pesticide applicator supervises each Forest Service application crew and trains crew members in personal safety, proper handling and application of herbicides, and proper disposal of empty containers.
6. Each Contracting Officer's Representative (COR), who must ensure compliance on contracted pesticide projects, is a certified pesticide applicator. Contract inspectors are trained in pesticide use, handling, and application.
7. Contractors ensure that their workers use proper protective clothing and safety equipment required by labeling for the pesticide and application method.
8. Notice signs (FSH 7109.11) are clearly posted, with special care taken in areas of anticipated visitor use.
9. No pesticide is ground-applied within 60 feet of any known threatened, endangered, proposed, or sensitive plant. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
10. Application equipment, empty pesticide containers, clothes worn during treatment, and skin are not cleaned in open water or wells. Mixing and cleaning water must come from a public water supply and be transported in separate labeled containers.
11. No pesticide is ground-applied within 30 horizontal feet of lakes, wetlands, or perennial or intermittent springs and streams. No pesticide is applied within 100 horizontal feet of any public or domestic water source. Selective treatments (which require added site-specific analysis and use of aquatic-labeled pesticides) may occur within these buffers only to prevent significant environmental damage such as noxious weed infestations. Buffers are clearly marked before treatment so applicators can easily see and avoid them.
12. During transport, pesticides, additives, and application equipment are secured to prevent tipping or excess jarring and are carried in a part of the vehicle totally isolated from people, food, clothing, and livestock feed.
13. Only the amount of pesticide needed for the day's use is brought to the site. At day's end, all leftover pesticide is returned to storage.
14. Pesticide mixing, loading, or cleaning areas in the field are not located within 200 feet of private land, open water or wells, or other sensitive areas.
15. During use equipment to store, transport, mix, or apply pesticides is inspected daily for leaks.

APPENDIX G – PROJECT MAPS


Macedonia Project Vicinity Map
C109
C108
C111
C110
C116
C115
C126
C127
Legend
Analysis Area 14
Compartment Boundaries
N
1:55,000
PISGAH
NATIONAL
FOREST
GLOUCESTER
Bald Knob
Bruce Knob
Bald Rock
Three Forks Mtn.
Cycleburn Gap
Big Mountain Gap
Double Springs Gap
Pine Grove Gap
Piney Mountain
Richland Ridge
Chestnut Mtn.
Rocky Mtn.
Quebec Mtn.
Whetstone Gap
Reeman

Alternative B (Scoping Proposal)
Macedonia Church Project Compartment 111
Pisgah Ranger District



Legend

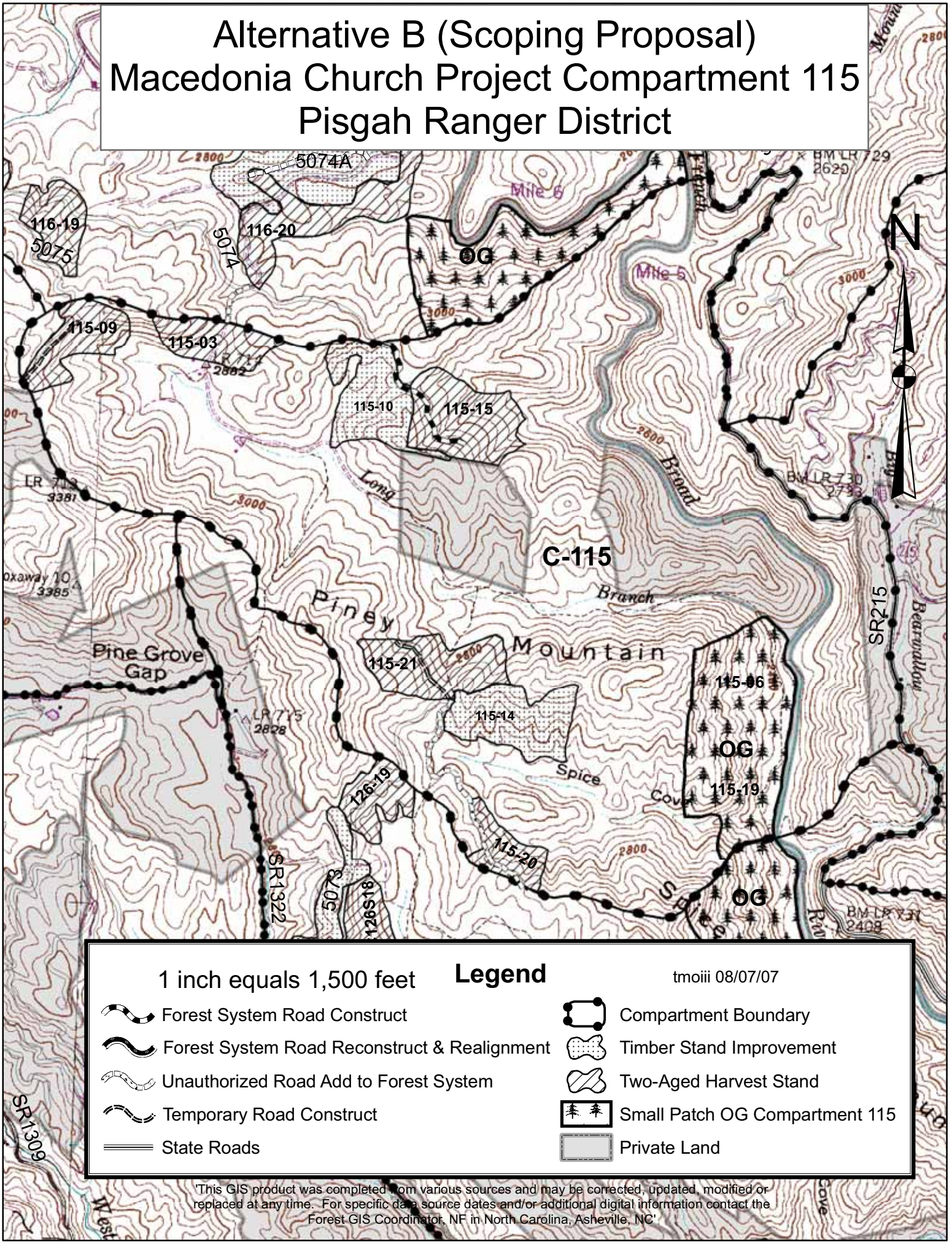
tmoiii 07/31/07

- State Roads
- Unauthorized Road Add to Forest System
- Forest System Road Construct
- Temporary Road Construct
- Progeny Test Fire Line Reconstuct
- Two-Aged Harvest Stand
- Intermediate Thinning Stand
- Timber Stand Improvement
- Small Patch OG Compartment 111
- Compartment Boundary

1 inch equals 1,500 feet

'This GIS product was completed from various sources and may be corrected, updated, modified or replaced at anytime. For specific data source dates and/or additional digital information contact the Forest GIS Coordinator, NF's-NC, Asheville, NC'

Alternative B (Scoping Proposal)
Macedonia Church Project Compartment 115
Pisgah Ranger District



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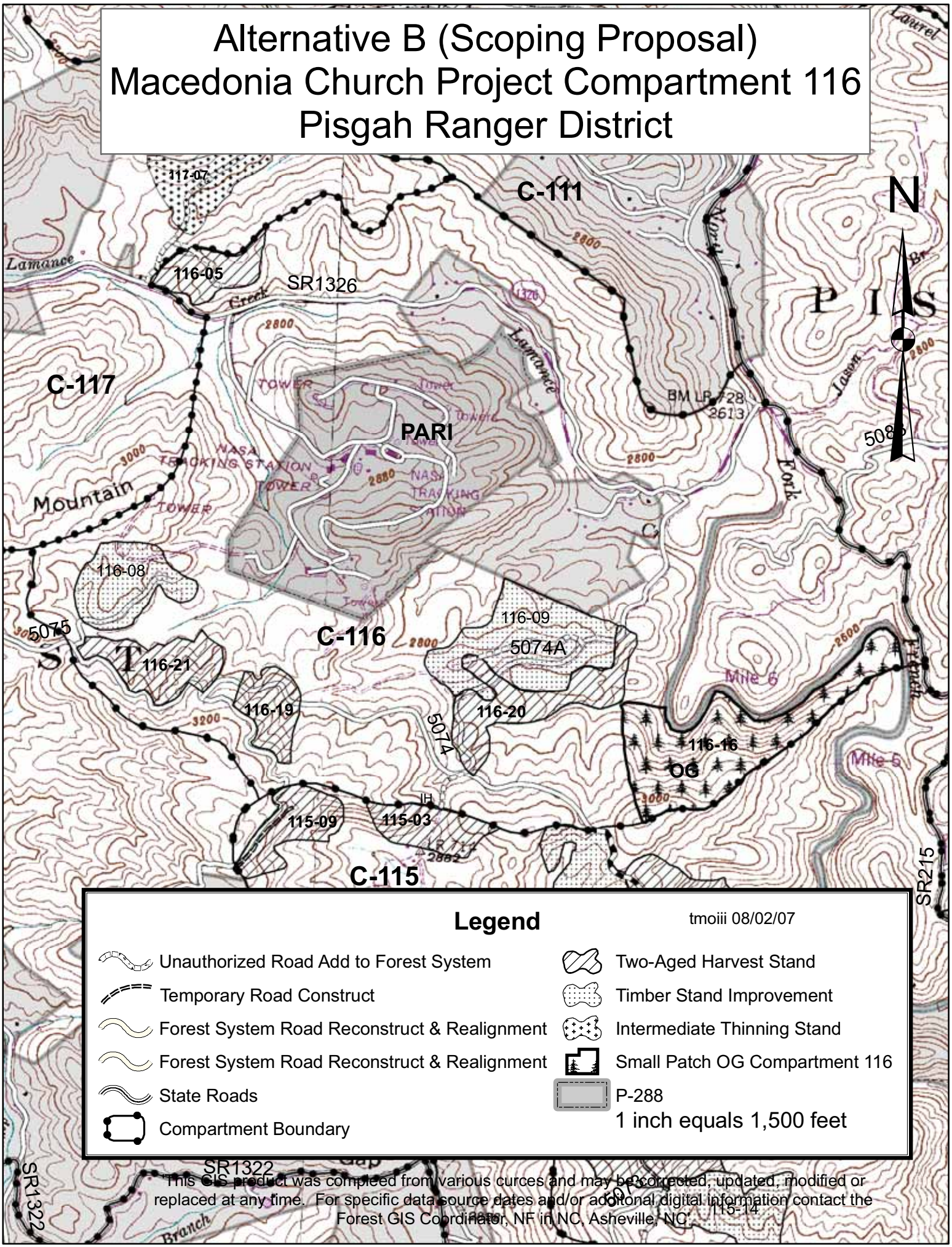
Alternative B (Scoping Proposal)
Macedonia Church Project Compartment 116
Pisgah Ranger District



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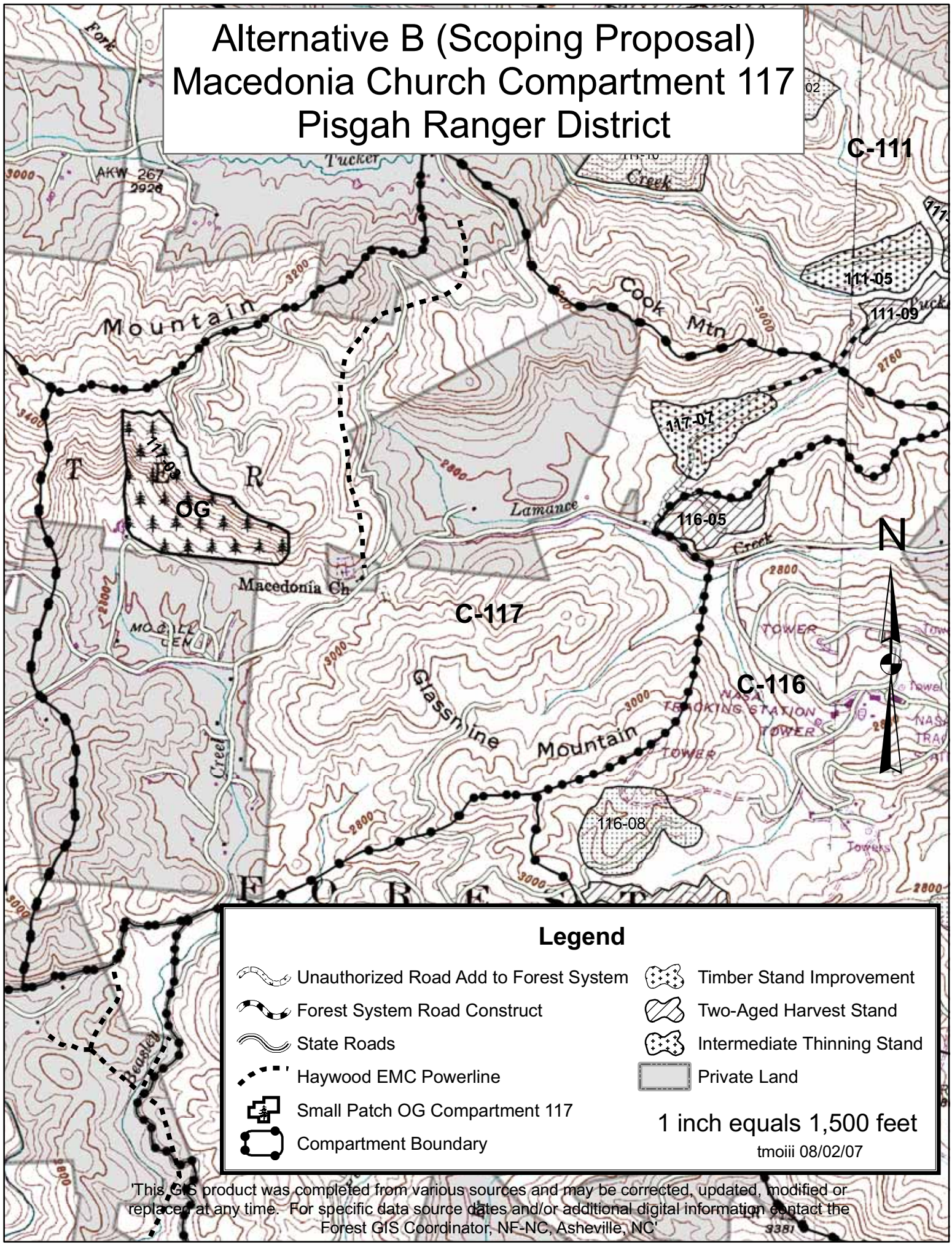
Alternative B (Scoping Proposal)
Macedonia Church Compartment 117
Pisgah Ranger District



Legend

- Unauthorized Road Add to Forest System
- Forest System Road Construct
- State Roads
- Haywood EMC Powerline
- Small Patch OG Compartment 117
- Compartment Boundary
- Timber Stand Improvement
- Two-Aged Harvest Stand
- Intermediate Thinning Stand
- Private Land

1 inch equals 1,500 feet

tmoiii 08/02/07

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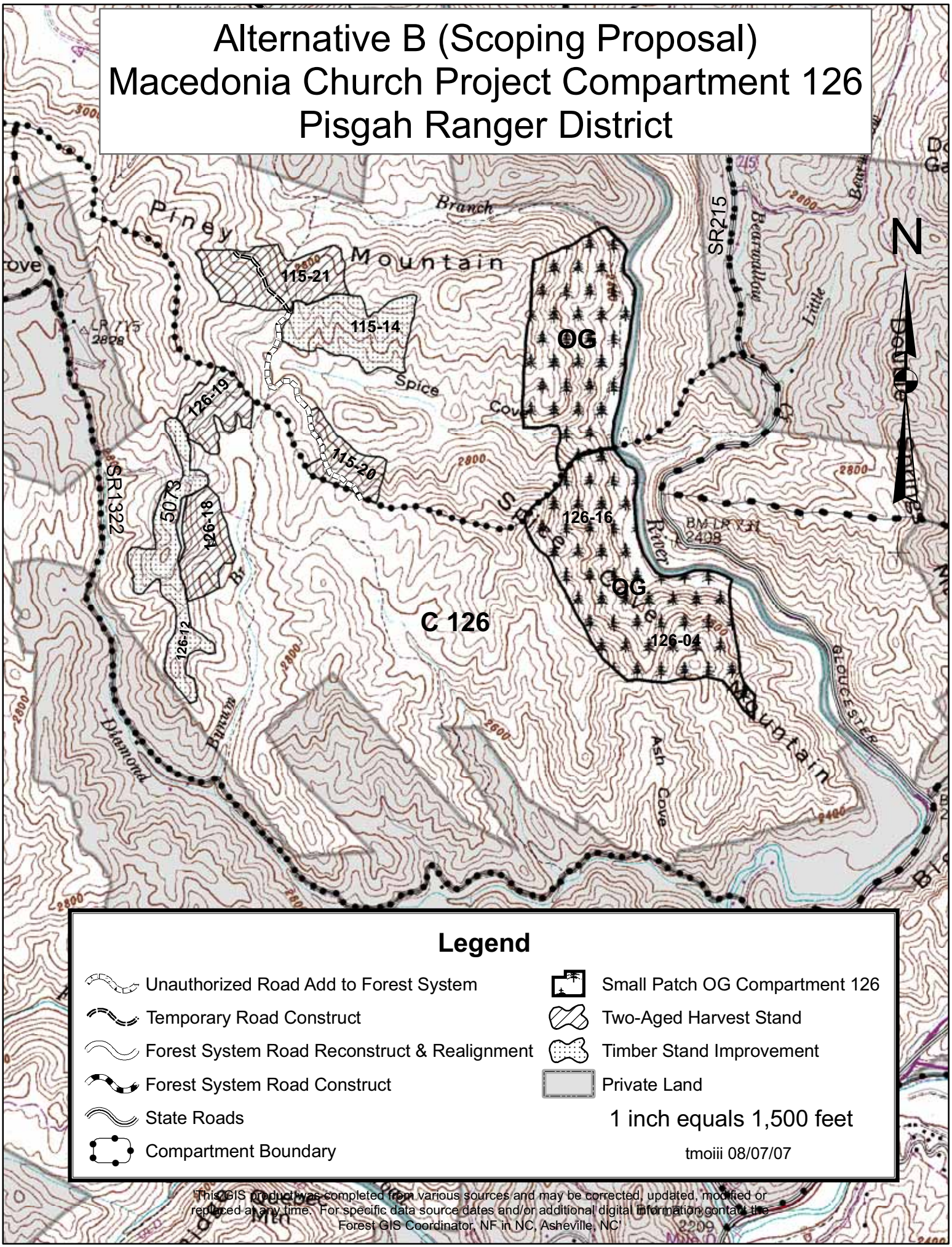
Alternative B (Scoping Proposal)
Macedonia Church Project Compartment 126
Pisgah Ranger District



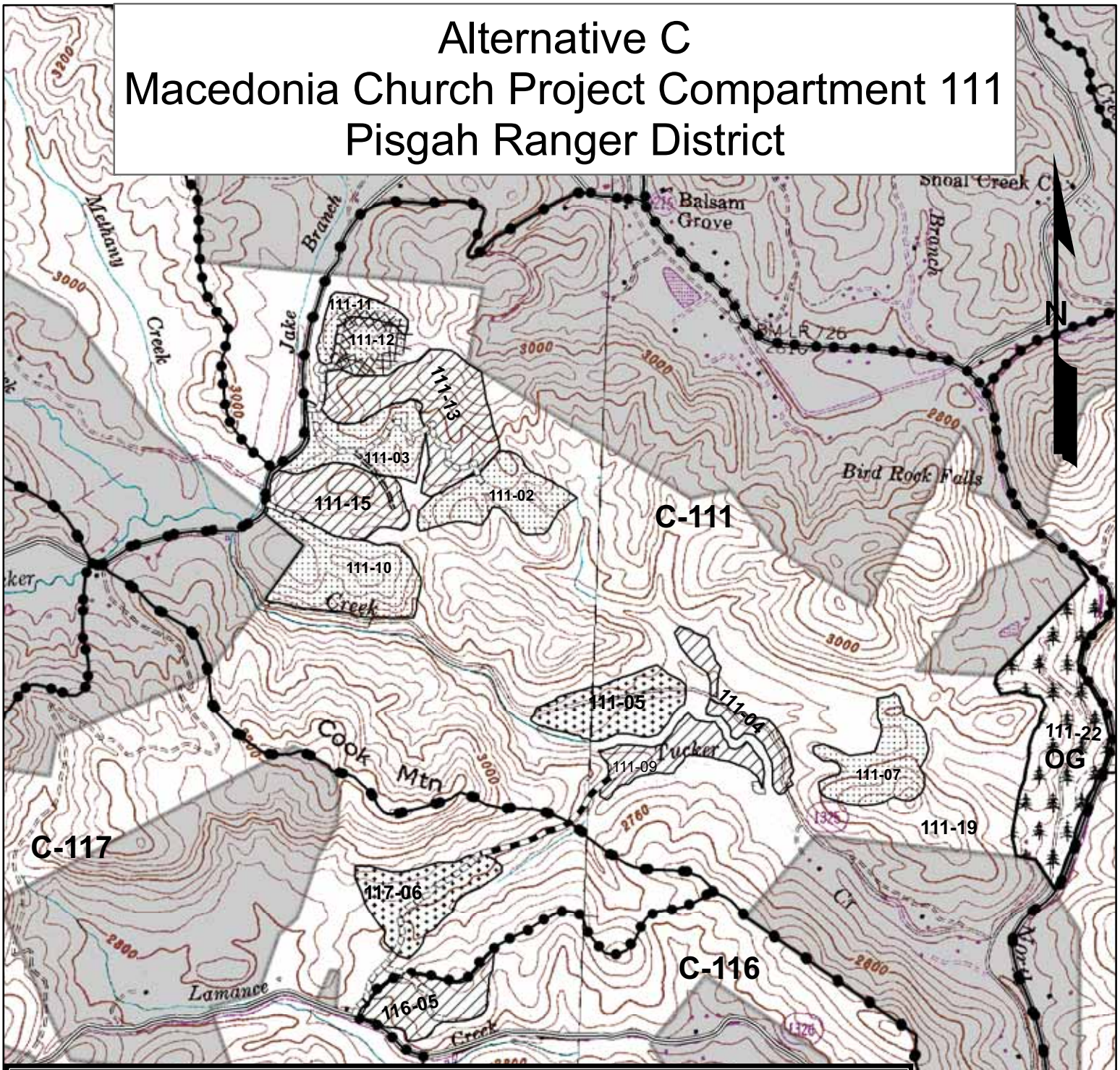
Legend

- Unauthorized Road Add to Forest System
- Temporary Road Construct
- Forest System Road Reconstruct & Realignment
- Forest System Road Construct
- State Roads
- Compartment Boundary
- Small Patch OG Compartment 126
- Two-Aged Harvest Stand
- Timber Stand Improvement
- Private Land

1 inch equals 1,500 feet

tmoiii 08/07/07

Alternative C
Macedonia Church Project Compartment 111
Pisgah Ranger District



Legend

tmoiii 11/15/07

- State Roads
- Unauthorized Road Add to Forest System
- Forest System Road Construct
- Temporary Road Construct
- Progeny Test Fire Line Reconstuct

1 inch equals 1,500 feet

- Two-Aged Harvest Stand
- Intermediate Thinning Stand
- Timber Stand Improvement
- Small Patch OG Compartment 111
- Compartment Boundary
- Old Impoundment C111S09

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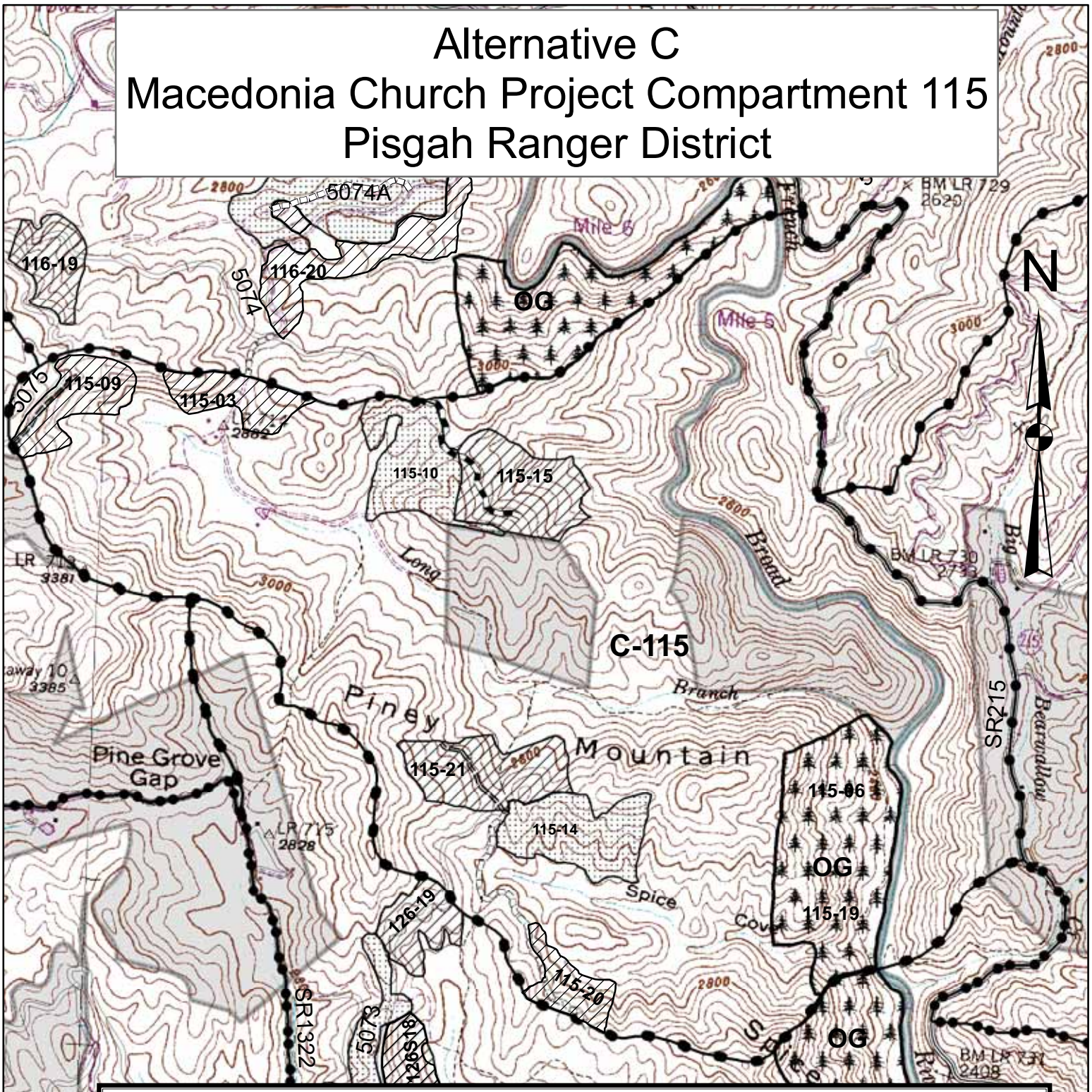
Alternative C
Macedonia Church Project Compartment 115
Pisgah Ranger District



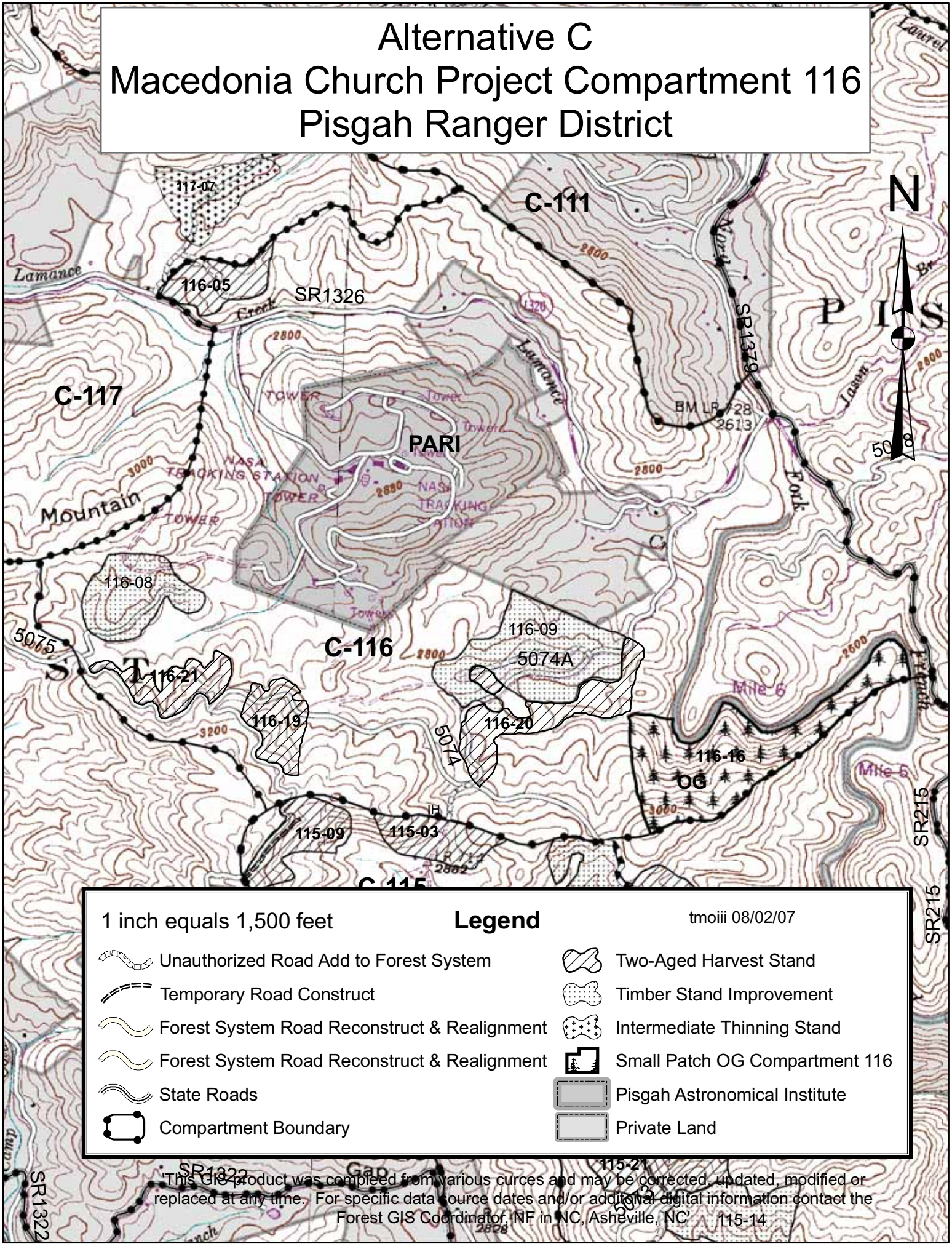
Legend

tmoiii 11/15/07

- Forest System Road Construct
- Forest System Road Reconstruct & Realignment
- Unauthorized Road Add to Forest System
- Temporary Road Construct
- State Roads
- Compartment Boundary
- Timber Stand Improvement
- Two-Aged Harvest Stand
- Small Patch OG Compartment 115

1 inch equals 1,500 feet

Alternative C
Macedonia Church Project Compartment 116
Pisgah Ranger District

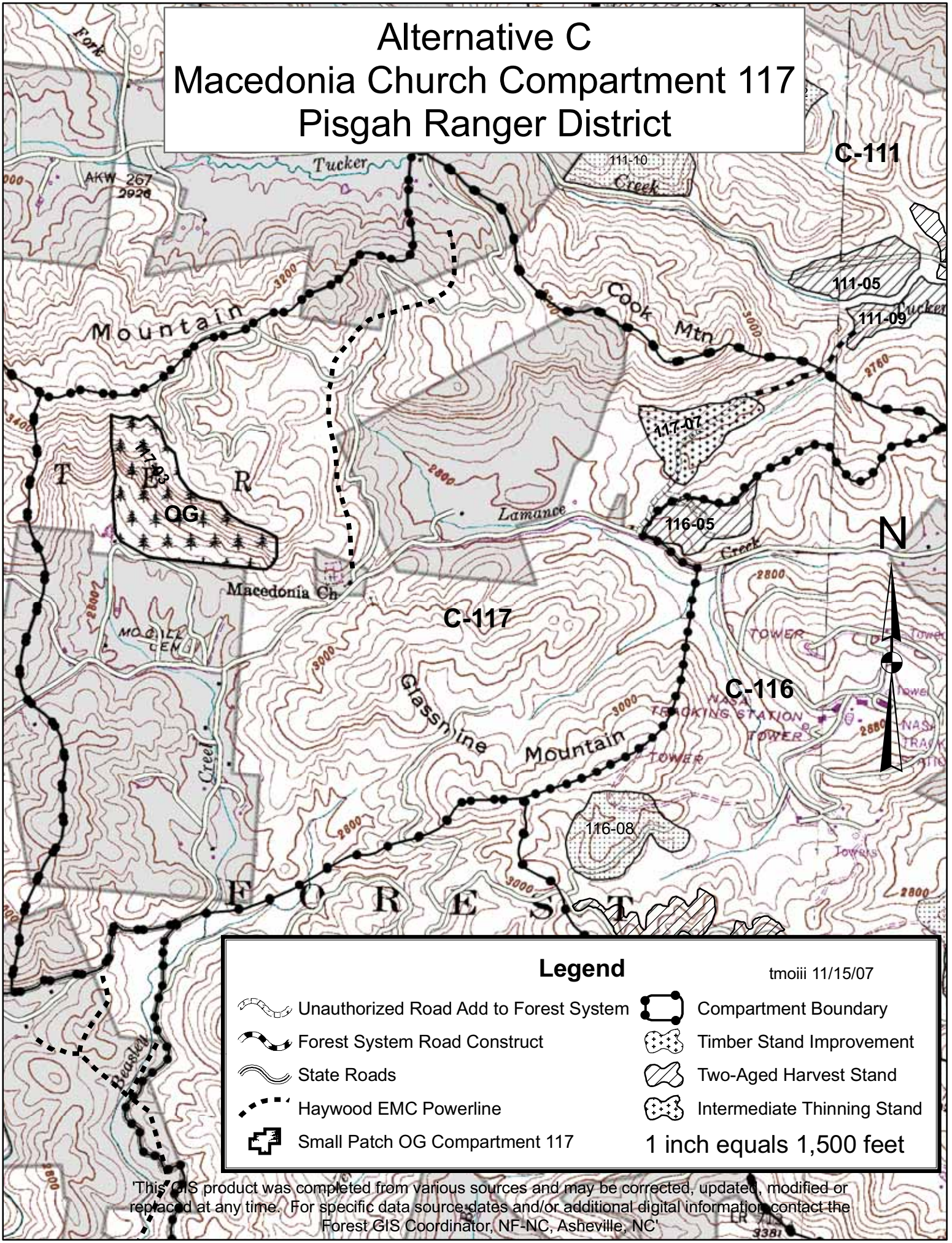


1 inch equals 1,500 feet

Legend

tmoiii 08/02/07

- Unauthorized Road Add to Forest System
- Temporary Road Construct
- Forest System Road Reconstruct & Realignment
- Forest System Road Reconstruct & Realignment
- State Roads
- Compartment Boundary
- Two-Aged Harvest Stand
- Timber Stand Improvement
- Intermediate Thinning Stand
- Small Patch OG Compartment 116
- Pisgah Astronomical Institute
- Private Land


Alternative C
Macedonia Church Compartment 117
Pisgah Ranger District
C-111
111-10
111-05
111-09
117-07
116-05
C-117
C-116
116-08
Tucker
Creek
Cook Mtn
Mountain
Lamance
Macedonia Ch
Grassmine Mountain
Beasley
N
T O R E S T
Legend
tmoiii 11/15/07
Unauthorized Road Add to Forest System
Forest System Road Construct
State Roads
Haywood EMC Powerline
Small Patch OG Compartment 117
Compartment Boundary
Timber Stand Improvement
Two-Aged Harvest Stand
Intermediate Thinning Stand
1 inch equals 1,500 feet
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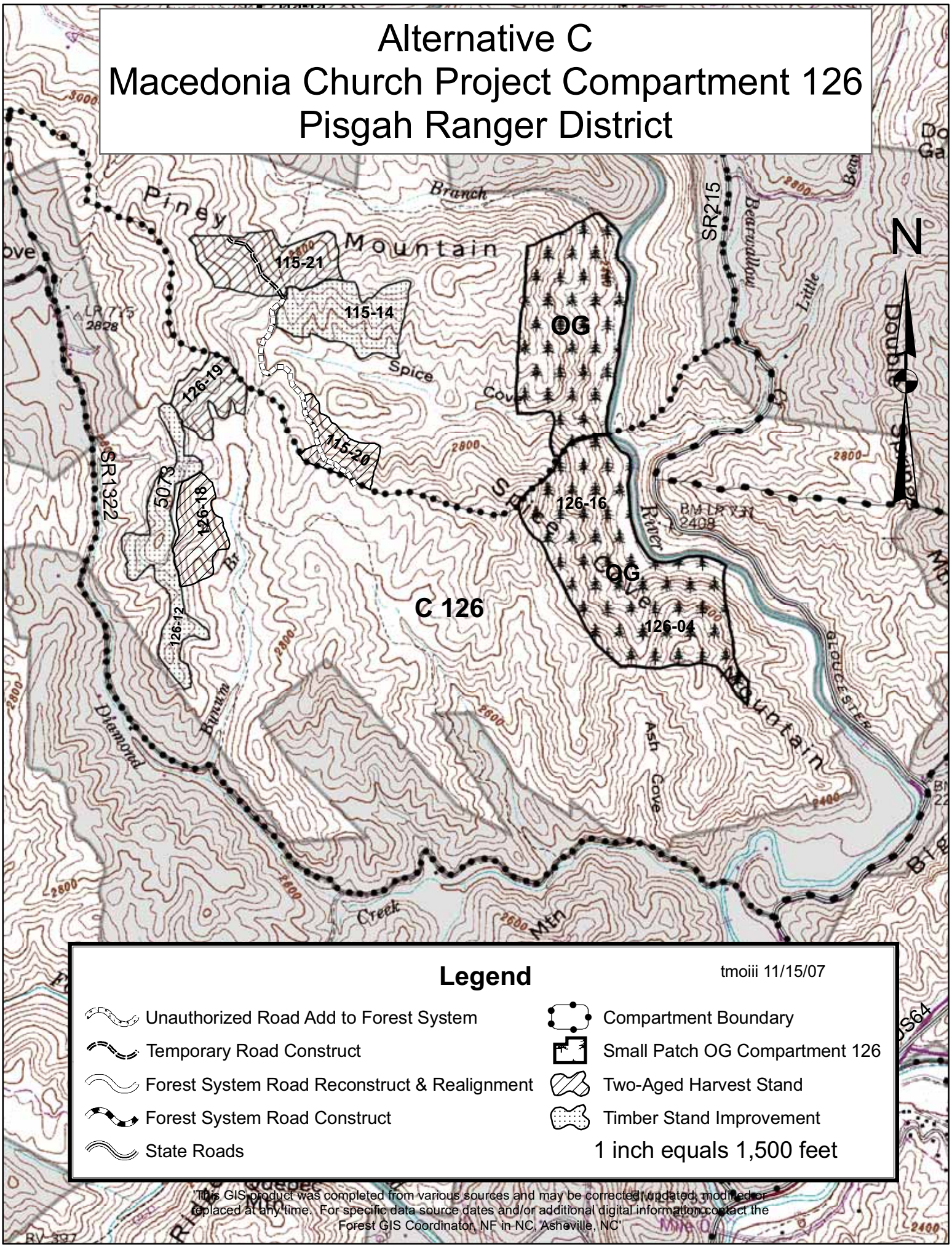
Alternative C
Macedonia Church Project Compartment 126
Pisgah Ranger District



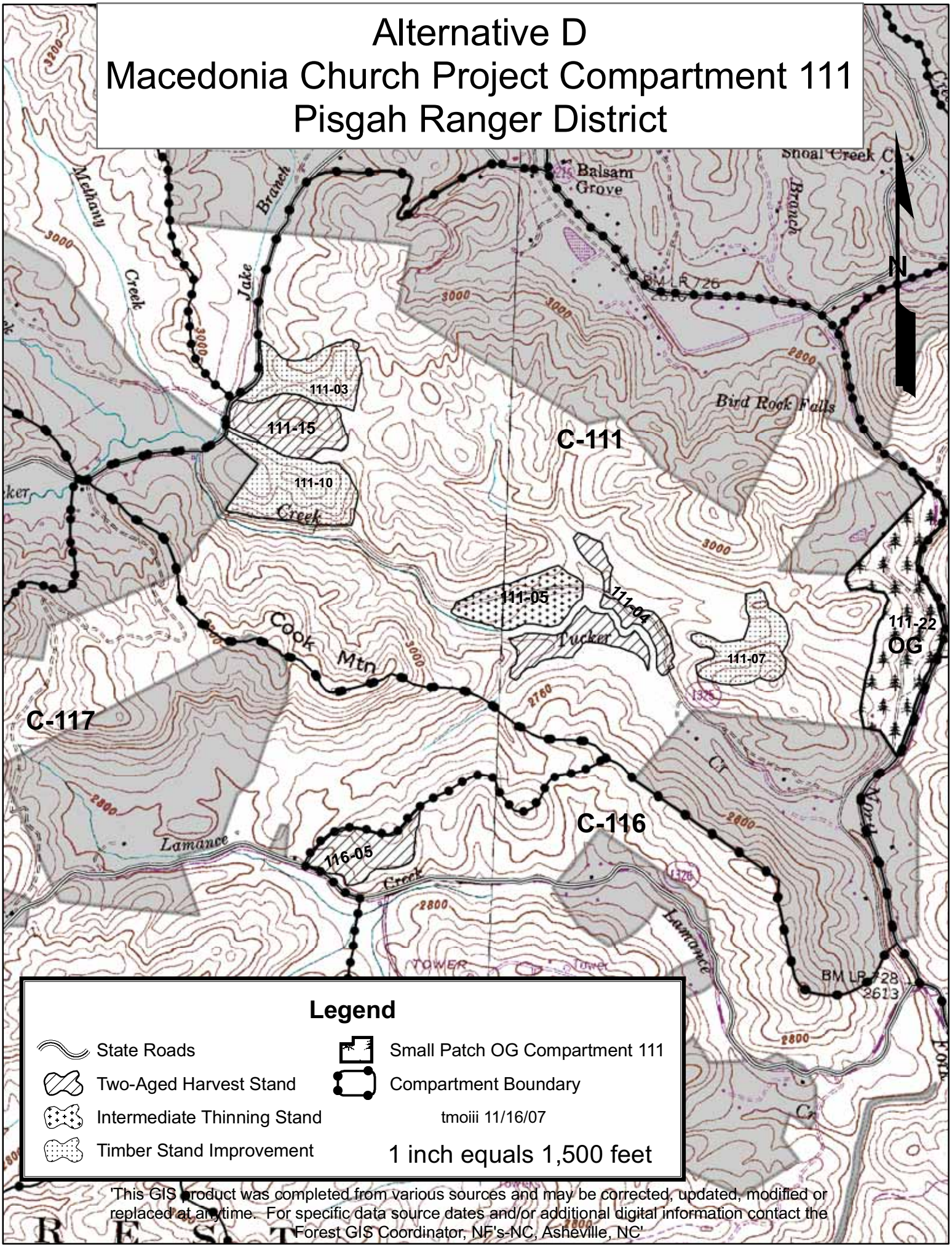
Legend

tmoiii 11/15/07

- Unauthorized Road Add to Forest System
- Temporary Road Construct
- Forest System Road Reconstruct & Realignment
- Forest System Road Construct
- State Roads
- Compartment Boundary
- Small Patch OG Compartment 126
- Two-Aged Harvest Stand
- Timber Stand Improvement

1 inch equals 1,500 feet

Alternative D
Macedonia Church Project Compartment 111
Pisgah Ranger District



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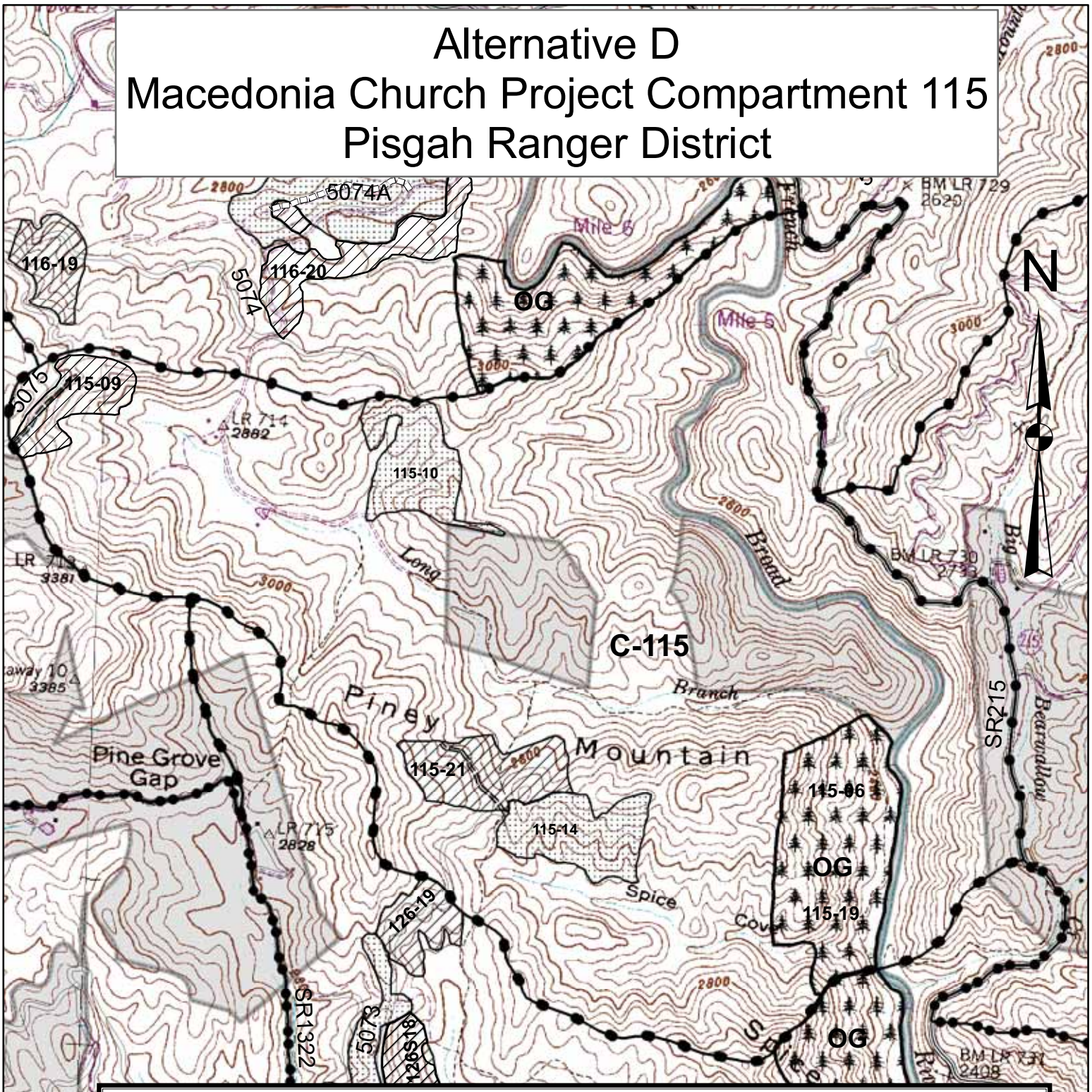
Alternative D
Macedonia Church Project Compartment 115
Pisgah Ranger District



Legend

- Forest System Road Reconstruct & Realignment
- Temporary Road Construct
- State Roads
- Compartment Boundary
- Timber Stand Improvement
- Two-Aged Harvest Stand
- Small Patch OG Compartment 115
- Private Land

1 inch equals 1,500 feet

tmoiii 11/16/07

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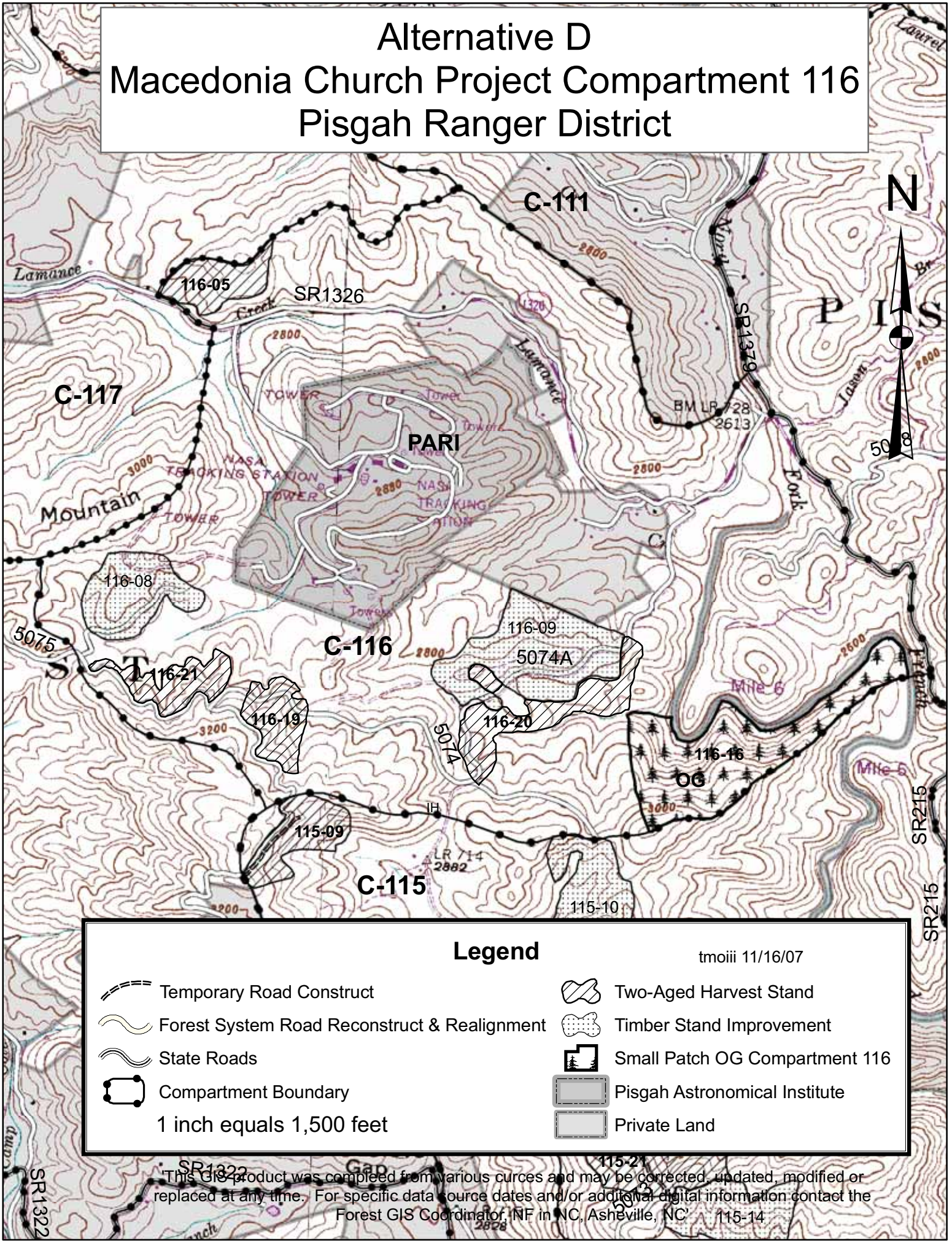
Alternative D
Macedonia Church Project Compartment 116
Pisgah Ranger District



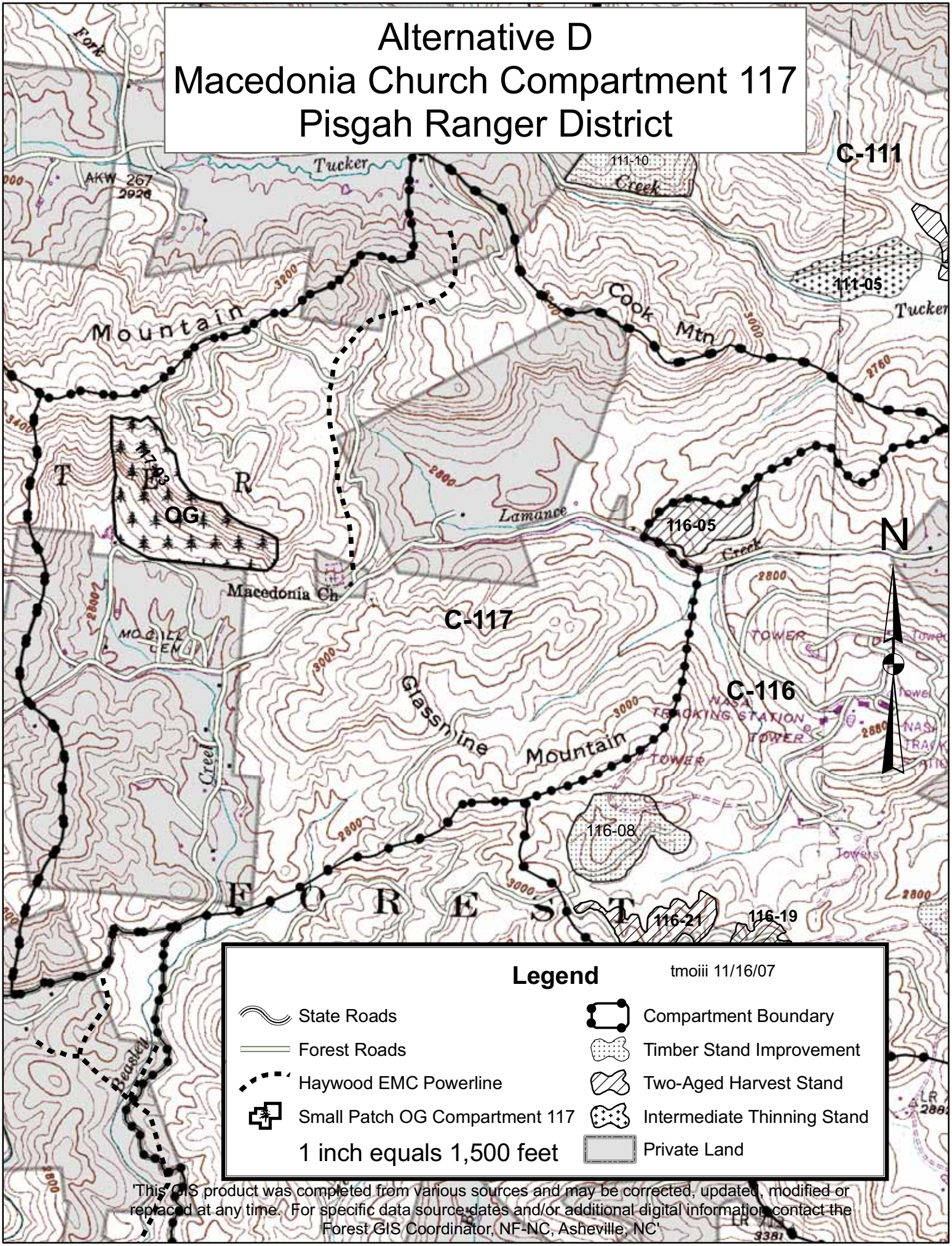
Legend

tmoiii 11/16/07

- Temporary Road Construct
- Forest System Road Reconstruct & Realignment
- State Roads
- Compartment Boundary

1 inch equals 1,500 feet

- Two-Aged Harvest Stand
- Timber Stand Improvement
- Small Patch OG Compartment 116
- Pisgah Astronomical Institute
- Private Land


Alternative D
Macedonia Church Compartment 117
Pisgah Ranger District
C-111
111-10
111-05
Tucker
Creek
Cook Mtn
Mountain
Lamance
116-05
Creek
N
Macedonia Ch
C-117
C-116
Grassmine Mountain
116-08
116-21
116-19
Legend
tmoiii 11/16/07
State Roads
Forest Roads
Haywood EMC Powerline
Small Patch OG Compartment 117
1 inch equals 1,500 feet
Compartment Boundary
Timber Stand Improvement
Two-Aged Harvest Stand
Intermediate Thinning Stand
Private Land
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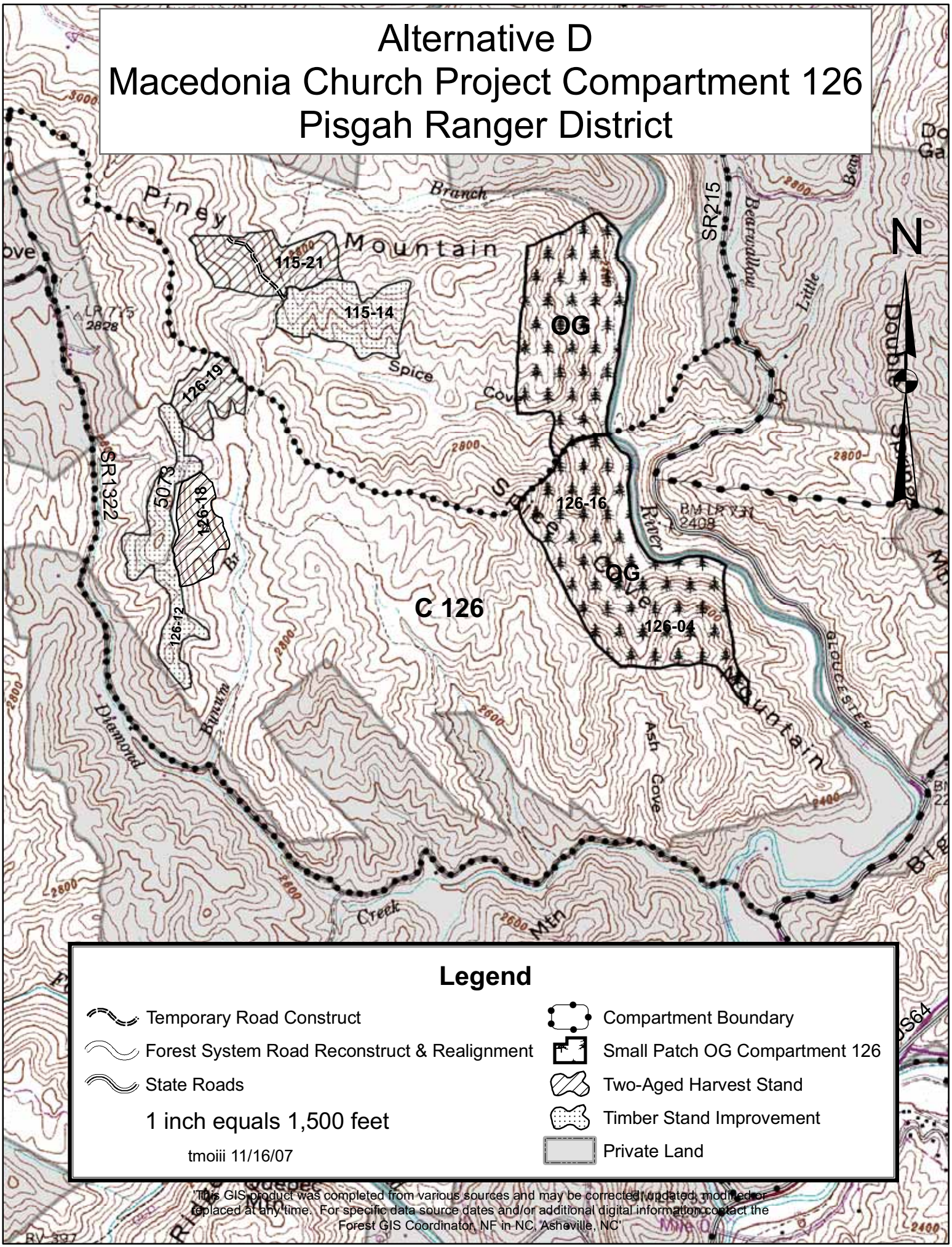
Alternative D
Macedonia Church Project Compartment 126
Pisgah Ranger District



Legend

- Temporary Road Construct
- Forest System Road Reconstruct & Realignment
- State Roads
- Compartment Boundary
- Small Patch OG Compartment 126
- Two-Aged Harvest Stand
- Timber Stand Improvement
- Private Land

1 inch equals 1,500 feet

tmoiii 11/16/07

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