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Environmental Assessment

Spring Creek

Ocoee/Hiwassee Ranger District, Cherokee National Forest

McMinn, Monroe and Polk Counties, Tennessee

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INTRODUCTION

Document Structure

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

- *Introduction:* The section includes information on the history of the project proposal, the purpose of and need for the project, and the agency's proposal for achieving that purpose and need. This section also details how the Forest Service informed the public of the proposal and how the public responded.
- *Comparison of Alternatives, including the Proposed Action:* This section provides a more detailed description of the agency's proposed action as well as alternative methods for achieving the stated purpose. This discussion also includes possible mitigation measures. Finally, this section provides a summary table of the environmental consequences associated with each alternative.
- *Environmental Consequences:* This section describes the environmental effects of implementing the proposed action and other alternatives. This analysis is organized by resource area. Within each section, the affected environment is described first, followed by the effects of the No Action Alternative that provides a baseline for evaluation and comparison of the other alternatives that follow.
- *Agencies and Persons Consulted:* This section provides a list of preparers and agencies consulted during the development of the environmental assessment.
- *Appendices:* The appendices provide more detailed information to support the analyses presented in the environmental assessment.

Additional documentation, including more detailed analyses of project area resources, may be found in the project planning record located at the Tellico Ranger District Office in Tellico Plains, Tennessee.

Background

This project area encompasses all or portions of Compartments 102, 104, 105, 106, 117, 118, 119, 120, 121, 122, 126, 127, 128, 145, 146, 147, and 148. The area is approximately seven miles southeast of Etowah, nine miles northeast of Benton, and three miles northeast of Reliance, Tennessee. Figure 1 displays the location of the project area.

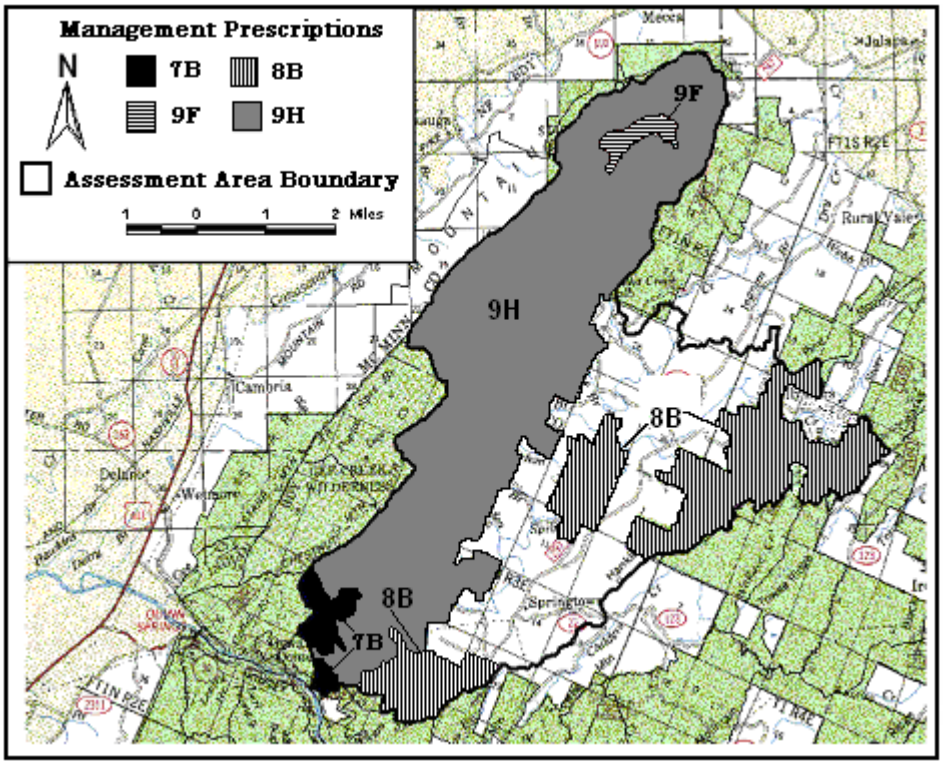


Figure 1. Vicinity map

Purpose and Need for Action

The Cherokee National Forest Revised Land and Resource Management Plan (RLRMP), approved in 2004, made broad decisions regarding allocation of land and measures necessary to manage National Forest resources. The RLRMP establishes direction for the multiple use management and sustained yield of goods and services for all National Forest System (NFS) lands within the Cherokee National Forest (CNF) boundaries. It describes how different areas of land should look and what resources could be provided from these lands now and in the future (desired future condition).

The RLRMP further allocates land into Management Prescriptions (MPs). A MP is a selected grouping of National Forest lands with similar land and resource characteristics and similar management goals. MPs provide a more specific set of goals and objectives, which help lead to the Forest's overall desired future condition (DFC).

The seventeen compartments that comprise the Spring Creek project area are predominantly assigned to MP 9.H Restoration (57%) and 8.B Early Successional (20%). The remainder of the project area is allocated to: 7.B Scenic Corridors (2%), 9.F Rare Communities (<1%) and 11 Riparian Corridors (19%). These are estimations only, especially of the Riparian Prescription. The project area does contain MPs that no activities are actually proposed (i.e. 9.F). This is because the project area was selected using compartment boundaries and not MP boundaries.

The RLRMP (pages 118 to 168) describes the DFC and standards for management activities/practices that will lead to the DFC of the MPs within the project area. Where MPs are silent on specific goals, objectives and standards the forest wide goals, objectives and standards (pgs. 21-72) should be applied.

The Forest uses rapid assessments at the watershed scale to identify opportunities that are ripe for decision. As part of the assessment for the Spring Creek watershed (CNF, 2007), current conditions were compared to the goals and objectives in the RLRMP. This assessment identified a need for vegetation treatments to increase early age class/early successional habitats and the need for an improved trail infrastructure to implement both the RLRMP and the Forest's strategic plan for trails.

There are approximately 2,870 acres of MP 8.B in the Spring Creek project area. Currently, approximately 3% of the 8.B MP is in early succession while the prescription has an objective of 10% to 17% early succession The 8.B MP emphasizes optimal to suitable habitat for a variety of upland game species and plants and animals associated with the lush re-growth of vegetation that follows a disturbance. The mix of habitat, measured at the landscape scale, is not in the optimal ratio to promote desired plant and animal species. The difference between the desired and existing conditions provides opportunities for management activities that can lead these areas toward this DFC.

The purpose of the vegetation management portion of the proposed action is to provide wildlife habitat diversity through periodic or regularly scheduled activities accomplished through prescribed burning; mechanical and chemical vegetation control; and uneven-aged, two-aged, and even-aged silvicultural methods. Road and some wildlife management actions are connected actions that are associated with the proposed vegetation management actions.

Equestrian recreation opportunities are an emphasis for the area; Spring Creek is one of four recreation zones across the Forest where the development of a horse trail complex is recommended (CNF, 2007). There is an opportunity to expand the existing trail network suitable for equestrian use. The purpose of this part of the proposed action is to develop additional, interconnecting trails that would help provide at least 12 miles of trail for daily rides.

Proposed Action

The Ocoee/Hiwassee Ranger District is proposing the following actions to achieve the purpose and need (See Appendix A for maps).

Silvicultural Treatments – Proposed Activities

1) Maintain or restore shortleaf pine and shortleaf pine-oak communities and create early successional habitat through silvicultural treatments on approximately 102 acres of existing forested stands. These are mostly ridge sites that would support "xeric pine and pine-oak forests" within which fire has historically played an important role in shaping species composition. To ensure desired conditions are achieved, herbicide applications (triclopyr) would be applied in the second year after regeneration. Activities would occur in the stands listed in Table 1.

Table 1. Pine restoration/maintenance

Comp/ Stand	Acres	Type of Harvest	Reforestation	Age	Community Type
146/14	37	Seedtree w/reserves	Slashdown, site preparation burn, plant shortleaf 15 X 15, 2nd year chemical release	80-90	Conifer-Northern Hardwood
146/16	25	Seedtree w/reserves	Slashdown, site preparation burn, plant shortleaf 15 X 15, 2nd year chemical release	80-90	Conifer-Northern Hardwood
146/23	40	Shelterwood w/reserves	Natural regeneration by seeding and sprouting, slashdown with 2nd year chemical release	80-90	Conifer-Northern Hardwood

2) Restore native riparian community through silvicultural treatments on approximately 10 acres of existing forested stands that have been planted to loblolly plantations (see Table 2).

Table 2. Native riparian community restoration

Comp/ Stand	Acres	Type of Harvest	Reforestation	Age	Community Type
147/31	3	Clearcut w/reserves	Natural regeneration by seeding and sprouting, non-native invasive plant control using herbicides	60-70	Xeric pine and pine-oak
148/40	7	Clearcut w/reserves	Natural regeneration by seeding and sprouting, non-native invasive plant control using herbicides	90-100	Xeric pine and pine-oak

3) Restore forest health, tree vigor, and wildlife browse by diversifying stands heavily stocked with pine on approximately 38 acres. Thinning would remove the pines, allowing other more appropriate tree species to develop. Activities would occur in the stands listed in Table 3.

Table 3. Pine removal

Comp/Stand	Acres	Type of Harvest	Age	Community Type
146/1	31	White Pine Removal	90-100	Conifer-Northern Hardwood
146/29	7	Loblolly pine removal, non-native invasive plant control using herbicides	100-110	Dry& Dry Mesic Oak Pine

4) Thin stands on 62 acres to promote the forest health and improve tree vigor (see Table 4).

Table 4. Thinning

Comp/Stand	Acres	Age	Community Type
122/11	33	30-40	Dry and Dry Mesic Oak-Pine
122/19	29	30-40	Dry and Dry Mesic Oak-Pine

The activities described above would contribute to meeting the following RLRMP Goals and Objectives: Goals 10, 17, 18, 19, 11-1.; Objectives 17.01, 17.02, 17.03, 17.05, 18.02, 19.01, 19.02; 8.B-1.01, and 9.H-1.01.

Additional Wildlife Habitat Improvements – Proposed Activities

1) Maintain approximately 81 acres of existing spot and linear wildlife openings. Maintenance activities typically include, but are not limited to, mowing, fertilizing, sowing, burning, and rehabilitation. The spot and linear openings are listed in Table 5.

Table 5. Wildlife Opening Maintenance

NFSR	Opening number	Acres	NFSR	Opening number	Acres	NFSR	Opening number	Acres
	102-1	.5		105-2	.8	NFSR 11213		4.6
	102-2	.9		105-3	2.2	NFSR 1106		2.8
	102-3	.6		105-4	1.8		121-6	3.7
	102-4	2.3		105-5	.8	NFSR 11215		2.2
	102-5	1.5		105-6	1		122-1	2.6
NFSR 297A		1.8		105-7	1.9	NFSR 2372-1		3.5
	102-7	.3		105-8	.8	NFSR 11272		3.2
	104-1	.4		106-1	.4		127-2	1
	104-2	1		106-2	.9		127-3	1.3
	104-3	1.7	NFSR 220K		1.9	NFSR 114601	146-1	4.9
	104-4	.5	NFSR 2372		3.4	NFSR 2010		8.8
NFSR 110503		1		121-1	2.5		148-1	4.7
NFSR 220D		.8		121-2	1.5		148-3	1.3
	105-1	1.1		121-3	.3			

2) Seed 62 acres of areas of timber harvest that are site prep burned with a non invasive grass seed mixture of native and non-persistent non-native species immediately following burn.

3) Construct ephemeral pools in temporary roads and gated roads in appropriate areas.

4) Open road corridors and spot openings (see Table 6) by removing trees up to 50 feet from either side of the following linear wildlife openings and spot openings (approximately 63 acres). Trees would be removed to allow sunlight to reach the road. Not all trees would be removed. The effect would resemble heavy thinning of trees that are merchantable. In some areas, no trees would be cut. Areas with immature oaks, particularly white oaks would be thinned to release mast producing trees.

Table 6. Daylighting

Road Name/Number	Miles of roads or acres of spots
White Cliff Spur-NFSR 220K and 3 spots	1.2 mi./4.9 ac.
Hogback Ridge-NFSR 1106 and 3 spots	2 mi./7.7 ac.
Round Mtn-NFSR 11215 and 1 spot	1 mi./0.3 ac.
Hogback Br-NFSR 2372	1 mi.

The activities described above would contribute to meeting the following RLRMP Goals and Objectives: Goals 21, 23 and 24; Objectives 21.01, 21.02, and 24.01.

Prescribe Burning – Proposed Activities

1) Prescribe burn Unit O-02 (Starr Mountain). Unit O-02 is approximately 2,980 acres. Roads and dozer line (approximately 2,850 feet) would be used as fire lines.

The activities described above would contribute to meeting the following RLRMP Goals and Objectives: Goals 21, 23 and 24; Objectives 21.01, 21.02, and 24.01.

Transportation System – Proposed Activities

1) Add three unauthorized roads to the transportation system as National Forest System Road (NFSR) 2010E (0.6 miles), NFSR 2010F (0.5 miles) and NFSR 27D (0.5 miles) and reconstruct these roads (approximately 1.6 miles) to access units treated by commercial timber sales. Roads would be the minimum standard needed to remove timber and would be available for administrative use only after the sales. Work would consist of widening curves, spot placing gravel, brushing, minor re-shaping, cleaning and constructing dips and other drainage structures to improve overall drainage, upgrading culverts, and replacing gates.

2) Construct approximately 0.4 miles of temporary roads to access harvest units. Temporary roads would be closed, stabilized and seeded with wildlife preferred species following completion of the project.

3) Reconstruct approximately 0.6 miles of existing NFSR 2372-1 to bring it up to standard. Work could consist of widening curves, spot placing gravel, brushing, minor re-shaping,

cleaning and constructing dips and other drainage structures to improve overall drainage, upgrading culverts, and replacing gates.

4) Perform maintenance on approximately 4.6 miles of NFSRs to prepare the roads for management activities. Maintenance activities include placing gravel, grading and mowing.

The activities described above would contribute to meeting the following RLRMP Goals and Objectives: Goals 30, 31, 33, 47, 48, and 51

Recreation/Trails – Proposed Activities

1) Develop a day use parking area that would accommodate horse trailers (approximately 1.5 acres) east of Starr Mountain. Construct approximately 3.0 miles of trail. One segment of trail would access the existing trail network from the proposed parking area. The other segment would follow an old decommissioned road which would provide access to the southern Starr Mountain trail network. These two trails would create additional loop opportunities using the existing trail network

The activities described above would contribute to meeting the following RLRMP Goals and Objectives: Goals 30, 31, and 33

Decision Framework

The deciding official will review the proposed action and the other alternatives in order to make the following decisions:

Should the proposed action, a portion of the proposed action, or another alternative, be implemented in order to fulfill the purpose and need of the proposed action?

Public Involvement

Scoping, to solicit the issues and concerns related to the proposed action started on October 8, 2008. Letters (see Project File) were mailed to approximately 65 interested or potentially affected agencies, organizations, tribes, individuals and adjacent landowners. See the Consultation and Coordination section of this document for a listing of the agencies, organizations, tribes, individuals and adjacent landowners contacted. These letters informed recipients of the proposed action and requested their input. Additional information was sent to those that requested it. The proposal has also been listed in the CNF Schedule of Proposed Actions since July 2008.

Using the comments from the public, other agencies, and tribes, the interdisciplinary team (IDT) developed a list of issues to address.

Issues

Issues were derived from the public, other agencies, organizations and businesses, and Forest Service resource specialists. Issues are defined as a point of discussion, debate, or dispute about environmental effects. From the public comments received several issues were identified. These issues are the basis for the project analysis, project design features, alternatives, and overall disclosure of information in this document and supporting project record.

The Forest Service IDT analyzed comments and separated the issues into two groups: issues analyzed and issues considered but not carried forward in the analysis. Issues to be analyzed were defined as those directly or indirectly caused by implementing the proposed action and that will require project specific alternatives, mitigation measures or design elements to address them. Issues considered but not carried forward were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, RLRMP, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council for Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

A list of issues considered but not analyzed and the reasons regarding their categorization may be found in the project record.

Issues to be analyzed were derived from the responses received from the public and by the ID Team. The issues carried forward and used to develop alternatives are the following:

1. The mix of habitat measured at the landscape scale is not in the optimal ratio to promote desired plant and animal species (ecological restoration, forest health).
2. Equestrian emphasis is a priority in this area with a need for increasing trail mileage and providing appropriate trailer facilities. Conflicts with local property owners and hunters should be minimized.

There were no significant issues raised by the team or the public for the Spring Creek project area that would promote the need for a separate alternative. Therefore, only the No Action Alternative and the proposed action alternative will be analyzed in detail.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Spring Creek project. It includes a description and map of each alternative considered. This section also presents the alternatives in comparative form, sharply defining the differences between each alternative and providing a clear basis for choice among options by the decision maker and the public. Some of the information used to compare the alternatives is based upon the design of the alternative and some of the information is based upon the environmental, social and economic effects of implementing each alternative.

Alternatives

Alternative 1

No Action

Under the No Action Alternative, no changes to the existing environment would occur beyond those attributed to natural processes and disturbances. No proposed project activities would be implemented. Routine activities such as road maintenance and wildlife opening

maintenance would continue to occur. Also, activities that are approved under other EAs, such as non-native invasive species treatment or prescribed burning would continue to occur.

Alternative 2

The Proposed Action

Following is a summary of the proposal that was scoped to the public. A more detailed account of the proposed activities is presented in the previous chapter. In this alternative the Ocoee/Hiwassee Ranger District is proposing the following actions to achieve the purpose and need (See Appendix A for maps).

- Restore and maintain shortleaf pine and shortleaf pine-oak communities and create early successional habitat through silvicultural treatments on approximately 102 acres of forested stands that have been altered from desired conditions due to previous land use.
- Restore native riparian communities through silvicultural treatments on approximately 10 acres that have been planted to loblolly plantations.
- Restore forest health, tree vigor, and wildlife browse by diversifying stands heavily stocked with pine on approximately 38 acres
- Thin stands on 62 acres to promote forest health and improve tree vigor.
- Maintain approximately 81 acres of existing spot and linear wildlife openings.
- Seed 62 acres of areas of timber harvest that are site prep burned with a non invasive grass seed mixture immediately following burn.
- Construct ephemeral pools in temporary roads and gated roads in appropriate areas.
- Open road corridors and spot openings by removing timber up to 50 feet either side of the road or spot.
- Prescribe burn Unit O-02 (Starr Mountain) totaling approximately 2,980 acres.
- Add three unauthorized roads to the transportation system as roads #2010E (0.6 miles), #2010F (0.5 miles) and #27D (0.5 miles) and reconstruct these roads (approximately 1.6 miles) to access units treated by commercial timber sales.
- Construct 0.4 miles of temporary roads to access timber stands
- Perform maintenance on 4.6 miles of NFSRs needed for timber haul.
- Develop a parking area that would accommodate horse trailers (1.5 acres) east of Starr Mountain.
- Construct 3.0 miles of trail to create loop hiking/riding opportunities.

Alternatives Not Considered in Detail

An alternative was suggested by the public that would contain prescribed burning but no harvesting and herbicide application or road construction. In this project early successional habitat is proposed to be created by commercial harvesting of several stands. This habitat is

lacking in this project area as indicated on page 3, and is proposed to achieve RLRMP Objective 8.B-1.01 and Objective 12.01. Because herbicide application and road construction are connected actions, if they are not included the timber could not be removed nor would appropriate regeneration occur. Therefore, an alternative that includes only prescribed burning would not fully achieve the purpose and need of the project and will not be analyzed in detail. In addition, the area has been prescribed burn in the past (NEPA completed previously) and it is appropriately included in the cumulative effects analysis for the No Action alternative. Therefore, the No Action Alternative does analyze the effects of no harvesting, herbicide application and road construction and includes prescribed burning.

Different locations were suggested for the horse parking area. The locations suggested were in the vicinity of the proposed site. Because the difference between the suggestions and the proposed action are relatively small, it was determined that a separate alternative to analyze the effects is unnecessary. One suggestion placed the parking area up NFSR 44, which is too narrow and steep for horse trailers and poses a safety hazard.

Design Criteria Common to All Alternatives

The RLRMP contains Forest Wide, Management Prescription specific, and Management Area specific standards that mitigate adverse effects to all resources. These standards are part of all action alternatives.

This section also summarizes project specific mitigation measures that are not already covered in any RLRMP standards. These are applied to mitigate effects of implementing this specific project. Application of these mitigation measures is presumed for the effects analysis in the Environmental Consequences Chapter.

- To comply with Forest Wide Standard 28 ("Protect individuals and locations of other species needed to maintain their viability within the planning area. Site specific analysis of proposed management actions will identify any protective measures".) the following protective measure would be followed: 1) data on the location of individuals of *Collinsonia verticillata* would be used during sale layout to ensure that impacts to this species is minimized; 2) a no-cut zone surrounding the population of *Collinsonia verticillata* would be designated with directional felling and skidding away from the population.
- Three vegetation treatments would occur within defined riparian corridors. These treatments are directed at removing pine plantations and allowing the natural riparian community to re-establish. The operations would cause short term ground disturbances within the riparian corridor. Riparian Prescription Standards-RX11-1, RX11-8, RX11-29, RX11-30, RX11-31, and RX11-32 (USDA 2004a) would be followed with additional mitigation measures, such as silt fencing, determined as conditions warrant on site.
- Soil movement would occur during road maintenance activities, however, mitigation measures designed to stabilize the road surface, such as adding aggregate surfacing or armoring the soil or limiting distance and amount of concentrated flow by installing water diversion devices (dips, reverse grades, outslopes, leadoff ditches, culverts) would be implemented.

- Adequate road drainage such as out sloping, cross drains, and/or rolling dips will be implemented when building roads on Brevard series soils where they are found in the project area.

Comparison of Alternatives

This section provides a summary of each alternative. Information in the Table 7 focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among alternatives. This information is estimated based on best available data.

Table 7. Comparison of Alternatives

ACTIVITY	UNITS	ALT. 1	ALT. 2
VEGETATION			
Seedtree with reserves	Acres	0	62
Shelterwood with reserves	Acres	0	40
Clearcut with reserves	Acres	0	10
Removal Cut	Ares	0	38
Thinning	Acres	0	62
Site Preparation – slashdown and burning slashdown	Acres Acres	0 0	62 40
Regeneration– Pine planting	Acres	0	62
Natural	Acres	0	50
Seedling release-chemical	Acres	0	102
Non-Native invasive control	Acres	0	17
TRANSPORTATION			
Temporary Rd Construction	Miles	0	.4
Add to system and Reconstruct	Miles	0	1.6
Road Maintenance	Miles	4.6	4.6
WILDLIFE			
Maintenance of linear and spot openings	Acres	81	81
Grass Seeding	Acres	0	62
Daylighting	Acres	0	63
Ephemeral pool construction	Number	0	10-30
FUELS REDUCTION			
Dormant season burning	Acres	0	2,980
RECREATION			
Parking Lot	Acres	0	1.5
Trail Construction	Miles	0	3.0

ENVIRONMENTAL CONSEQUENCES

This section summarizes the physical, biological, social and economic environments of the affected analysis area and the potential changes to those environments due to implementation of the alternatives. It also presents the scientific and analytical basis for comparison of alternatives presented in the chart above.

As required by 36 CFR 219 the best available science was used in this analysis. The project record demonstrates a thorough review of relevant scientific information, consideration of responsible opposing views, and where appropriate, the acknowledgement of incomplete or unavailable information, scientific uncertainty, and risk.

Activities that have occurred in the analysis area in the recent past (1990's- 2010) include: harvesting (County Line), salvage and impacts from southern pine beetle (SPB); prescribed burning and wildfires; recreational uses (i.e. camping, hiking, horseback riding hunting, fishing, shooting range etc.); and utility right-of-way (ROW) and electronic site maintenance.

Activities that are currently occurring in the analysis area include: prescribed burning; recreational uses; maintenance of roads and wildlife openings, existing ROWs, trails and campgrounds; changes in private land use patterns; restoration of areas impacted by SPB; impacts from hemlock wooly adelgid (HWA); and non-native invasive species treatments.

Reasonably foreseeable activities expected in the analysis area include: harvesting (Hopper Branch), maintenance of roads, existing ROW's, trails and campgrounds; prescribed burning and wildfires; recreational uses; changes in private land use patterns; impacts from HWA; and treatments of non-native invasive species.

Biological Factors

This section discloses effects to biological elements of the environment expected as a result of implementing the Proposed Action or alternative. The biological environment includes the diversity of plant and animal communities, habitat components, and individual species of concern or interest. Analysis of effects to these elements is organized in this document following the framework used during CNF planning (USDA 2004b). Use of this framework is designed to ensure comprehensive consideration of effects to the biological environment. Elements in this framework are assessed for their relevance to this project (Table 8). Only those elements relevant to the project are analyzed further in this document.

Table 8. Elements of the biological environment, derived from RLRMP analysis, and their relevance to the Spring Creek project,CNF, McMinn, Monroe, and Polk Counties, Tennessee, 2009.

Biological Element	Analyzed Further?	Relevance to this Project
Mesic Deciduous Forest	Yes	Mesic deciduous forest would be affected by the proposed activities.
Spruce-fir Forest	No	There are no spruce-fir forests in the vicinity of the affected areas.
Eastern Hemlock and White Pine Forest	Yes	Eastern hemlock and white pine forest would be affected by the proposed

Table 8. Elements of the biological environment, derived from RLRMP analysis, and their relevance to the Spring Creek project,CNF, McMinn, Monroe, and Polk Counties, Tennessee, 2009.

Biological Element	Analyzed Further?	Relevance to this Project
		activities.
Oak and Oak-pine Forest	Yes	Oak and oak-pine forest would be affected by the proposed activities.
Pine and Pine-oak Forest	Yes	Pine and pine-oak forest occur would be affected by the proposed activities.
Woodlands, Savannas, and Grasslands	No	There are no natural woodlands, savannas, or grasslands in the vicinity of the affected areas.
Rare Communities		
Wetland Communities	No	There are likely some small wetlands associated with small streams in the analysis area, however all occurrences of this community type would be protected by riparian buffers.
Barrens, Glades, and Associated Woodlands	No	None of this type of habitat occurs in the vicinity of the affected areas.
Carolina Hemlock Forests	No	None of this type of habitat occurs in the vicinity of the affected areas.
Table Mountain Pine Forests	No	None of this type of habitat would be affected by the proposal.
Basic Mesic Forests	No	None of this type of habitat occurs in the vicinity of the affected areas.
Beech Gap Forests	No	None of this type of habitat occurs in the vicinity of the affected areas.
Rock Outcrops and Cliffs (includes forested boulder fields)	No	None of this type of habitat occurs in the vicinity of the affected areas.
High Elevation Balds and Meadows	No	None of this type of habitat occurs in the vicinity of the affected areas.
Caves and Mines	No	None of this type of habitat occurs in the vicinity of the affected areas.
Successional Forested Habitats	Yes	Vegetation manipulation activities would alter the forest age-class distribution.
High Elevation Early Successional Habitats	No	None of this type of habitat occurs in the vicinity of the affected areas.
Permanent openings and old fields, Right-of way, Improved pastures	Yes	The project proposes to maintain this type of habitat.
Forest Interior Birds	No	The affected area is/is not identified in the RLRMP as an area where edge effect is an issue.
Old Growth	No	None of this type of habitat occurs in the vicinity of the affected areas.
Terrestrial Riparian Habitats	Yes	Riparian habitats occur within or near the proposed affected areas.
Snags, Dens, and Downed Wood	Yes	Snags, dens, and downed wood occur in the proposed affected areas.
Aquatic Habitats	Yes	Aquatic habitats occur in the proposed affected areas.

Table 8. Elements of the biological environment, derived from RLRMP analysis, and their relevance to the Spring Creek project,CNF, McMinn, Monroe, and Polk Counties, Tennessee, 2009.

Biological Element	Analyzed Further?	Relevance to this Project
Threatened and Endangered Species	Yes	Potential effects to T and E species will be analyzed.
Demand Species	Yes	Demand species could be affected by project activities.
Migratory Birds	Yes	Migratory bird issues are closely tied to Major Forest Community types and Successional Forested Habitats. RLRMP objectives for these biological elements take into consideration migratory bird requirements.
Invasive Non-native Plants and Animals	Yes	Invasive Non-native Plants and Animals could be affected by the project.
Species Viability	Yes	Species with viability concerns occur in the area.
Forest Health	Yes	Forest health is an issue in the affected area.

The RLRMP selected management indicator species (MIS) as a tool to help indicate effects of management on several biological elements (USDA 2004b). The MIS are selected for analysis based on potential effects to their populations or habitats resulting from proposed project activities (Table 9).

Table 9. Forest-level MIS, derived from RLRMP analysis, and their relevance to the Spring Creek project, CNF, McMinn, Monroe, and Polk Counties, Tennessee, 2009.

Species Name	Purpose	Selected for Project Analysis?	Reasons for Selection/Non-Selection
Prairie warbler	To help indicate management effects of creating and maintaining early successional forest communities.	Yes	Some proposed activities would create early successional communities.
Chestnut-sided warbler	To help indicate management effects of creating and maintaining high elevation early successional forest communities and habitat	No	There are no high elevation early successional habitats in the Spring Creek Watershed Assessment Area.
Pine warbler	To help indicate effects of management in pine and pine-oak communities	Yes	Pine and pine-oak communities occur in the vicinity of the project and some are subject to management actions.
Pileated woodpecker	To help indicate management effects on snag dependent wildlife species	Yes	Forests with snags occur in the vicinity of the project and some are subject to management actions.
Acadian flycatcher	To help indicate management effects within mature riparian forest community	Yes	Riparian habitats occur near the proposed affected areas.

Table 9. Forest-level MIS, derived from RLRMP analysis, and their relevance to the Spring Creek project, CNF, McMinn, Monroe, and Polk Counties, Tennessee, 2009.

Species Name	Purpose	Selected for Project Analysis?	Reasons for Selection/Non-Selection
Scarlet tanager	To help indicate effects of management in xeric oak and oak pine communities	Yes	Xeric oak and oak pine communities occur in the vicinity of the project, and may be subject to management actions.
Ruth's golden aster	To help indicate management effects on the recovery of this T&E plant species	No	No populations of this species or their habitat occur in or near the vicinity of the project.
Ovenbird	To help indicate management effects of wildlife species dependent upon mature forest interior conditions	No	The affected area is not identified in the RLRMP as an area where edge effect is an issue.
Black bear	To help indicate management effects on meeting hunting demand for this species	Yes	Hunting demand for black bear could be impacted by the alternatives.
Hooded warbler	To help indicate effects of management on providing dense understory and midstory structure within mature mesic deciduous forest communities	Yes	Mesic deciduous communities occur in the vicinity of the project, and may be subject to management actions.

Scope of Analysis

Unless otherwise described in the sections below, analysis of direct and indirect effects for terrestrial elements is primarily focused within the boundaries of the individual treatment areas. Forested community types and successional stages were calculated using data from the Forest Service "R8 FSVeg Age Class Distribution" table run on 17 August 2009. Data for 17 compartments in the Spring Creek analysis area (102, 104, 105, 106, 117, 118, 119, 120, 121, 122, 126, 127, 128, 145, 146, 147, and 148) were used. Successional stages were analyzed based on the year 2010 for each alternative.

The timeframe for short-term effects is within the first year after treatment, and long-term effects up to 50 years from treatment. Analysis of cumulative effects also includes past, present and reasonably foreseeable activities on the forest, and thus may extend beyond the limits of the defined project areas to include the range of a species or habitat type. Time frames for cumulative effects analysis for terrestrial elements generally include 10 years prior to 50 years post treatment. A list of past, present and reasonably foreseeable activities to be considered is included on page 12.

Existing Condition Major Forest Communities

The area used for this terrestrial analysis includes approximately 16,244 acres of Forest Service ownership according to R8 FSVeg data. The RLRMP categorizes forest types from the Continuous Inventory of Stand Conditions (CISC) database into forested community types (USDA 2004a). Nine forested community types have been identiifed on the CNF (Table 10). The RLRMP Final Environemental Impact Statement (FEIS) further groups

these 9 forest community types into 5 major forested communities (USDA 2004b) (Table 11).

Table 10. Forest community types, as defined in the 2004 RLRMP, found on the CNF, Tennessee.

Forest Community Type[1]	Forest Type(s) (CISC Code[2])	Acres on CNF (in 2004)
Northern Hardwood Forest	Sugar maple-Beech-Yellow birch (81),Black birch (83)	18,516
Montane Spruce-Fir Forest	Fraser fir (6), Red spruce-Fraser fir (7), Red spruce-Northern hardwood (17)	647
Mixed Mesophytic-Hardwood Forest	Cove hardwood-White pine-Hemlock (41), Yellow poplar (50), Yellow poplar-White oak-Red oak (56), Black Locust (88)	138,858
Conifer-Northern Hardwood Forest	White pine (3), White pine-Hemlock (4), Hemlock (5), Hemlock-Hardwood (8), White pine-Cove hardwood (9), White pine-Upland hardwoods (10).	52,072
Dry to Mesic Oak Forest	Post oak-Black oak (51), White oak-Red oak-Hickory (53), White oak (54), Northern red oak-Hickory (55).	125,189
Dry and Dry-Mesic Oak-Pine Forest	Upland hardwoods-White pine (42), Southern red oak-Yellow pine (44), Chestnut oak-Scarlet oak-Yellow pine (45), Bottomland hardwoods-Yellow pine (46), White oak-Black oak-Yellow pine (47), Northern red oak-Hickory-Yellow pine (48).	56,465
Dry and Xeric Oak Forest	Chestnut oak (52), Scarlet oak (59), Chestnut oak-Scarlet oak (60).	69,984
Xeric Pine and Pine-Oak Forest	Shortleaf pine-oaks (12), Loblolly pine/hardwood (13), Pitch pine-oaks (15), Virginia pine-oaks (16), Table-mountain pine-Hardwoods (20), Shortleaf pine (32), Loblolly pine (31), Virginia pine (33), Spruce pine (37), Pitch pine (38), Table-mountain pine (39).	140,872
Eastern Riverfront and River Floodplain Hardwood Forests	Sweetgum-Yellow poplar (58), River birch-Sycamore (72), Sweetgum-nuttall oak-willow oak (62), Black Walnut (82)	1,086

1 = Forest community types as defined in the 2004 CNF RLRMP (USDA 2004a).
2 = Continuous Inventory Stand Conditions database forest stand type codes.

Table 11. Major forested communities, as defined in the 2004 FEIS for the RLRMP and Number of Acres in Spring Creek.

Major Forested Communities[1]	Forest Type(s) (CISC Code[2])	Acres in Analysis Area
Mesic Deciduous Forest	Loblolly pine-Hardwood (13), Cove hardwood-White pine-Hemlock (41), Bottomland hardwoods-Yellow pine (46), Yellow poplar (50), Post oak-Black oak (51), White oak-Red oak-Hickory (53), White oak (54), Northern red oak (55), Yellow poplar-White oak-Red oak (56), Sweetgum-Yellow poplar (58), River birch-Sycamore (72), Sugar maple-Beech-Yellow birch (81), Black walnut (82).	2,519
Spruce-Fir Forest	Fraser fir (6), Red spruce-Fraser fir (7), Red spruce-Northern hardwood (17).	0

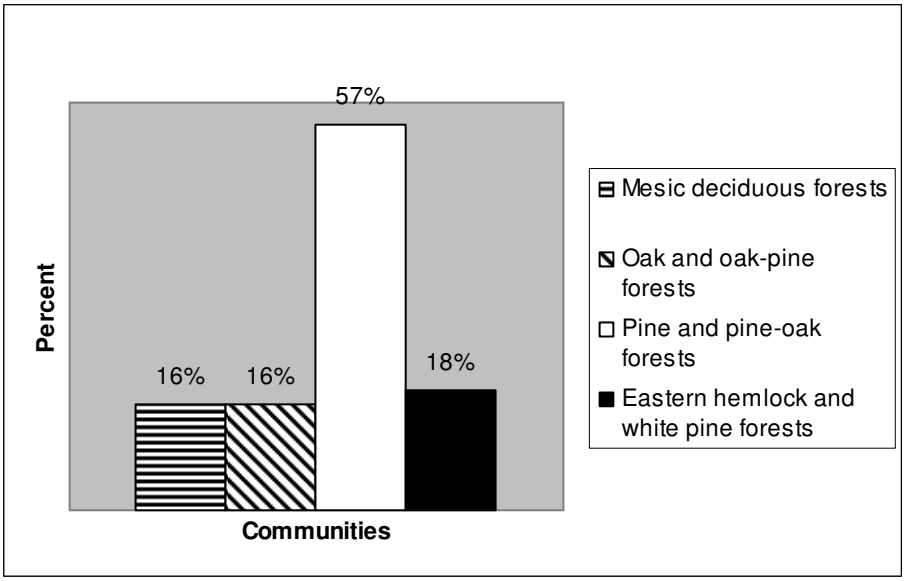
Table 11. Major forested communities, as defined in the 2004 FEIS for the RLRMP and Number of Acres in Spring Creek.

Major Forested Communities[1]	Forest Type(s) (CISC Code[2])	Acres in Analysis Area
Eastern Hemlock & White Pine Forest	White pine (3), White pine-Hemlock (4), Hemlock (5), Hemlock-Hardwood (8), White pine-Cove hardwood (9), White pine-Upland hardwoods (10), Upland hardwoods-White pine (42).	2,877
Oak & Oak-Pine Forest	Southern red oak-Yellow pine (44), Chestnut oak-Scarlet oak-Yellow pine (45), White oak-Black oak-Yellow pine (47), Northern red oak-Hickory-Yellow pine (48), Post oak-Black oak (51), White oak-Red oak-Hickory (53), White oak (54), Northern red oak (55), Scarlet oak (59), Chestnut oak-Scarlet oak (60).	2,543
Pine & Pine-Oak Forest	Shortleaf pine-Oaks (12), Loblolly pine/hardwood (13), Pitch pine-Oaks (15), Virginia pine-Oaks (16), Table mountain pine-Hardwoods (20), Loblolly pine (31), Shortleaf pine (32), Virginia pine (33), Pitch pine (38), Table mountain pine (39).	9,234

1 = Major forested communities as outlined in the 2004 FEIS for the RLRMP, CNF (USDA 2004b).
2 = Continuous Inventory Stand Conditions database forest stand type codes.

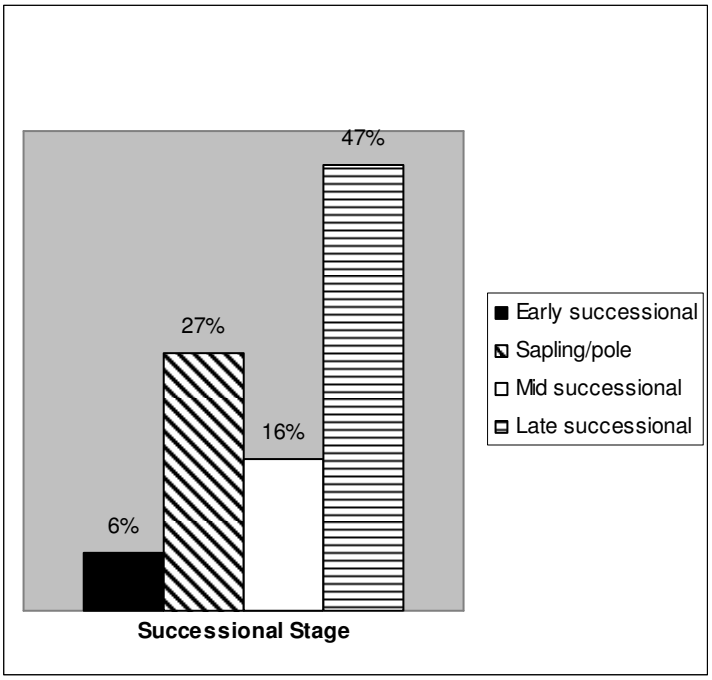
Four of the major forested communities are found in the analysis area and include Mesic deciduous forests (2,519 acres), Eastern hemlock and white pine forests (2,877 acres), Oak and oak-pine forests (2,543 acres), and Pine and pine-oak forests (9,234 acres) (Figure 2). The percentages of the major forested communities do not equal 100% because some forest types can be a component of more than one community.

Figure 2. Spring Creek Major Forested Communities



The percentage distribution of existing successional stages in Spring Creek are presented in Figure 3.

Figure 3. Spring Creek Successional Stages Existing Condition



Existing Condition Mesic Deciduous Forest

Mesic deciduous forests as defined in the RLRMP include northern hardwood, mixed mesophytic, and bottomland hardwood community types, as well as the dry-mesic oak forest communities. These forest types are characterized by relatively low levels of disturbance, and from a habitat perspective, their primary value is providing habitat for a variety of species dependent on mid- and late-successional forest stages. A number of bird species, including the cerulean warbler (Dendroica cerulea) favor mature, mesic hardwood forests with a diverse and well-developed canopy structure including canopy gaps and associated midstory and understory structural diversity. This structural diversity may be characteristic of the decadent, patchy conditions found in old growth forests, to which these species have presumably adapted. While a growing portion of the landscape in the southern Appalachians consists of large hardwoods, most sites have very simple canopy structures. This lack of structure is likely the result of previous even-aged timber management, resulting in forest stands of approximately equally-aged trees with low mortality and few canopy gaps. Most of these mid- and late-successional forests have not yet begun to develop the canopy gaps characteristic of old growth forests. It may be many centuries before such structure develops through natural succession (USDA 2004b).

Mesic deciduous forests are abundant and well distributed, comprising 283,088 acres (44 percent) on the CNF. The best, most clustered distributions are found at higher elevations of the Tellico Ranger District and Big Frog Mountain, followed by Big Bald, Unaka, Roan, Pond and Holston Mountains and Rogers Ridge. Poorest distributions are found on the pine dominated Starr and Chilhowee Mountains (USDA 2004b). In the Spring Creek analysis

area, mesic deciduous forests are one of the least abundant forest community type comprising 16% (2,519 acres) of the analysis area (Figure 2).

Hooded Warbler (MIS)

The hooded warbler (*Wilsonia citrina*) is a Neotropical migrant that is fairly common to common in the Southeast during the breeding season (Hamel 1992). It nests in understory of deciduous forest, especially along streams and ravine edges, and thickets in riverine forests. It is an inhabitant of both young and mature forests but is most abundant in the latter. A dense shrub layer and scant ground cover are important. In North Carolina, it is common in mountain ravines with dense growth of mountain laurel and rhododendron and in bottomland swamps with dense pepperbush and giant cane. This warbler generally favors large tracts of uninterrupted forest, but sometimes nests in forest patches as small as 5 hectares, probably where these are close to larger forested areas. The nest is placed in sapling or shrub in dense deciduous undergrowth, usually between 0.3 - 1.5 m. Individuals often return to the same area to nest in successive years (males are more likely to do so than females) (Sauer et al. 2005).

North American Breeding Bird Survey data indicate a fairly static population in the Blue Ridge Mountains from 1966-2005 (Sauer et al. 2005). The trend is significantly positive in eastern North America. It has been identified as a MIS for mid-late mesic deciduous forests with canopy gaps and structurally diverse understories. The hooded warbler is common in appropriate habitat on the CNF (USDA 2004b).

Direct and Indirect Effects Mesic Deciduous Forest

There is one stand classified as mesic deciduous forest, comprising 1.5 acres, proposed for treatments under the proposed action in the Spring Creek analysis area (Table 12).

Table 12. Acres of mesic deciduous forest potentially affected by treatments under the proposed action in the Spring Creek analysis area.

Treatment	Alt. 1	Alt. 2
Conversion to parking area	0	1.5
Total Acres	**0**	**1.5**

Alternative 1 (No Action)

With this alternative, no project activities would be implemented. No changes to the existing distribution or age-class structure of mesic deciduous forest would occur beyond those attributed to natural processes and disturbances.

Loblolly and white pine occur on several uncharacteristic sites in the Spring Creek analysis area. Allowing these species to persist negatively impacts forest health, tree vigor, wildlife browse, and reduces quality habitat available for hooded warblers.

Prescribed burning is generally beneficial for mesic deciduous forest. In the absence of prescribed fire, fuels build up, invasive non-native plant species can increase, and shade tolerant species increase reducing oak regeneration. Although prescribed fire reduces understory initially in some areas, resulting in habitat that is less attractive to the hooded

warbler, the overall all long-term benefits of prescribed fire in mesic deciduous forests benefit hooded warblers.

The FEIS for the RLRMP (USDA 2004b) states that expected population trends for hooded warblers under plan implementation is relatively stable for the next 50 years. Alternative 1 would have no effect on populations of this management indicator.

Alternative 2 (Proposed Action)

Under this alternative, 1.5 acres of mesic deciduous forest would be affected. A stand would be removed and converted to a horse trailer parking area. Although this action would reduce that available habitat for hooded warblers, this is less than 1/10 of 1% of the existing mesic deciduous forest in the Spring Creek analysis area. Consequently, the overall effect of this action on hooded warblers would be minimal.

The proposed application of prescribed fire in the analysis area would benefit mesic deciduous forest by reducing fuel loads, minimizing adverse effects of invasive and non-native plant species, reducing white pine and Virginia pine density, promoting advanced oak regeneration, and improve wildlife habitat for many species by improving forage and browse quality.

Other actions proposed in Alternative 2, including maintenance of wildlife openings; construction of ephemeral pools; road construction, reconstruction, and maintenance; and trail construction would not substantially affect mesic deciduous forest or hooded warblers.

Cumulative Effects Mesic Deciduous Forest

All Alternatives

Mature mesic hardwood forests were widespread historically. Species composition, diversity and structure of today's forests does not approximate historic conditions due to loss of the American chestnut, unregulated cutting and burning in the early 20th century, and loss of large diameter trees. Under RLRMP implementation, long term stability or increases in mature mesic forest is expected (USDA 2004).

Prescribed burning is generally beneficial for mesic deciduous forest. Controlled fire reduces invasive and non-native plant species, suppresses shade tolerant species, stimulates oak regeneration, and releases nutrients into the soil. Prescribed fire can reduce white pine density and the continued increase in this forest type in the absence of a natural fire regime. In the absence of prescribed fire, fuels build up and increase the risk of catastrophic wildfire, invasive and non-native plant species can increase, and shade tolerant species increase reducing oak regeneration.

Prescribed burning reduces dense understory in some areas, resulting in habitat that is initially less attractive to the MIS hooded warbler. However, with understory sprouting that typically occurs after a prescribed burn, the area would provide better habitat within a year or two. Prescribed burning is implemented on a spatial and temporal rotation, the result is that forest understory over a large area would be in different stages of regrowth.

Past, present and reasonably foreseeable timber harvest activities within the general project area are so minimal as to have almost no cumulative effects on mesic forest communities and associated MIS.

Considerable recreational activities do occur within the general project area; however the impacts from these activities on major forest communities and associated MIS are minimal and have almost no cumulative effects.

Natural events may have some effect on habitat in the general project area. The SPB outbreak negatively impacted some pine forests through high mortality. White pine and oak forests likely have benefited through increased seeding resulting from increased sunlight on the forest floor. The SPB outbreak likely displaced pine warblers through habitat loss; however as pine forests recover pine warbler numbers would increase in these habitats. Hooded warblers and scarlet tanagers have probably benefited when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The recent emergence of the HWA threatens the future of eastern hemlock forests, despite protection and restoration objectives given in the RLRMP. The reduction or elimination of hemlock forests may affect hooded warblers by decreasing nesting sites; however foraging sites would increase by the increase in sunlight causing new growth in the understory. The forest community and associated wildlife as a whole would likely be affected by the loss of this component. However the specific effects are not known at this time. The loss of the hemlock is a new development and effects will have to be assessed during and after it occurs due to the complexities of the systems involved.

Insects and diseases such as gypsy moth (Lymantria dispar) and oak decline are expected to have an overall negative effect on oak forests in the future (SAMAB 1996). Several gypsy moth infestations have been detected in the CNF's northeastern counties, and the infestation is expected to expand throughout the CNF by 2020. Many of the older xeric oak forests are experiencing oak decline. The greatest impact of oak decline would be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility would increase. Although oaks would not be eliminated from affected areas, oak abundance and diversity would be reduced. On both NFS and private lands, the future of oak forests would largely depend on management activities such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. Effects on associated MIS would be dependent on the severity of impacts on the oak forest habitats.

Impacts associated with other natural events such as wind-throw and wildfire may have some effect on habitat and associated MIS; however the magnitude and timing are such that they are not considered to be of any significance.

Any development on private land would potentially decrease the availability of this habitat. However, these activities are not within the control of the Forest Service. Other past, present and reasonably foreseeable activities would have little effect.

Existing Condition Eastern Hemlock and White Pine Forest

Eastern hemlock (Tsuga canadensis) and white pine (Pinus strobus) forests are broadly defined to include those forested communities that are either dominated or co-dominated by eastern hemlock or white pine in the canopy. For the purposes of this analysis, forests with a

significant component of eastern hemlock are classified as hemlock forests, even where white pine may be dominant. White pine forests include all other forests where white pine is dominant. This division puts priority on the presence of hemlock as a key habitat component (USDA 2004b).

Eastern hemlock forests typically occur on acidic soils and often have a dense shrub layer composed of ericaceous species. These communities are typically low in herbaceous diversity, but may support rich bryophyte communities. White pine forests occupy similar sites but also may occur on dryer locations, particularly in areas where fire has been suppressed. White pine forests have also been artificially created as timber plantations (USDA 2004b).

The combination of a largely evergreen canopy and a dense midstory in naturally occurring hemlock and white pine forests provide for a variety of benefits. Benefits include shading and cooling of riparian systems, thermal cover for wildlife, and nesting and foraging habitat for several species of Neotropical migrant birds dependent upon the layered canopy structure and understory thickets. There is some evidence that hemlock-white pine forests provide necessary habitat components for the long-term conservation of red crossbills (Loxia curvirostra) (USDA 2004b).

Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations. Red-breasted nuthatches (Sitta canadensis), winter wrens (Troglodytes troglodytes), and golden-crowned kinglets (Regulus satrapa) are found in late successional hemlock forests down to elevations of 2,000 feet. Several species of rare bryophytes that are known to occur primarily within the spruce/fir zone are also found at lower elevations in humid gorges often under a canopy that includes eastern hemlock. The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the hemlock woolly adelgid (Adelges tsugae) in the southern Appalachians. First identified in the eastern U.S. near Richmond, VA in the early 1950's, this exotic pest has recently spread into the southern Appalachians and threatens to spread throughout the range causing mortality within five years after initial infestation (USDA 2004b).

On the CNF, eastern hemlock forests are found primarily in association with north facing coves and slopes and riparian systems. Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. Based upon data from the RLRMP FEIS, eastern hemlock and white pine forests occupy 52,072 acres on the CNF (USDA 2004b).

In the Spring Creek analysis area, eastern hemlock and white pine forests are the second most abundant forest community type at 18% (2,877 acres) of the analysis area. This consists predominantly of white pine dominated forest types.

Direct and Indirect Effects Eastern Hemlock and White Pine Forest

Five stands classified as eastern hemlock and white pine forest, comprising 166 acres, are proposed for silvicultural treatments under the proposed action in the Spring Creek analysis area (Table 13).

Table 13. Acres of eastern hemlock and white pine forest potentially affected by silvicultural treatments under the proposed action in the Spring Creek analysis area.

Treatment	Alt. 1	Alt. 2
Shelterwood with reserves	0	40
White pine removal	0	31
Thinning	0	33
Seedtree with reserves	0	62
Total Acres	**0**	**166**

Alternative 1 (No Action)

With this alternative, no project activities would be implemented. No changes to the existing distribution or age-class structure of eastern hemlock or white pine forest would occur beyond those attributed to natural processes and disturbances.

Without silvicultural treatments in white pine forests, white pine would continue to increase and become established on uncharacteristic sites in the Spring Creek analysis area. Allowing white pine to increase and spread negatively impacts forest health, tree vigor, and wildlife browse by reducing oaks and other native species. Invasive and non-native species would also continue to increase due to a lack of management. Native plants would be displaced and quality habitat for wildlife would decrease.

Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. In the absence of fire, white pine continues to spread, fuels build up, invasive non-native plant species can increase, and shade tolerant species increase and reduce oak regeneration.

Alternative 2 (Proposed Action)

Under this alternative, 166 acres would be treated by timber harvests and 102 acres treated with a second year herbicide applications, to begin restoration of diverse natural communities. The eventual forested stands would approximate DFCs favoring a mixed stand of tree species. This action would restore forest health, tree vigor, and wildlife browse by stimulating the growth and regeneration of hardwoods and return stands to forest communities appropriate to the site. This would improve wildlife habitat for many species by improving forage and browse quality.

Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. Prescribed fire can be used as a tool to emulate natural fire regimes and reduce hemlock and white pine density. The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities. This action would restore forest health, tree vigor, and wildlife browse by stimulating the growth and regeneration of hardwoods and return stands to forest communities appropriate to the site. This would improve wildlife habitat for many species by improving forage and browse quality. Although

prescribed fire reduces understory initially in some areas, resulting in habitat that is less attractive to some wildlife, the overall long-term results of prescribed fire benefit many species.

Other actions proposed in Alternative 2, including maintenance of wildlife openings; construction of ephemeral pools; road construction, reconstruction, and maintenance; and trail construction would not substantially affect eastern hemlock and white pine forests or associated species.

Cumulative Effects Eastern Hemlock and White Pine Forest

All Alternatives

Years of fire suppression have allowed individual hemlocks and white pine to creep upslope onto more xeric slopes and ridges where they would not likely exist under a natural fire regime. Prescribed fire can be used as a tool to emulate natural fire regimes and reduce hemlock and white pine density. The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities. This action would restore forest health, tree vigor, and wildlife browse by stimulating the growth and regeneration of hardwoods and return stands to forest communities appropriate to the site. This would improve wildlife habitat for many species by improving forage and browse quality.

In the absence of prescribed fire, white pine continues to spread and fuels build up and increase the risk of catastrophic wildfire. Allowing white pine to increase and spread negatively impacts forest health, tree vigor, and wildlife browse by reducing oaks and other native species. Invasive and non-native species would also continue to increase due to a lack of management. Native plants would be displaced and quality habitat for wildlife would decrease. This results in habitat that is less attractive to many wildlife species.

Past, present and reasonably foreseeable timber harvest activities within the general project area are so minimal as to have almost no cumulative effects on eastern hemlock and white pine forest.

Considerable recreational activities do occur within the general project area; however the impacts from these activities on major forest communities and associated MIS are minimal and have almost no cumulative effects.

Natural events may have some effect on habitat in the general project area. The SPB outbreak negatively impacted some pine forests through unnaturally high mortality. White pine and oak forests likely have benefited through increased reproduction resulting from increased sunlight on the forest floor. The SPB outbreak likely displaced pine warblers through habitat loss; however as pine forests recover pine warbler numbers would increase in these habitats. Hooded warblers and scarlet tanagers have probably benefited when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The recent emergence of the HWA threatens the future of eastern hemlock forests, despite protection and restoration objectives given in the RLRMP. The reduction or elimination of hemlock forests may affect hooded warblers by decreasing nesting sites; however foraging sites would increase by the increase in sunlight causing new growth in the understory. The forest community and associated wildlife as a whole would likely be affected by the loss of

this component. However the specific effects are not known at this time. The loss of the hemlock is a new development and effects will have to be assessed during and after it occurs due to the complexities of the systems involved.

Impacts associated with other natural events such as wind-throw and wildfire may have some effect on habitat and associated MIS; however the magnitude and timing are such that they are not considered to be of any significance.

Any development on private land would potentially decrease the availability of this habitat. However, these activities are not within the control of the Forest Service. Other past, present and reasonably foreseeable activities would have little effect.

Existing Condition Oak and Oak-pine Forest

Oak dominated forests covered under this section include dry to mesic oak and oak-pine forests. Dry-mesic oak forests vary greatly in their species composition due to their wide distribution and are also a component of the mesic deciduous forest community type. The major species include chestnut oak (Quercus montana), northern red oak (Q. rubra), black oak (Q. velutina), white oak (Q. alba), and scarlet oak (Q. coccinea). The dry to mesic oak-pine forests considered here are oak-dominated forests containing a significant pine component. Predominant pine species include white pine, shortleaf pine (Pinus echinata), Virginia pine (P. virginiana), and loblolly pine (P. taeda). In the southern U.S., acres of oak-hickory and oak-pine forests have increased over the last 50 years. Oak and oak-pine forests are common throughout the South, comprising over half of the timberland of the region as a whole. Oak-hickory forests are the dominant forest type in the Southern Appalachian Ecoregion (USDA 2004b).

Oak forests are abundant on the CNF, comprising 251,638 acres or 36 percent of the forest acreage. These forests are very well distributed within the northern portion of the CNF. Oak forests are less evenly distributed on the southern CNF, especially along the pine-dominated lower elevations including Starr Mountain and the lower Citico Creek drainage; and in the highest elevations, where mesic deciduous forest types predominate (USDA 2004b).

In the Spring Creek analysis area, oak and oak-pine forests are one of the least abundant major forested communities, and comprise 16% (2,543 acres) of the analysis area. Many of the forest types in this community have a significant yellow pine component.

Scarlet Tanager (MIS)

The breeding range of scarlet tanager includes eastern North Dakota and southeastern Manitoba across southern Canada and northern U.S. to New Brunswick and central Maine, south to central Nebraska, Kansas, Oklahoma, Arkansas, northern Alabama, northern Georgia, northwestern South Carolina, western North Carolina, central Virginia, and Maryland (NatureServe 2008). Habitat on breeding grounds is deciduous forest and mature deciduous woodland, including deciduous and mixed swamp and floodplain forests and rich moist upland forests. The scarlet tanager prefers oak trees for nesting. They nest less frequently in mixed forest and are most common in areas with a relatively closed canopy, a dense understory with a high diversity of shrubs, and scant ground cover. They are able to breed successfully in relatively small patches of forest. Tanagers also sometimes nests in wooded parks, orchards, and large shade trees of suburbs. They are known to breed in various forest stages but are most abundant in mature forest, but according to some sources,

they prefer pole stands (USDA 2004b). North American Breeding Bird Survey data indicate a stable population in the Eastern U.S. from 1966-2005, but a declining trend in the Blue Ridge Mountains in the same time period (Sauer et al. 2005).

Direct and Indirect Effects Oak and Oak-pine Forest

There are no direct silvicultural activities proposed for oak and oak-pine forest in the Spring Creek analysis area. However, oak and oak-pine forests occur in the proposed prescribed burn unit and would be affected.

Alternative 1 (No Action)

With this Alternative, no project activities would be implemented. No changes to the existing distribution or age-class structure of oak and oak-pine forest would occur beyond those attributed to natural processes and disturbances.

In the absence of prescribed fire, fuels build up and increase the risk of catastrophic wildfire, invasive non-native plant species can increase, and shade tolerant species increase reducing oak regeneration.

Alternative 2 (Proposed Action)

There are no direct silvicultural activities proposed for oak and oak-pine forest in the Spring Creek analysis area. However, oak and oak-pine forests occur in the proposed prescribed burn unit and would be affected.

Prescribed burning is generally beneficial for oak and oak-pine forest. Controlled fire reduces the risk of catastrophic wildfire, reduces invasive and non-native plant species, suppresses shade tolerant species, stimulates oak regeneration, and releases nutrients into the soil. Prescribed fire can reduce white pine density and the continued increase in this forest type in the absence of a natural fire regime. Burning would further promote oak regeneration and help restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities.

Prescribed burning reduces dense understory in some areas, resulting in habitat that is initially less attractive to scarlet tanagers. However, with understory sprouting that typically occurs after a prescribed burn, the area would provide better habitat within a year or two. Prescribed burning is implemented on a spatial and temporal rotation, the result is that forest understory over a large area would be in different stages of regrowth.

Cumulative Effects Oak and Oak-pine Forest

All Alternatives

Prescribed burning is generally beneficial for oak and oak-pine forest. Controlled fire reduces the risk of catastrophic wildfire, reduces invasive and non-native plant species, suppresses shade tolerant species, stimulates oak regeneration, and releases nutrients into the soil. Prescribed fire can reduce white pine density and the continued increase in this forest type in the absence of a natural fire regime. Burning would further promote oak regeneration and help restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with these communities.

In the absence of prescribed fire, fuels build up and increase the risk of catastrophic wildfire, invasive non-native plant species can increase, and shade tolerant species increase reducing oak regeneration. Although prescribed fire reduces understory initially in some areas, resulting in habitat that is less attractive to the scarlet tanager, the overall all long-term benefits of prescribed fire in oak and oak-pine forest benefit scarlet tanagers.

Prescribed burning reduces dense understory in some areas, resulting in habitat that is initially less attractive to scarlet tanagers. However, with understory sprouting that typically occurs after a prescribed burn, the area would provide better habitat within a year or two. Prescribed burning is implemented on a spatial and temporal rotation, the result is that forest understory over a large area would be in different stages of regrowth.

Past, present and reasonably foreseeable timber harvest activities within the general project area are so minimal as to have almost no cumulative effects on mesic forest communities and associated MIS.

Considerable recreational activities do occur within the general project area; however the impacts from these activities on major forest communities and associated MIS are minimal and have almost no cumulative effects.

Natural events may have some effect on habitat in the general project area. The SPB outbreak negatively impacted some pine forests through unnaturally high mortality. White pine and oak forests likely have benefited through increased reproduction resulting from increased sunlight on the forest floor. The SPB outbreak likely displaced pine warblers through habitat loss; however as pine forests recover pine warbler numbers would increase in these habitats. Hooded warblers and scarlet tanagers have probably benefited when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

Insects and diseases such as gypsy moth (Lymantria dispar) and oak decline are expected to have an overall negative effect on oak forests in the future (SAMAB 1996). Several gypsy moth infestations have been detected in the CNF's northeastern counties, and spread of the infestation is expected to expand throughout the CNF by 2020. Many of the older xeric oak forests are experiencing oak decline. The greatest impact of oak decline would be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility would increase. Although oaks would not be eliminated from effected areas, oak abundance and diversity would be reduced. On both NFS and private lands, the future of oak forests would largely depend on management activities such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. Effects on associated MIS would be dependent on the severity of impacts on the oak forest habitats.

Impacts associated with other natural events such as wind-throw and wildfire may have some effect on habitat and associated MIS; however the magnitude and timing are such that they are not considered to be of any significance.

Any development on private land would potentially decrease the availability of this habitat. However, these activities are not within the control of the Forest Service. Other past, present and reasonably foreseeable activities would have little effect.

Existing Condition Pine and Pine-oak Forest

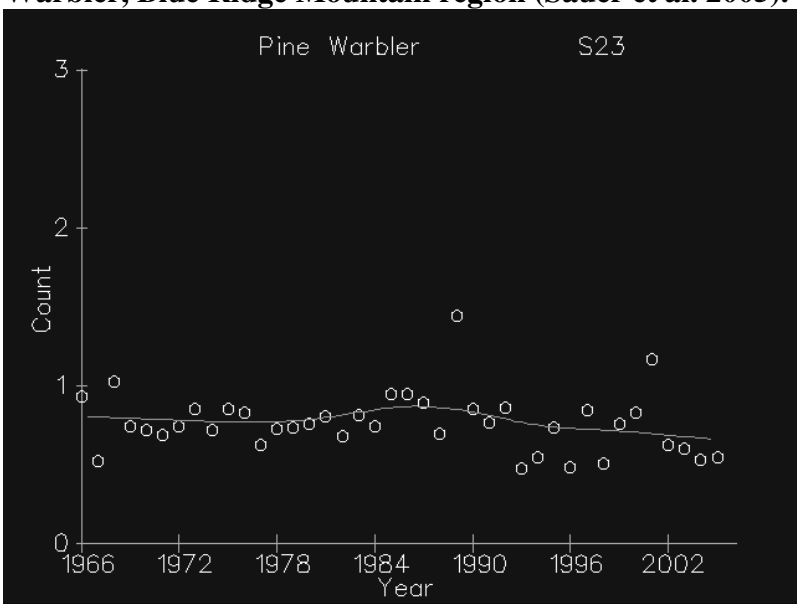
Pine dominated forests covered in this section include all "Southern Yellow Pine" forest types with various mixtures of hardwood species occurring as minor components. These forests occur on a variety of landforms at a wide range of elevations. Historically, in the Blue Ridge Physiographic Province, these communities occupied areas that were subject to natural fire regimes and typically occurred on ridges and slopes with southern exposures. However, due to a combination of previous land use, fire exclusion, and intensive forestry (plantations), many pine species have expanded beyond their natural range and today, pine-dominated communities can be found on virtually all landforms and aspects. Based upon data from the FEIS for the RLRMP, pine and pine-oak forests occupy 140,872 acres on the CNF (USDA 2004b).

In the Spring Creek analysis area, pine and pine-oak forests are the most abundant major forested community, comprising 57% (9,234 acres) of the analysis area. The pine forest types here are dominated by Virginia pine and shortleaf pine. A portion of the pine in the analysis area was impacted by the latest SPB outbreak. Much of the overstory was killed and some of it is being restored through slashdown, burning and planting shortleaf pine.

Pine Warbler (MIS)

The pine warbler (Dendroica pinus) is a short-distance migrant and summer resident that occurs primarily at elevations below 3,500 feet (NatureServe 2008). It is apparently more abundant on the southern districts of the CNF. Based on 1992-1993 point count data collected on the Tellico Ranger District, this species is not a predominant component of any community type, but was detected in yellow pine forest types across all successional stages. Point count data collected for this species from 1996-2002 on the Tellico and Ocoee/Hiwassee Ranger Districts, indicates 88% of pine warbler observations were in conifer forests, 17% were in early successional vegetation, 54% were in mid successional, and 29% were in late successional. The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a slow and slight decrease (Figure 4).

Figure 4. Breeding Bird Survey trend data for Pine Warbler, Blue Ridge Mountain region (Sauer et al. 2005).



Direct and Indirect Effects Pine and Pine-oak Forests

Four stands classified as pine and pine-oak forest, are proposed for silvicultural treatments under the proposed action in the Spring Creek analysis area (Table 14).

Table 14. Acres of pine and pine-oak forest potentially affected by silvicultural treatments under the proposed action in the Spring Creek analysis area.

Treatment	Alt. 1	Alt. 2
Thinning	0	29
Clearcut with reserves	0	10
Loblolly pine removal, invasive/non-native plant control using herbicides	0	7
Total Acres	**0**	**46**

Alternative 1 (No Action)

With this alternative, no project activities would be implemented. No changes to the existing distribution or age-class structure of oak and oak-pine forest would occur beyond those attributed to natural processes and disturbances.

Loblolly and Virginia pine occur on several uncharacteristic sites in the Spring Creek analysis area. Allowing these species to persist negatively impacts forest health, tree vigor, and wildlife browse by reducing oaks and other native species. Native plants would be displaced and quality habitat for wildlife would decrease.

In the absence of prescribed fire, fuels build up and increase the risk of catastrophic wildfire, invasive non-native plant species can increase, and shade tolerant species increase reducing oak regeneration.

Without implementation of management actions (i.e., silvicultural treatments and prescribed burning) shade tolerant species, likely white and Virginia pine or maple, would increase and displace other species especially oak and short-leaf pine. This would reduce habitat quality for species that prefer pine-oak forest. This would lead to a reduction in pine warbler habitat.

Alternative 2 (Proposed Action)

Under this alternative, 46 acres of pine and pine-oak forest would be directly affected by silvicultural activities. Two plantation stands of loblolly pine totaling 10 acres would be clearcut, allowed to naturally regenerate to mesic deciduous forest, and herbicides used to control invasive and non-native plants. The loblolly pine would be removed from a 7-acre loblolly pine–hardwood stand and herbicides used to control invasive non-native plants. Thinning would be done on 29 acres. These actions would restore forest health, tree vigor, and wildlife browse by stimulating the growth and regeneration of hardwoods and return these stands to forest communities appropriate to the sites. This action would benefit many species, including pine warblers, by diversifying understory structure which would increase habitat quality.

The proposed application of prescribed fire in the project area would benefit pine and pine-oak forest by reducing fuel loads and preventing catastrophic fires, minimizing adverse effects of invasive and non-native plant species, reducing white pine and Virginia pine density, promoting advanced oak regeneration, and improve wildlife habitat for many species by improving forage and browse quality. Although prescribed fire reduces understory initially in some areas, resulting in habitat that is less attractive to the pine warbler, the overall all long-term benefits of prescribed fire in oak and oak-pine forest benefit pine warblers.

Other actions proposed in Alternative 2, including maintenance of wildlife openings; construction of ephemeral pools; road construction, reconstruction, and maintenance; and trail construction would not substantially affect pine and pine-oak forest or pine warblers.

Cumulative Effects Pine and Pine-oak Forests

All Alternatives

Prescribed burning is generally beneficial for pine and pine-oak forest. Controlled fire reduces the risk of catastrophic wildfire, reduces invasive and non-native plant species, suppresses shade tolerant species, stimulates oak regeneration, and releases nutrients into the soil. Prescribed fire can reduce white pine density and the continued increase in this forest type in the absence of a natural fire regime. In the absence of prescribed fire, fuels build up and increase the risk of catastrophic wildfire, invasive and non-native plant species can increase, and shade tolerant species increase reducing oak regeneration.

Past, present and reasonably foreseeable timber harvest activities within the general project area are so minimal as to have almost no cumulative effects on pine and pine-oak forest communities and associated MIS.

Considerable recreational activities do occur within the general project area; however the impacts from these activities on major forest communities and associated MIS are minimal and have almost no cumulative effects.

Natural events may have some effect on habitat in the general project area. The SPB outbreak negatively impacted some pine forests through unnaturally high mortality. White pine and oak forests likely have benefited through increased reproduction resulting from increased sunlight on the forest floor. The SPB outbreak likely displaced pine warblers through habitat loss; however as pine forests recover pine warbler numbers would increase in these habitats. Hooded warblers and scarlet tanagers have probably benefited when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

Insects and diseases such as gypsy moth (Lymantria dispar) and oak decline are expected to have an overall negative effect on oak forests in the future (SAMAB 1996). Several gypsy moth infestations have been detected in the CNF's northeastern counties, and spread of the infestation is expected to expand throughout the CNF by 2020. Many of the older xeric oak forests are experiencing oak decline. The greatest impact of oak decline would be immediately behind the advancing front of gypsy moth due to repeated severe defoliations. As existing oak stands grow older, susceptibility would increase. Although oaks would not be eliminated from effected areas, oak abundance and diversity would be reduced. On both NFS and private lands, the future of oak forests would largely depend on management activities such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. Effects on associated MIS would be dependent on the severity of impacts on the oak forest habitats.

Impacts associated with other natural events such as wind-throw and wildfire may have some effect on habitat and associated MIS; however the magnitude and timing are such that they are not considered to be of any significance.

Any development on private land would potentially decrease the availability of this habitat. However, these activities are not within the control of the Forest Service. Other past, present and reasonably foreseeable activities would have little effect.

Existing Condition Successional Forested Habitats

This section deals with successional forest conditions across all forest types. Permanent openings such as open woodlands, savannas, grasslands, barrens and glades, balds, wildlife openings, old fields, pastures, and ROWs are covered elsewhere in this document. Old growth conditions are covered only generally in this section.

Forest age and related structure are key determining factors for presence, distribution, and abundance of a wide variety of wildlife. Some species depend on early-successional habitats, some depend on late-successional habitats, and others depend on a mix of both occurring within the landscape. These habitat conditions are also important as wintering and stopover habitats for migrating species. In order to support viability of diverse plant and animal populations and to support demand for game species, a variety of habitat types are needed within national forest landscapes (USDA 2004b).

For analysis purposes, forest succession is divided into four stages: early, sapling/pole, mid, and late (Table 15). Early-successional forest is defined as regenerating forest of 0-10 years of age for all forest community types. It is characterized by dominance of woody growth of regenerating trees and shrubs, often with a significant grass/forb component, and relatively low density or absent overstory. This condition is distinguished from most permanent opening habitats by dominance of relatively dense woody vegetation, as opposed to

dominance of grasses and forbs. Such conditions may be created by even-aged and two-aged regeneration cutting, and by natural disturbance events, such as windstorms, severe wildfire, and some insect or disease outbreaks.

Ages defining the remaining successional stages vary slightly by forest community type. Sapling/pole forest is characterized by canopy closure of dense tree regeneration, with tree diameters typically smaller than 10 inches. Mid-successional forest begins to develop stratification of over-, mid-, and understory layers. Late-successional forests are usually greater than 80 years old. The old growth stage contains the largest trees and often has many well developed canopy layers, scattered openings caused by tree mortality, and an abundance of dead and downed wood (USDA 2004b).

Table 15. Forest age (years) corresponding to successional stages for each forested community type, and total acres of each successional stage in the Spring Creek analysis area.

Forested Community Type[1]	Successional Stage			
	Early	Sapling/Pole	Mid	Late
Northern Hardwood Forest	0-10	11-40	41-80	81+
Conifer-Northern Hardwood Forest	0-10	11-40	41-80	81+
Mixed Mesophytic-Hardwood Forest	0-10	11-40	41-80	81+
River Floodplain Hardwood Forest	0-10	11-20	21-60	81+
Dry-Mesic Oak Forest	0-10	11-40	41-80	81+
Dry and Xeric Oak Forest; Woodland & Savanna Dry	0-10	11-40	41-80	81+
Xeric Pine & Pine-Oak Forest & Woodland	0-10	11-40	41-80	81+
Dry and Dry-Mesic Oak-Pine Forest	0-10	11-40	41-80	81+
Montane Spruce-Fir Forest	0-10	11-40	41-80	81+
Total Acres in Analysis Area	968	4356	2574	7561

1 = Forest community types as outlined in the 2004 RLRMP, CNF (USDA 2004a).

Of particular importance as habitat are forest conditions that exist at both extremes of the forest successional continuum – early-successional and late-successional/old growth forests. Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of any of the forest successional stages, and are typically in short supply and declining on national forests in the Southern Appalachians and in the eastern U.S. Early-successional forests are also not distributed regularly or randomly across the landscape. These habitats are essential or beneficial for some birds (ruffed grouse (Boasa umbellus), chestnut-sided warbler

(Dendroica pensylvanica), golden-winged warbler (Vermivora chrysoptera), prairie warbler (Dendroica discolor), yellow-breasted chat (Icteria virens), blue-winged warbler (Vermivora pinus)); beneficial to white-tailed deer (Odocoileus virginianus), eastern wild turkey (Meleagris gallopavo), and black bear in the South; and sought by hunters, berry pickers, crafters, and herb gatherers for the opportunities they provide. Many species commonly associated with late-successional forest conditions also use early-successional forests periodically, or depend upon it during some portion of their life cycle (USDA 2004b).

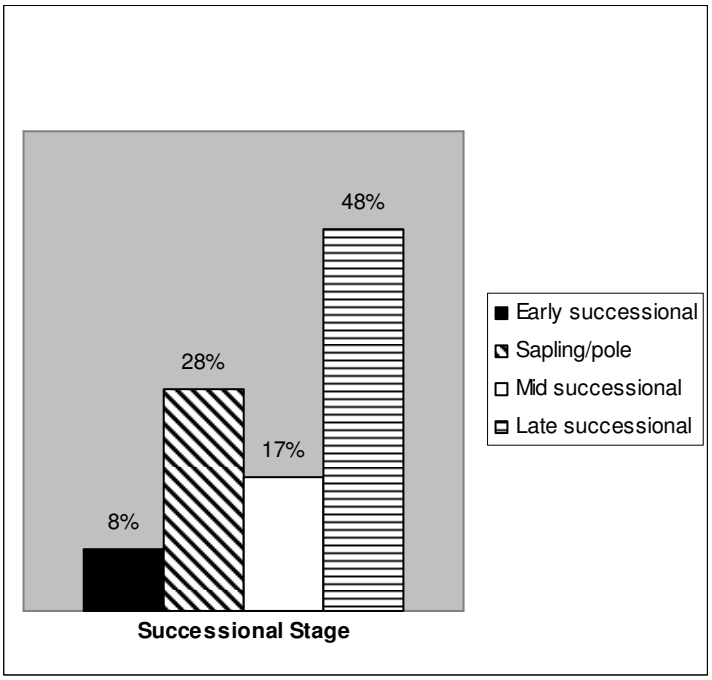
Like early-successional forests, late-successional forests provide habitats and food supplies for a suite of habitat specialists as well as habitat generalists. These habitats are important providers of high canopy nesting, roosting, and foraging habitat, suitable tree diameters for cavity development and excavation, and relatively large volumes of seed and hard mast. Although it takes many decades for late-successional forest conditions to develop, these habitats are more common and contiguous across the national forest and are dominant features in the Southern Appalachians (USDA 2004b).

Sapling/pole stages are generally of least value to wildlife because closed canopies limit understory development, and trees are not yet large and old enough to begin producing mast or other wildlife benefits. However, this successional stage does provide value as dense cover for some species. Mid-successional forests begin to look and function like late-successional forests, and provide habitat for many species that use late-successional forests. For most of these species however, mid-successional forests provide lower quality habitat than do late-successional forests (USDA 2004b).

Successional stages were calculated using data from the Forest Service "R8 FSVeg Age Class Distribution" table run on 17 August 2009, along with the SPB impacted stands in GIS totaling 618 acres in the analysis area, 56 acres of potential timber harvest in the Hopper Branch sale and 139 acres of harvest in the County Line sale.

Approximately 48% (7,747 acres) of the forest in the analysis area is currently greater than 80 years of age or considered late-successional (Figure 5). Early-successional forest (0-10 years) accounts for 8% (1,263 acres). In comparison, MP 8.B (Early Successional Habitat Emphasis), which emphasizes providing optimal to suitable habitat for a variety of upland game species and plants and animals associated with early successional forest habitats, includes 3% early successional forest. The goal for MP 8.B is to maintain 10 to 17 percent in early successional forest. Non-forest, which includes roads, water, and permanent openings, such as pastures, permanent wildlife openings, old fields, maintained ROWs, and balds, are not included in calculations of early-successional forest percentages. Woodlands, savannas, and grasslands, which will be managed for a relatively open condition on a permanent basis, also are not included in these calculations. Sapling/pole and mid-successional forest accounts for 28% and 17% of the forest acres, respectively.

Figure 5. Percent of existing forest successional stages found in the Spring Creek analysis area.



Prairie Warbler (MIS)

Prairie warblers (Dendroica discolor) are shrub land-nesting birds found in suitable habitats throughout the southern Appalachians (Hamel 1992). Prairie warblers require dense forest regeneration or open shrubby conditions in a forested setting. Near optimal habitat conditions are characterized by regeneration, thinned areas or patchy openings ten acres or more in size where woody plants average two to three meters in height, three to four centimeter in diameter, and occur in stem densities around 3,000 stems/acre (USDA 2004). Populations respond favorably to conditions created three to ten years following forest regeneration in larger forest patches. Providing a sustained flow of regenerating forests is necessary to support populations of prairie warbler. Populations of prairie warbler have been steadily declining in the eastern U.S. (Trend -2.08, P value 0.0000; Sauer et al. 2005).

Direct and Indirect Effects Successional Forested Habitats

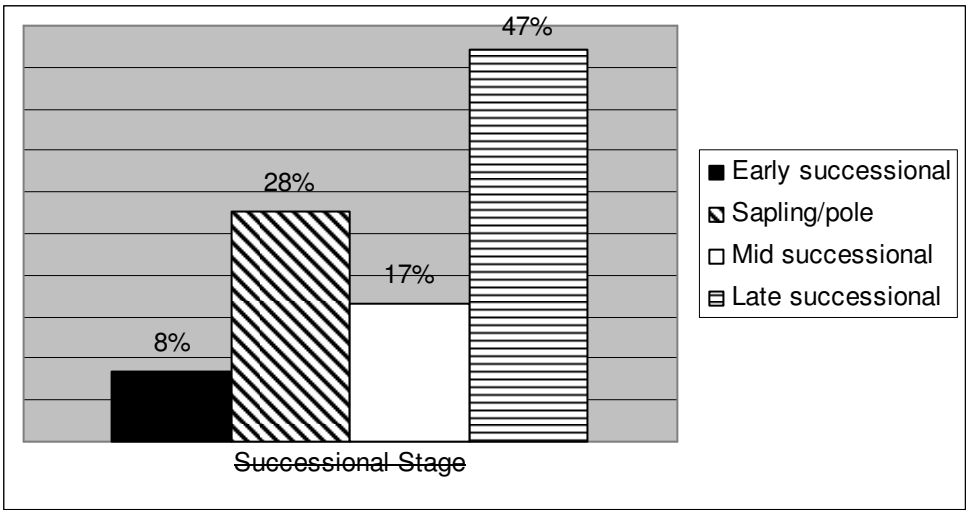
Alternative 1 (No Action)

With this alternative, no project activities would be implemented. All current early-successional forest habitat in the NFS lands in the analysis area would have grown to sapling/pole stage, except what might be created by natural weather events and wildfire. Consequently, prairie warblers and other species that utilize early-successional forest habitats could experience a long-term population decline in this area. Mid- and late-successional forest habitat acres would increase over time as forest stands continue to age. Species that are dependent on mid- and late-successional forest habitat may experience slight population increases with aging forest habitats.

Alternative 2 (Proposed Action)

Habitat management activities associated with this alternative would create an additional 112 acres of early-successional forest habitat, reduce mid-successional forest habitat by 35 acres, and reduce late-successional forest habitat by 77 acres in the analysis area (Figure 6). The actual change in successional forest habitats would be affected by the project implementation date, acres treated by year, and continued aging of forest stands. For the purpose of analyzing effects an implementation date 2010 is utilized.

Figure 6. Percent of forest successional stages in the Spring Creek analysis area, after Alternative 2 treatments.



The forested age class distribution for Spring Creek analysis area would be affected by the even aged and two aged regeneration treatment of stands. These treatments include clearcut with reserves, shelterwood with reserves and seedtree with reserves. The MPs whose age class distribution would be affected by this alternative are 7.B and 8.B.

There are two proposed treatment stands (147/31 and 148/40) in MP 7.B that would affect age class distribution. These two stands when treated would increase early successional habitat by 10 acres, in an area of MP 7.B that is about 7,084 acres. This represents an increase of early successional condition and a change in age class distribution of less than one percent. Management Prescription 7.B is suitable for timber management, but has no objectives for early successional habitat.

There are three stands proposed for regeneration (146/14, 146/16 and 146/23) that would affect age class distribution in MP 8.B. The acreage in older successional stages and associated vegetation would decrease by 102 acres or 3 % within these compartments in Alternative 2. The regeneration proposed in Alternative 2 (approximately 3%), combined with the existing 0-10 year old forest (approximately 3%), would total about 6%.

Implementing this alternative over the long-term would lead to a more balanced forest-wide age-class distribution and improve the health and vigor of individual stands through harvesting.

Cumulative Effects Successional Habitats

All Alternatives

Any activity which would open the understory and create patchy openings would benefit age class distribution and dependent MIS. This includes prescribed burning, timber harvest, utility ROW herbicide and SPB affected areas. Therefore, there would be beneficial cumulative effects to prairie warbler.

The development of private land may have a detrimental effect if the land is converted to a use other than forested land. Much of the private land surrounding the analysis area is in open fields, not necessarily beneficial to prairie warblers without the shrubby habitat they favor. Most of the areas to be harvested are not in close proximity to other land with the shrubby early successional habitat preferred by the MIS. The addition of 112 acres of this habitat in Alternative 2 would likely not impact populations surrounding the area on private land.

Existing Condition Permanent Openings and Old Fields, Right-of-Way, Improved Pastures

Habitats considered here include permanent openings and old fields, utility ROWs, and improved pastures. Other early successional habitats such as woodlands, grasslands, and early successional forests are discussed in their respective biological element section.

Permanent Openings and Old Fields

There are approximately 1,517 acres of permanent, maintained openings on the CNF. This represents 0.2 percent of the total national forest acres. Many were created by the expansion of log landings following timber harvest or by closing and seeding old roads to create linear openings. They are maintained with funding provided by the Tennessee Wildlife Resources Agency (TWRA), the Forest Service, and partners including the National Wild Turkey Federation (NWTF). Many are planted in non-native grass-clover mixtures, which include combinations of white or red clovers along with wheat, rye, oats, orchard grass, and ryegrass. Some of the older openings are dominated by fescue and/or annual weed species, and some of the recently renovated openings are planted to grain sorghum. Old fields acreage is currently unknown (USDA 2004b).

Currently, on NFS lands in the Spring Creek analysis area there are approximately 81 acres of maintained grassy wildlife openings. This includes 44 acres of spot openings and 37 acres of linear wildlife openings. Many of these are infested with non-native invasive species including fescue (Festuca spp.) and Microstegium vimineum.

Right-of-Way and Improved Pastures

Utility ROWs and improved pastures typically are managed for purposes other than to provide wildlife habitat. However, they can provide wildlife benefits if managed appropriately. ROWs can be established and maintained in plantings that enhance their benefits to wildlife. Once established, maintenance costs generally are reduced. There are approximately 1,300 acres of powerline ROW on the CNF. ROW acreage was estimated by multiplying the existing 85 miles of powerline ROW known to the CNF by an average width of 125 feet. The majority of these support a mixture of herbaceous plants and shrubs and are

maintained by a variety of methods. There are approximately 6 miles of transmission line traversing the analysis area.

Direct and Indirect Effects Permanent Openings and Old Fields, Right-of-Way, Improved Pastures

Alternative 1 (No Action)

This alternative would not affect the current wildlife openings in the analysis area. It would allow portions of the ROW in the analysis area to grow from its current state of early successional grasses and shrubs into a mid successional stage forest. Invasive species may also spread into the ROW displacing native and other desired vegetation.

Alternative 2 (Proposed Action)

The proposed action would include approximately 81 acres of wildlife opening maintenance and about 12 acres of daylighting around openings. Daylighting would remove selected trees encroaching on either the linear of spot openings. This would benefit many species of wildlife, both game and non-game species. The openings provide an important source of nutritious forage in winter, especially when acorns are in short supply. Forest openings also are a key habitat component for wild turkeys throughout the year. Maintained openings provide nutritious green forage in the winter and early spring and seeds during late summer and fall. Because of the abundance of insects and herbaceous plants produced in these openings they are especially important as brood rearing habitat for young turkeys. Linear openings, especially those associated with young regenerating forests provide optimal brood habitat conditions for ruffed grouse.

Cumulative Effects Permanent Openings and old fields, Right-of way, Improved pastures

All Alternatives

Prescribed burning near any of the affected areas could provide some of the benefits of openings if the burning frequency is adequate to stimulate grassy vegetation and create small openings.

There would be no net loss or gain or other effect from road maintenance. If road maintenance occurs to access a stand then the road would be replanted after harvest and maintained as a linear wildlife opening again.

Openland habitat, in the form of wildlife openings and rehabilitated roads (linear openings), would be maintained in these alternatives. This habitat type provides year-round forage, soft mast, and an abundance of insects for many species.

Other past, present and reasonably foreseeable activities (see page 12) would have little effect.

Existing Condition Terrestrial Riparian Habitats

Terrestrial riparian habitats encompass the transition area between aquatic systems and upland terrestrial systems. All wetlands (including beaver ponds), as well as margins of

varying widths along streams, rivers, lakes, ponds, and reservoirs, are contained within terrestrial riparian habitats. These areas provide a number of critical functions for associated species. Most importantly, they provide rich, moist environments, not often found in upland areas. Riparian terrestrial habitats may serve as corridors for wildlife movement, allowing for daily travel and seasonal migration. The riparian area may serve as a connector of habitats and populations allowing gene flow to occur, thus keeping populations genetically vigorous (USDA 2004b). Riparian habitats ideally include a mosaic of native plant and animal communities and successional stages, with a predominance of late-successional forests. Late successional riparian forests contain multiple canopy layers that provide a variety of ecological niches, thermal and protective cover, and maintenance of moist conditions. Decadence of older forests provide an abundance of snags and downed wood, which also help retain moisture and provide important habitat substrate for reptiles, amphibians, small mammals, invertebrates, and mosses and liverworts. The majority of riparian dependent species need or prefer late-successional forest conditions for the diverse structure and the moist, temperature-moderated microclimates they provide.

Riparian habitats within the planning area are typical for the area with numerous small streams and drains feeding into Spring Creek and the Hiwassee River. Stands 146/29, 147/31, and 148/40 are immediately adjacent to the Hiwassee River. Two riparian communities were described in this area that have components of two rare communities (Arundinaria gigantea ssp. gigantea Shrubland – CEGL003836, and Hiwassee/Ocoee River Boulder Scour Vegetation – CEGL008455). This section of the EA examines the biological elements of the terrestrial riparian area. The physical elements are addressed in "Water and Soil Resources" discussed later.

Acadian Flycatcher (MIS)

Breeding range of the Acadian flycatcher (Empidonax virescens) includes southeastern South Dakota east across southern Great Lakes region to southern New England, south to southern Texas, Gulf Coast, and central Florida, west to central Kansas; in Canada, restricted to southwestern Ontario (NatureServe 2002). The highest nesting densities were in the Cumberland Plateau and in Virginia and West Virginia. Key habitat requirements are moist deciduous forests with a moderate understory, generally near a stream (Hamel 1992). Humid deciduous forest (primarily mature), woodland, shaded ravines, floodplain forest, river swamps, hammocks and cypress bays of south, thickets, second growth, and plantations are used for nesting and breeding. Acadian flycatchers require a high dense canopy and an open understory. These birds tend to be scarce or absent in small forest tracts, unless the tract is near a larger forested area. North American Breeding Bird Survey data indicate a stable population in the Eastern U.S. from 1966-2005, but a declining trend in the Blue Ridge Mountains in the same time period (Sauer et al. 2005).

Direct and Indirect Effects Terrestrial Riparian Habitats

Alternative 1 (No Action)

Under this alternative no project activities would be implemented, thus there would be no direct or indirect effects to terrestrial riparian habitats. Likewise, this alternative would have no direct or indirect effect to Acadian flycatchers.

Alternative 2 (Proposed Action)

The proposed action would implement activities in compliance with the RLRMP and associated riparian standards that are designed to maintain, restore, or enhance terrestrial riparian habitats. Most project activities would be implemented outside of riparian areas with the exception of Stands 146/29, 147/31, and 148/40 which are located within the riparian zone of the Hiwassee River. These three stands are currently dominated by loblolly pine (Pinus taeda) as a result of previous land management. The proposed action would remove the pine and restore a natural bottomland hardwood riparian community on these sites.

Treatment of the three riparian stands would have little to no short-term effect on Acadian flycatchers. Existing habitat is fragmented and composed of species that are atypical of riparian forests. The long-term goal of this project is to restore native, bottomland hardwood forests on sites currently occupied by pine plantations. In the long-term, effects of the proposed action could be beneficial to Acadian flycatchers.

Cumulative Effects Terrestrial Riparian Habitats

All Alternatives

Past, present and reasonably foreseeable activities (see page 12) would have little to no effect on terrestrial riparian habitats as all activities on NFS lands would be in compliance with the RLRMP and thus not be likely to negatively impact these habitats. There could be a small positive contribution to the quality of riparian habitats from the proposal that could lead to a positive cumulative effect for this habitat type and the associated Acadian flycatcher.

Existing Condition Snags, Dens, and Downed Wood

Snags, dens, and downed wood (including branches, large logs, stumps, and root wads) are important habitat components, structurally and as sources of energy, for terrestrial and aquatic communities. Many species of potential viability concern are associated with snags, downed wood, or den trees. Large snags provide birds with nesting and feeding sites, singing perches, and as lookout posts for predators and prey. Bats roost and produce maternity colonies under exfoliating bark. Viability of the Indiana bat (Myotis sodalis) is critically tied to snags because of their use as roosts. The need to avoid disturbance to this species is the driving factor in considering effects of management on snags. Amphibians, reptiles, small mammals, and invertebrates utilize snags and downed woody debris as cover. A variety of species utilize snags, logs, and stumps as den sites. Downed wood and logs are used as drumming sites by grouse to attract mates. Small mammals utilize logs as travel ways. Fungi and other decomposers of woody debris are key components of food webs. Rotting wood tends to absorb moisture during wet periods and release it in dry periods thus helping to maintain a cooler microclimate (USDA 2004b).

Den trees, defined as living trees with hollows or cavities inhabited by animals, are a critical habitat component for many species. They are used for nesting, roosting and hibernating. Little information is available on how much large woody material is sufficient to support associated species. A general recommendation of 2-4 snags per acre is considered a "reasonable target." Generally, for most dependent wildlife, the more snags available the greater the benefit (USDA 2004b).

Within the aquatic system, downed wood from riparian trees and shrubs greatly influence stream channel morphology and aquatic ecology. By obstructing stream flow, large woody debris stores and distributes sediment, and creates channel features, such as pools, riffles, and waterfalls. Wood also traps organic matter, which allows this material to be processed by instream organisms. Fish and insects occupy the pools and riffles created by the large woody debris, and riparian forest regeneration occurs on deposited sediment. Turtles and snakes use logs in streams and overhanging branches for basking and sunning. Large woody debris in riparian areas is used as cover by amphibians, insects, and other invertebrates, and small mammals (USDA 2004b).

Snag, downed wood, and den site availability is influenced by a variety of factors including tree species, age, forest health, slope, aspect, and fire intensity and frequency. Fire may reduce snags and downed wood in fire-dependent communities, but can also cause some tree mortality creating new snags and downed wood. Snags and downed wood also may be extremely abundant in forests affected by mortality events such as storms, insect, and disease outbreaks. Snags, downed wood, and den trees are typically most abundant in late-successional forests (USDA 2004b).

Snag availability is currently not considered a limiting factor on the CNF. Current abundance of late-successional forest by community type is discussed in detail in the section on Successional Forest Habitats. This information indicates late-successional forests are abundant in the assessment area. It is estimated that there are about 7 to 8 snags per acre across the CNF and the recent SPB outbreak has resulted in a sharp increase in snag availability over the past several years (USDA 2004b).

Pileated Woodpecker (MIS)

The pileated woodpecker (Dryocopus pileatus) utilizes many forest communities, but generally is limited to mature coniferous, deciduous, and mixed forests with large, dead trees (DeGraaf et al. 1991). Highest densities occur in mixed pine-hardwood sawtimber. It is a locally common permanent resident of Tennessee found in woodlands with trees large enough for nesting and foraging. It is typically considered a forest interior species but will readily fly across openings and is somewhat tolerant of forest fragmentation. Its occurrence in an area is more dependent on regional forested area rather than individual forested tracts. Tennessee Christmas bird counts show an increase in pileated numbers (Nicholson 1997). The overall regional population trend (Blue Ridge Mountains) for 1966-2005 indicates a steady increase (Figure 7).

Figure 7. Population trends for pileated woodpecker in the Blue Ridge Mountains, 1966-2005 (Sauer et al. 2005).

Direct and Indirect Effects Snags, Dens and Downed Wood

Alternative 1 (No Action)

This alternative would have no effect to snags, dens, and downed wood. The forest would continue to age, causing an increase in those elements. No management activities would take place. There would be no effect to pileated woodpeckers.

Alternative 2 (Proposed Action)

The proposed timber harvests would remove potential snags, dens and downed wood. This would negatively affect species in the area that use those elements due to the loss of nesting sites, dens and escape cover. The effects would be limited to the areas affected by harvest. Due to the recent SPB outbreak, snags are not a limiting factor at this time.

The proposed habitat improvements would negatively impact pileated woodpeckers by removing mature trees the birds might use for nesting and feeding. There is an abundance of this type of habitat found in the surrounding area. The proposed action would remove approximately 112 acres (less than 1% of the analysis area) of forest in the area. The other activities proposed would not affect the woodpecker.

Cumulative Effects Snags, Dens and Downed Wood

All Alternatives

Areas affected by SPB and other areas potentially affected by hemlock woolly adelgid would increase snags, dens and downed wood and would benefit pileated woodpeckers.

Timber sales may also provide snags and downed wood but would also remove some mature trees. Prescribed burning near any of the affected areas would not cumulatively affect

pileated woodpeckers. Recreation would not affect this habitat component or the MIS. Private land development may reduce snags, dens and downed wood. Other past, present and reasonably foreseeable activities (see page 12) would have little effect.

Existing Condition Aquatic Habitats

All streams in the Spring Creek analysis area drain to Spring Creek then to the Hiwassee River and are within the Blue Ridge Province. Based on the RLRMP FEIS (USDA 2004b) the Hiwassee River Watershed has an average rating for sediment, point source pollution, temperature, and altered stream flow. Sedimentation poses a moderate risk while the other water quality factors pose only a slight risk to aquatic species viability (USDA 2004).

The Spring Creek analysis area contains approximately 672 miles of ephemeral, intermittent and perennial streams (Table 16).

Table 16. Forest Service managed aquatic habitats in the Spring Creek Assessment

Aquatic Habitats	Analysis Area Miles
Ephemeral Streams	417miles
Intermittent Streams	139 miles
Perennial Streams (no fish)	116 miles
Coldwater Fish Streams	0 miles
Coolwater Fish Streams	20 miles
Warmwater Fish Ponds	0 acres

Approximately 20 miles of Forest Service managed streams are capable of supporting fish and are displayed in Table 17 along with their physical characteristics. All of the stream reaches should support cool water fisheries. Fifteen of nineteen reaches have been surveyed for fish. Based on their physical characteristics, none of the unsurveyed streams are likely to support any different species; however, the sensitive Tennessee dace could be present in these unsurveyed reaches.

Table 17. Streams in the Spring Creek Watershed Assessment

Stream Name	Reach	Miles	Order	Low Elev	% Gradient	Date Last Surveyed	Number of Fish Species
Basin Branch	1	0.4	4	820	0.90	Never	--
Basin Branch	2	1.1	4	1000	10.30	7/17/2001	6
Bullet Creek	1	0.8	5	1020	0.50	11/6/1990	5
Bullet Creek	2	0.2	5	1200	6.00	3/25/1984	1
Bullet Creek	3	0.4	5	1290	14.60	5/28/1984	2
Bullet Creek	4	2.6	5	1620	0.50	7/8/1971	1
Dugan Branch	1	0.4	4	1140	1.50	7/31/2001	4
Ellis Branch	1	1.1	4	1010	7.80	7/17/2001	2
Sheehan Branch	1	0.4	4	910	4.00	7/20/2001	5
Spring Creek	1	3.4	6	750	0.40	6/8/1994	43
Spring Creek	2	4.3	6	910	4.50	7/8/1971	14
Spring Creek	3	0.6	5	1070	1.50	Never	--
Spring Creek Lower Unnamed	1	0.2	3	1000	5.00	Never	--

Table 17. Streams in the Spring Creek Watershed Assessment

Stream Name	Reach	Miles	Order	Low Elev	% Gradient	Date Last Surveyed	Number of Fish Species
Spring Creek-Upper Unnamed	1	0.6	4	1100	3.30	Never	--
Spurling Branch	1	1.1	3	1100	3.30	7/20/2001	3
Tinker Branch	1	0.2	4	910	3.00	7/18/2001	1
Yellow Creek	1	0.7	5	1280	8.00	11/6/1990	0
Yellow Creek	2	1.0	4	1570	3.30	7/20/2001	0
Yellow Creek	3	0.6	4	1740	1.30	7/8/1971	0

A total of 45 species of fish have been documented from the streams in this area (Table 18). Three of these fish species are sensitive species and two are locally rare. Protection and population restoration are the goals for these species. Eleven are managed as game species (includes two desirable exotics); with a goal of enhancing their numbers to provide more fishing opportunities. Twenty-nine other fish are native with a goal of maintaining their viability throughout the Forest. Two fish are undesirable exotics which have no viability goal. Other aquatic species present in this area, include: amphibians, mussels, reptiles, insects, crayfish, and snails. No known game or rare species from these taxa occur here.

All of Yellow Creek and reach 4 of Bullet Creek have very low fish species diversity relative to other streams in the area of comparable size, gradient and elevation. This reduced diversity is likely do to historic land treatments that resulted in localized extirpations. The native species are not able to re-colonize these streams because of the significant waterfalls on Yellow and Bullet Creeks.

Table 18. The total number of fish populations in the Spring Creek Watershed Assessment and their relative abundance across this Forest (USDA 2007)

Species	Populations		Status	Forest Viability Goal
	Analysis Area	Forest Wide		
blotchside darter	1	2	Sensitive	Protect/Restore
mountain brook lamprey	1	3	Sensitive	Protect/Restore
Tennessee dace	4	36	Sensitive	Protect/Restore
dusky darter	1	1	Locally Rare	Protect/Restore
mountain shiner	1	2	Locally Rare	Protect/Restore
Bluegill	1	57	Game	Enhance
brown trout	3	96	Game	Enhance
green sunfish	1	33	Game	Enhance
largemouth bass	1	23	Game	Enhance
longear sunfish	1	12	Game	Enhance
rainbow trout	2	270	Game	Enhance
redbreast sunfish	3	38	Game	Enhance
redear sunfish	1	10	Game	Enhance
rock bass	2	77	Game	Enhance
smallmouth bass	2	56	Game	Enhance
spotted bass	1	21	Game	Enhance
banded darter	2	17	Native	Maintain

Table 18. The total number of fish populations in the Spring Creek Watershed Assessment and their relative abundance across this Forest (USDA 2007)

Species	Populations		Status	Forest Viability Goal
	Analysis Area	Forest Wide		
bigeye chub	1	21	Native	Maintain
black redhorse	1	28	Native	Maintain
western blacknose dace	6	290	Native	Maintain
central stoneroller	4	132	Native	Maintain
creek chub	7	227	Native	Maintain
gilt darter	1	9	Native	Maintain
greenside darter	2	38	Native	Maintain
lamprey sp.	1	-	Native	Maintain
Logperch	1	15	Native	Maintain
longnose dace	1	105	Native	Maintain
mirror shiner	1	16	Native	Maintain
northern hogsucker	3	110	Native	Maintain
northern studfish	1	8	Native	Maintain
redline darter	2	48	Native	Maintain
river chub	2	70	Native	Maintain
saffron shiner	1	26	Native	Maintain
sculpin sp.	8	-	Native	Maintain
snubnose darter	3	59	Native	Maintain
speckled darter	1	5	Native	Maintain
striped shiner	1	36	Native	Maintain
telescope shiner	2	31	Native	Maintain
Tennessee shiner	2	57	Native	Maintain
warpaint shiner	3	81	Native	Maintain
whitetail shiner	2	39	Native	Maintain
fathead minnow	1	2	Introduced/Undesirable	None
yellow perch	1	11	Introduced/Undesirable	None

There are 51 (Table 19) aquatic or semi-aquatic TES species on the CNF TES species list (CNF 2001). There are ten (Table 19 and 20) aquatic/semi-aquatic TES species that could occur in the analysis area. Only the Tennessee dace, blotchside darter, and mountain brook lamprey have been documented within the analysis area.

Table 19. Aquatic and semi-aquatic Threatened, Endangered and Sensitive species that are on the CNF list and potentially in the Spring Creek Watershed Assessment area.

Group	Number	
	CNF List	Assessment area
Amphibians	3	0
Fish	18	3
Insects	8	7
Mussels	21	0
Reptiles	1	0
Totals	**51**	**10**

Table 20. Aquatic and semi-aquatic Threatened, Endangered and Sensitive species that may occur within the Spring Creek Watershed Assessment area

Group	Common Name	Status	Analysis Area	Forest Wide
Fish	Tennessee dace	Sensitive	Present	Tributaries
Fish	blotchside darter	Sensitive	Present	Tributaries
Fish	mountain brook lamprey	Sensitive	Present	Tributaries
Insects	Helma's net-spinning caddisfly	Sensitive	Not Documented	Polk County
Insects	Cherokee clubtail	Sensitive	Not Documented	Polk County
Insects	Green-faced clubtail	Sensitive	Not Documented	Unknown
Insects	Mountain river cruiser	Sensitive	Not Documented	Unknown
Insects	Allegheny snaketail	Sensitive	Not Documented	Unknown
Insects	Edmund's snaketail	Sensitive	Not Documented	Polk County
Insects	Appalachian snaketail	Sensitive	Not Documented	Polk County

Direct and Indirect Effects Aquatic Habitats

Alternative 1 (No Action)

Alternative 1 would not involve any new ground disturbance. Sediment accumulation is a problem in the Spring Creek watershed and is attributed to roads. Only 1.4 miles of roads will be maintained. No new adverse or positive effects would occur to the aquatic environment.

Alternative 2 (Proposed Action)

All activities authorized under Alternative 2 would employ filter strips and/or silt fencing between ground disturbance and water bodies (Forest Wide (FW) Standards-FW-3, FW-6, FW-7, FW-9, and FW-10; USDA 2004a). Three vegetation treatments would occur within defined riparian corridors. These treatments are directed at removing pine plantations and allowing the natural riparian community to re-establish. The operations would cause short term ground disturbances within the riparian corridor. Riparian Prescription Standards-RX11-1, RX11-8, RX11-29, RX11-30, RX11-31, and RX11-32 (USDA 2004a) would be followed with additional mitigation measures, such as silt fencing, determined as conditions warrant on site.

Maintenance of 4.6 miles of roads for timber hauling would help to reduce sediment runoff from these roads. (Goals 47 and 48; USDA 2004a)

Herbicides may be used for woody vegetation control. Forest Wide Standards (FW-14, FW-15, and FW-16; USDA 2004a) would be followed during implementation.

Implementation of Alternative 2 with full consideration of these standards would result in no increase of direct or indirect effects to aquatic habitats or species from these management activities (pgs. 198-199; USDA 2004b). A substantial decrease in road generated sediment would result compared to Alternative 1.

Cumulative Effects Aquatic Habitats

Alternative 1 (No Action)

Alternative 1 does not propose any new ground disturbance. Other activities in the area including such dispersed recreation as horseback riding, hunting, fishing, hiking, and camping may be contributing sediment to streams. Sediment accumulation is a problem in the Spring Creek watershed. Past and present activities include: impacts from HWA and SPB; development of private lands; utility ROWs and electronic sites; prescribed and wild fires; noxious weed treatments; Gee Creek Wilderness Area and Bullet Creek Botanical Area. In conjunction with Alternative 1 these activities could continue to have an adverse cumulative effect on aquatic habitats and species.

Activities, on NFS lands, that are reasonably foreseeable would be implemented under the standards for protecting water bodies listed in the RLRMP for the CNF (USDA 2004a). These activities may include: dispersed recreational activities; Hopper Branch timber sale; continuing impacts from HWA and SPB; development of private lands; utility ROWs and electronic sites; prescribed and wild fires; noxious weed treatments; increased road maintenance from the stimulus package; and Gee Creek Wilderness and Bullet Creek Botanical Areas. Implemented in conjunction with Alternative 1 sedimentation could continue to have an adverse cumulative effect on the aquatic habitats and species. Reasonably foreseeable activities that occur on private lands could have a negative effect on the aquatic systems regardless of which alternative is selected; the Forest Service cannot control those actions.

Alternative 2 (Proposed Action)

Alternative 2 could create short term ground disturbances on uplands and within riparian areas.

Other activities in the area including horseback riding, hunting, fishing, hiking, and camping may be contributing sediment to streams. Sediment accumulation is a problem in this watershed.

Past and present activities include: impacts from HWA and SPB; development of private lands; utility ROWs and electronic sites; prescribed and wild fires; noxious weed treatments; Gee Creek Wilderness Area and Bullet Creek Botanical Area. In conjunction with Alternative 2 these activities could continue to have an adverse cumulative effect on the aquatic habitats and species. However, long term effects could reduce sediment transport to streams because of increased road maintenance and application of standards for protecting bodies of water listed in the RLRMP for the CNF (USDA 2004a) during project implementation.

Activities, on NFS lands, that are reasonably foreseeable would also be implemented under the standards for protecting water bodies listed in the CNF RLRMP (USDA 2004a). These activities may include: dispersed recreational activities; Hopper Branch timber sale; continuing impacts from HWA and SPB; development of private lands; utility ROWs and electronic sites; prescribed and wild fires; noxious weed treatments; increased road maintenance from the stimulus package; and Gee Creek Wilderness and Bullet Creek

Botanical Areas. Implemented in conjunction with Alternative 2, sediment reduction could have a positive cumulative effect on the aquatic habitats and species. Reasonably foreseeable activities that occur on private lands could have a negative effect on the aquatic systems regardless of which alternative is selected; the Forest Service cannot control those actions.

Existing Condition Threatened and Endangered Species

The Spring Creek project proposes several types of activities including timber harvest, prescribed burning, trail construction, and the use of herbicides that could have effects on threatened and endangered species if they are present in the analysis area. With the exception of any dozer lines needed for control, prescribed burning has no ground disturbing activities, nor does the use of herbicides. Botanical, snail and bat surveys were conducted within all areas proposed for ground-disturbing activities. No threatened, endangered, or candidate for federal listing species were found during surveys for this project. Potential effects to one federally listed plant species (Isotria medeoloides) are considered as this species could have habitat within the burn blocks. Effects to federally-listed threatened and endangered species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. Two federally listed species were analyzed in detail and the results are summarized here.

Direct, Indirect and Cumulative Effects Threatened and Endangered Species

Indiana Bat

No Indiana bats were found during surveys. Suitable roosting and foraging habitat occurs within the affected areas for Indiana bat. No suitable hibernacula (caves, mines, old buildings) or summer roost sites are known to occur within or near the areas. If any bats are in the areas during ground disturbance, individuals utilizing snags may be dislodged. This would result in movement from the area, but mortality is not likely. Indirect effects would include potential changes in forage availability and snag availability due to canopy removal. However, the RLRMP established standards aimed at protecting Indiana bat including provisions for snag retention (FW-34) and prescribed burning (FW-36). Herbicide use, planting, and maintenance of wildlife openings would not affect the bats. Construction of ephemeral pools would benefit the bats by providing water sources. Long-term population changes are not expected due to the small impact area and scale of the projects. Suitable habitat would remain within and around the affected areas.

The proposed action is consistent with the CNF RLRMP (2004). Alternative 2 is not likely to adversely affect the Myotis sodalis, because the project is consistent with the protective measures for Indiana bat set forth in the RLRMP. The USFWS concurs with this finding (2009).

Small Whorled Pogonia

Under Alternative 1 no project activities would occur, thus there would be no effects to this species. All areas where ground disturbance would occur (stands proposed for harvest and control lines for prescribed burns) were surveyed (Copperhead Environmental Consulting, Inc 2008) in order to analyze the potential effects of Alternative 2. This species was not found within the surveyed areas. The large burn blocks would be burned during the dormant season when above ground stems of this species are absent, thus dormant season burning would have no effects to small whorled pogonia.

No other Threatened, Endangered or Proposed species that occur on the CNF would be affected. Formal consultation with the USFWS is not required.

Existing Condition Demand Species

Black Bear (MIS)

The black bear (Ursus americanus) uses a wide variety of habitats in the southern Appalachians, occurring primarily on national forests and national parks of the Southern Blue Ridge, Northern Cumberland, and Allegheny Mountains and the Northern Ridge and Valley. These public lands in Virginia, West Virginia, North Carolina, Tennessee, and Georgia connect to form a forested landscape of over six million acres where bears are generally distributed at low to medium densities. The increase of older oak forests in this large block of habitat, along with increased protection and conservative hunter harvest, has allowed bear populations throughout the southeastern mountain region to moderately increase over the past 30 years.

Bears generally are absent from the Cumberland Plateau, Southern Cumberland Mountains, Southern Ridge and Valley and Piedmont (SAMAB 1996). Tennessee's black bear population is estimated at 1,000 to 1,500 animals, half of which may occupy the CNF. Bait station survey data and legal harvest data indicate a significant population increase since 1980 (USDA 2004c).

In the southern Appalachians, including the CNF, important habitat elements are habitat remoteness, habitat diversity, den site availability, and availability of hard mast.

Black bears are opportunistic omnivores and consume a variety of seasonal plant and animal foods including flowering plants, grasses, various roots and tubers, and especially soft mast (grapes, berries, apples, etc.). However, availability of hard mast (acorns and hickory nuts) is critical throughout the winter, and reproductive success is closely related to this habitat factor. Total production of hard mast and production by individual trees can fluctuate from year to year due to climatic and other factors (USDA 2004c).

Bears den in a wide variety of sites including road culverts, abandoned buildings, and in vegetation. Traditional dens are found on the ground in caves, rockfalls, or under the root mass of uprooted trees, and in hollow trees. Some researchers have found that hollow trees are preferred dens. Others have found that ground dens are preferred in the North Carolina mountains. Preference may be related to availability and may be a learned behavior (USDA 2004c).

Availability of potential den trees on the CNF is augmented by a forest wide standard requiring their retention during all vegetation management treatments. For this reason, the black bear was selected as an MIS to help indicate management effects on meeting hunting demand for this species.

Ginseng

While not designated as an MIS for demand in the RLRMP, Panax quinquefolius (ginseng) is included here due to its status as a species in demand by the public and concern over its range wide viability and sustainability of harvest. On the CNF demand is tracked by the number of permits issued. Ginseng is endemic to almost half of the U.S. and over a quarter of North America. It has been reported and documented in 33 states, the District of Columbia, and 2

Canadian provinces. Its range is from southwestern Quebec, southern Ontario, south to Georgia, Alabama, Louisiana, Oklahoma, and Kansas. (Kauffman 2006). Habitat varies somewhat across its range, but is generally described as nutrient rich, mesic hardwood forests (Weakley 2004). Ginseng is previously known from seventy-four sites on the CNF, though there are numerous sites that have not yet been updated in the Forest database bringing the current total to well over 200 known sites. Despite high numbers of sites for the species, few populations support more than 50 individuals and most contain only a few scattered plants. This is consistent with range wide trends reported by Kauffman (2006). Ginseng was found within one Spring Creek stand (146/1) and only one plant was noted at the site.

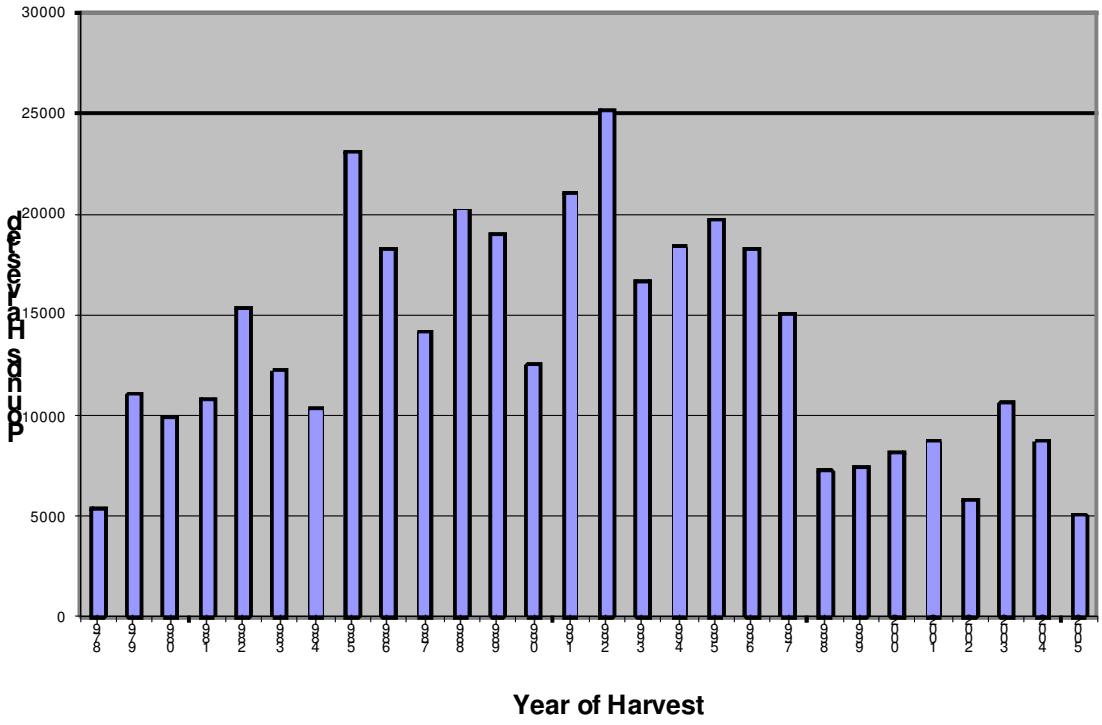
Previously known locations of this species fall under the forest wide MP allocations shown in Table 21.

Table 21. MP allocations of previously known locations of ginseng.

Management Prescription Allocation	Number of Occurrences
1A – Designated Wilderness	5
4A – Appalachian Trail Corridor	8
7A - Scenic Byway Corridors	2
7B - Scenic Corridors/Sensitive Viewsheds	3
7D - Concentrated Recreation Zone	1
7E2 – Dispersed Recreation Areas	5
8A1- Mixed Successional Habitats	12
8B- Early Successional Habitat Emphasis	2
8C – Black Bear Habitat Management	29
9F – Rare Communities	5
9H – Management, Maintenance, and Restoration of Plant Associations to Their Ecological Potential	2

Within the State of Tennessee, commercial ginseng harvest is regulated through a permit system administered by the Tennessee Department of Environment and Conservation-Division of Natural Heritage. The Tennessee ginseng program arose out of the Ginseng Dealer Registration Act of 1983, and the Ginseng Harvest Season Act of 1985. This program regulates Tennessee's ginseng industry in compliance with the Convention on International Trade in Endangered Species of Wild Fauna and Flora of 1973 (CITES). The Division permits about 50 ginseng dealers annually and certifies the roots for export. The purpose of this program is to monitor the harvest level of wild ginseng to ensure that commercial exploitation does not cause it to become endangered. Statewide harvest data for 1978-2005 is presented in Figure 8.

Figure 8. Statewide Ginseng Harvest Totals (lbs.) 1978-2005



In addition to the state permitting process that is geared at regulating commercial trade in ginseng roots, the CNF further tracks the removal of ginseng from Forest lands through a fee permit system (Table 22). Permits were sold to individuals at a rate of $20 per pound (green weight) from 1999-2007 for ginseng collection.

Table 22. Ginseng Harvest Data Summary for CNF, TN, 1999-2007. (Pounds are wet weight)

Fiscal Year	# Permits	Pounds	Price
1999	41	44	$880
2000	79	79	$1,580
2001	41	67.5	$1,350
2002	78	96	$1920
2003	69	69	$1,380
2004	102	102	$2,040
2005	32	32	$640
2006	16	16	$480
2007	26	26	$780

From 1978 to present, statewide ginseng harvests were at their highest from the mid 1980's through the 1990's. While overall ginseng harvest has declined in the state, numbers of permits issued per year on the CNF has fluctuated considerably and show no real trends.

Direct and Indirect Effects Demand Species

Alternative 1 (No Action)

The No Action Alternative would result in a decrease in vegetative age class diversity. Habitat diversity would decrease over time as young timber stands grow out of reach for browsing, soft mast production in early successional areas declines, and dense escape cover declines. Black bear utilize shrub/sapling stage vegetation to varying degrees. Currently, 8% of lands in the analysis area are in the 0-10 year age class.

This alternative allows the increase of white pine and other shade tolerant tree species to become more dominant. Hard mast would continue to decrease as a result.

Ginseng

Under Alternative 1, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon the above information, implementation of Alternative 1 would have no effect on the viability of ginseng.

Alternative 2 (Proposed Action)

The timber harvest in Alternative 2 increases the acreage in early successional forest from 1,263 to 1,375 acres. There is no change in percentages of 0-10 year age class for all forested lands. The addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover. Additional cover would be provided by tops and root wads which are left behind. Known black bear den sites would be protected for as long as they remain suitable by prohibiting vegetation management and ground-disturbing activities within a minimum 100 feet around the den. Potential black bear den trees would be retained during all vegetation management treatments. Potential den trees are those that are greater than 20" DBH and are hollow with broken tops.

Openings created by harvest and prescribed burning would benefit black bear by providing soft mast and cover. Female bears use middle elevations with higher stand richness during summer months (Van Manen personal communication) and the addition of structural and biological diversity in the form of shrub/sapling vegetation would provide soft mast, insects, forage, and escape cover. Burning stimulates the growth of these grassy and shrubby species.

Soft mast-producing species (dogwood, black gum, hawthorn, grapes, serviceberry, etc.) would be retained during vegetation cutting treatments to the extent possible, within constraints of meeting treatment objectives. Soft mast and other forage is a valuable diet supplement to black bears, especially during the months when hard mast is absent and in years when there is a hard mast failure. Those that would grow naturally after harvest, such as blackberries, would provide this. The treatments include removing pine and planting oak in many stands. Oak would be released in some of the harvest areas producing a mixed pine-hardwood or hardwood-pine stand where there is now a pine stand. This would increase hard mast and would benefit bears.

Negative effects would be a temporary increase in human disturbance. Overall use of the area by forest visitors is expected to increase slightly immediately after harvest even though the open road density would decrease. Access by foot, horseback, and mountain bike are likely to increase along newly closed roads. Disturbance disrupts movement patterns affecting feeding and mating. Disruption of these patterns uses essential energy and loss of energy could result in poor health, especially during winter when food is not as available and bears become dormant.

Openland habitat, in the form of wildlife openings and rehabilitated roads (linear openings), would be maintained in these alternatives. This habitat type provides year-round forage, soft mast, and an abundance of insects for many species, and would be a benefit to black bear. Ephemeral pools may serve as a water source, but otherwise would not affect bears.

The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and would likely have a long-term beneficial effect on organisms associated with dry-mesic oak forests.

The other actions in Alternative 2, including road construction and reconstruction and other activities would not appreciably affect the MIS or the community.

Alternative 2 would regenerate 112 acres of forest. Over 7,670 acres (47%) of late successional forest would remain within these compartments.

The proposed action alternative would benefit bears after the initial disturbance while timber is harvested.

Ginseng

Commercial collection of ginseng roots is listed as the primary factor in the species' decline although impacts from timber harvest activities can also negatively impact the species (Kaufmann 2006). Twenty-three of the previously known seventy-four sites occur within mapped MP allocations (1.A, 4.A, 7.A, 7.B, 9.F) that would at least minimize potential negative effects from management at a programmatic level. Many of the sites also fall into the unmapped riparian prescription that would also provide protection. Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The U.S. Fish and Wildlife Service Division of Scientific Authority recently published a "non-detriment" finding for the harvest and export of wild and wild-simulated ginseng roots "provided that exported roots are from plants that were at least 5 years of age or older at the time of harvest." Timber harvest activities affect plants regardless of age and thus could be detrimental to the species survival. Kauffman (2006) states that anecdotal information suggests that mature individuals are more resistant to canopy removal than young plants and seedlings, however very little published information exists on the impacts of canopy manipulation on ginseng.

The one stem of ginseng found within stand 146/1 occurs in a small drainage and would likely be protected by adherence to riparian standards. No further mitigations are proposed. Proposed dormant season fuel reduction burns would not affect riparian or rich cove habitats and thus would have no effect on ginseng. Herbicides would be used to control specific populations of non-native invasive plant species within this alternative. Herbicides may also be used for timber stand improvement. No herbicides would be used in the vicinity of the known population of ginseng. The intent of treating non-native invasive plant populations is

to increase the probability that native species would occupy those habitats. Areas treated may provide potential habitat for ginseng in the future. Based upon the above information, the implementation of Alternative 2 would have no effect on ginseng.

Cumulative Effects Demand Species

Alternative 1 (No Action)

Past prescribed burns may have reduced the understory immediately after the burn, but it is soon followed by a flush of new growth. That is beneficial to bears. There would be no cumulative effect because burns would take place in different years, so that the understory over a large area would be in different stages of regrowth. Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the bears when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or bears to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of habitat for bears. Other past, present and reasonably foreseeable activities (see page 12) would have little effect. There would be little to no cumulative effects to bears from the No Action Alternative.

Ginseng is a widespread species that is under intense pressure from commercial collection. The species has well over 200 locations documented on the forest, though most are small with only scattered individuals. The one new location found for this species within the Spring Creek analysis area occurs within a riparian area and would be protected from timber harvest impacts. The biggest threat to this species survival comes from commercial harvest. The CNF issues permits for harvest in accordance with findings from the U.S. Fish and Wildlife Service Division of Scientific Authority. Based upon this, ginseng would continue to have viable populations on the CNF. No negative cumulative effects are expected.

Alternative 2 (Proposed Action)

Examination of this cluster of compartments within the context of the surrounding landscape reveals that approximately 5% of the total 31,300 acre cumulative effects analysis area would be considered early successional habitat after cutting in Alternative 2. This habitat would provide needed age class diversity and soft mast. Large areas within these compartments would not be harvested, providing the extensive, fairly remote habitat black bear need for mating and feeding. Hard mast production would increase with the planting and release of oaks in the regeneration areas. Harvest of these stands within the analysis area would have a beneficial cumulative effect on black bear when viewed in combination with past, present, and reasonably foreseeable future actions.

Past prescribed burns may have reduced the understory immediately after the burn, but it is soon followed by a flush of new growth. That is beneficial to bears. There would be no cumulative effect because burns would take place in different years, so that the understory over a large area would be in different stages of regrowth. The SPB outbreak likely benefited the bears when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from hemlock woolly adelgid apparently would not affect this community or bears to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of habitat for bears. Other past, present and reasonably foreseeable activities (see page 12) would have little effect.

Ginseng is a widespread species that is under intense pressure from commercial collection. The species has well over 100 populations documented on the forest, though most are small with only scattered individuals. Many new locations found for this species within the Spring Creek analysis area occur within riparian areas and would be protected from timber harvest impacts. The biggest threat to this species survival comes from commercial harvest. The CNF issues permits for harvest in accordance with findings from the U.S. Fish and Wildlife Service Division of Scientific Authority. Based upon this, ginseng would continue to have viable populations on the CNF. No negative cumulative effects are expected.

Existing Condition Non-native Invasive Plants and Animals

A multitude of non-native invasive species threaten the integrity of native ecosystems in the southern Appalachian area. These include, but are not limited to, species such as kudzu, privet, Japanese honeysuckle, multiflora rose, and Nepal grass. The Southern Appalachian Assessment (SAA) (SAMAB 1996) provides a summary of the major threats from non-native invasive plant species.

Although not mentioned in the SAA, the wild boar (Sus scrofa) is another example of non-native species that is negatively affecting certain habitats (beech forests and wetlands) in the southern Appalachians (USDA 2004b). Wild boars were introduced into the southern Appalachian Mountains in the early 1900's. Originally imported for hunting, they eventually escaped from their enclosed hunting reserves in North Carolina and over time have become a naturalized component of the area's fauna (USDA 2004b). Management of this species is somewhat controversial in that some hunters desire it as a major game species, yet its impacts to the natural environment must be considered. No major impacts from wild boars were seen within the analysis area and this species will not be analyzed further in this document.

In 1999 the Southern Region released a Noxious Weed Management Strategy that outlined five emphasis areas, 1) Prevention and Education, 2) Control, 3) Inventory, Mapping, and Monitoring, 4) Research, and 5) Administration and Planning. This was followed in 2001 with the development of the Regional Forester's Invasive Exotic Plant Species list. The RLRMP includes numerous Goals, Objectives, and Standards to address the potential impacts of non-native invasive species. These include control efforts and maintenance and restoration of native species.

On the CNF, the following non-native invasive plant species are tracked through project level inventories: Tree of heaven (Ailanthus altissima), small carpetgrass (Arthraxon hispidus), autumn olive (Eleagnus umbellata), English ivy (Hedera helix), sericea lespedeza (Lespedeza cuneata), privet (Ligustrum sinense), Japanese honeysuckle (Lonicera japonica), Nepal grass (Microstegium vimineum), princess tree (Paulownia tomentosa), kudzu (Pueraria lobata), and multiflora rose (Rosa multiflora). While other non-native invasive plant species may occur with scattered distributions on the Forest, these species are recognized as having substantial occurrences with a high potential for impacts to native communities on the Forest.

Within the Spring Creek analysis area non-native invasive plant species are abundant, yet mostly restricted to roads and trails and other disturbed sites. Nepal grass (Microstegium vimineum,) and autumn olive (Eleagnus umbellata) are a particular problem along linear wildlife openings and roads. Nepal grass out-competes other desired vegetation and is often dominant where it occurs. Wildlife do not use Nepal grass, thus the plant is having an adverse effect on wildlife habitat within the analysis area.

Contract clause BT6.35 would be included in any contracts that would result from the Spring Creek Environmental Assessment. Contract clause BT6.35 is specifically designed to both prevent new infestations from being introduced from outside the national forest boundary and also to minimize spread of existing populations within the Forest. It specifically states:

- "(a) Areas, known by Forest Service prior to timber sale advertisement, that are infested with invasive species of concern are shown on Sale Area Map. A current list of invasive species of concern and a map showing the extent of known infestations is available at the Forest Supervisor's Office. For purposes of this provision, "Off-Road Equipment" includes all logging and construction machinery, except for log trucks, chip vans, service vehicles, water trucks, pickup trucks, cars, and similar vehicles.
- (b) Purchaser shall adhere to the following requirements with regard to cleaning "Off-Road Equipment":

  - Prior to moving Off-Road Equipment onto the Sale Area, Purchaser shall identify the location of the equipment's most recent operation. Purchaser shall not move any Off-Road Equipment that last operated in an area infested with one or more invasive species of concern onto Sale Area without having cleaned such equipment of seeds, soil, vegetative matter, and other debris that could contain or hold seeds, and having notified Forest Service, as provided in (iii). If the location of prior operation cannot be identified, then Purchaser shall assume that the location is infested with invasive species of concern.

  - Prior to moving Off-Road Equipment from a cutting unit that is shown on Sale Area Map to be infested with invasive species of concern to, or through any other area that is shown as being free of invasive species of concern, or infested with a different invasive species, Purchaser shall clean such equipment of seeds, soil, vegetative matter, and other debris that could contain or hold seeds, and shall notify the Forest Service, as provided in (iii).

  - Prior to moving any Off-Road Equipment subject to the cleaning requirements set forth above, Purchaser shall advise Forest Service of its cleaning measures and make the equipment available for inspection. Forest Service shall have 2 days, excluding weekends and Federal holidays, to inspect equipment after it has been made available. After satisfactory inspection or after such 2 day period, Purchaser may move the equipment as planned. Equipment shall be considered clean when a visual inspection does not disclose seeds, soil, vegetative matter, and other debris that could contain or hold seeds. Purchaser shall not be required to disassemble equipment unless so directed by the Forest Service after inspection.

  - If Purchaser desires to clean Off-Road Equipment on National Forest land, such as at the end of a project or prior to moving to, or through an area that is free of invasive

species of concern, Purchaser shall obtain prior approval from Contracting Officer as to the location for such cleaning and measures, if any, for controlling impacts."

Direct and Indirect Effects Non-native Invasive Plants and Animals

Alternative 1 (No Action)

Under this alternative no project activities would be implemented. There would be no anticipated effects to, or from, non-native invasive species if this alternative were chosen.

Alternative 2 (Proposed Action)

Alternative 2 would implement the proposed action which includes some treatments of non-native invasive species within stands 146/29, 147/31, and 148/40. Treatments would reduce the impacts from these plants and reduce the likelihood of them spreading. This would benefit the impacted area by allowing native vegetation to reoccupy the site. Potential introduction of new species and spread of existing non-native species through timber sale activities would be mitigated through the use of contract clause BT6.35 as described above.

Cumulative Effects Non-native Invasive Plants and Animals

Alternative 1 (No Action)

Past, present and reasonably foreseeable activities are listed on page 12. No project activities would be implemented under this alternative. Treatment of non-native invasive plant species is occurring forest-wide on the basis of prioritized acres. If an infestation within the analysis area meets the criteria of highest priority acres for treatment as outlined in the forest wide environmental assessment (CNF 2008) it would be treated accordingly. Otherwise, non-native invasive species would continue to spread on the landscape over time, causing environmental degradation though a displacement of native species. There would be no cumulative effects related to this proposal.

Alternative 2 (Proposed Action)

This alternative would use herbicide to control non-native invasive plant species in some locations of the Spring Creek analysis area. The action is intended to slow the spread of these species on the landscape. The CNF is currently treating non-native invasive species on high priority acres through an environmental assessment that was completed in June of 2008 (CNF 2008). Combined with those treatments, implementation of this project should result in cumulative benefits over time.

Existing Condition Viability Concern Species

Species of viability concern typically include threatened and endangered species, regional Forester Sensitive species, and other species for which viability is of concern in the analysis area. Threatened and endangered species are discussed above under a separate heading.

The Spring Creek project proposes several types of activities including timber harvest, prescribed burning, trail construction, and the use of herbicides to control invasive plants that could have effects on species of viability concern if they are present in the analysis area.

With the exception of any dozer lines needed for control, prescribed burning has no direct ground disturbing effects, nor does the use of herbicides. The use of herbicides as a part of the various silvicultural activities that are proposed would conform to standards outlined in the RLRMP that are designed to eliminate any potential effects to TES plant species (FW-87). Based on this, there would be no effect to the species from herbicide use. Surveys were conducted within all areas proposed for ground-disturbing activities. Effects to Regional Forester Sensitive Species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. A summary of effects is provided below.

Species known from the area or found during surveys include one Regional Forester's sensitive plant species, whorled horsebalm (Collinsonia verticillata). This species would be protected from impacts of the proposed action. Additional species not found during surveys are included in the analysis because suitable habitat is available within the burn blocks

Table 23 displays species evaluated in the Biological Evaluation and Determinations of Effect for each. Analysis of cumulative effects can be found in the Biological Evaluation.

Table 23. Species Evaluated in the Biological Evaluation and Determinations of Effect

Scientific Name	Common Name	Determination of Effect-Alternative 1	Determination of Effect Alternative 2
Plethodon aureolus	Tellico salamander	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Plethodon teyahalee	Southern Appalachian salamander	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Speyeria diana	Diana fritillary	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Corynorhinus rafinesquii	Rafinesque's big-eared bat	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Myotis leibii	Eastern small-footed bat	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Myotis sodalis	Indiana bat	No effect: No activities would occur; no habitat would be affected.	Alternative 2 is not likely to adversely affect the *Myotis sodalis.* The proposed action is consistent with the CNF RLRMP.
Paravitrea placentula	Glossy supercoil	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Patera archeri	Ocoee covert	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Vertigo bollesiana	Delicate vertigo	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Vertigo clappi	Cupped vertigo	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.

Table 23. Species Evaluated in the Biological Evaluation and Determinations of Effect

Scientific Name	Common Name	Determination of Effect-Alternative 1	Determination of Effect Alternative 2
Ditrichum ambiguum	A moss	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Homaliadelphus sharpii	A moss	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Aster georgianus	Georgia aster	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Berberis canadensis	American barberry	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Botrychium jenmanii	dixie grapefern	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Buckleya distichophylla	piratebush	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.
Collinsonia verticillata	whorled horsebalm	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Delphinium exaltatum	tall larkspur	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Diervilla rivularis	riverbank bush-honeysuckle	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Fothergilla major	large witchalder	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Gentiana austromontana	Appalachian gentian	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Isotria medeoloides	small whorled pogonia	No effect: No activities would occur; no habitat would be affected.	Not likely to adversely effect (pers. comm. Jim Widlak 4/25/05)
Lysimachia fraseri	Fraser's yellow loosestrife	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Monotropsis odorata	sweet pinesap	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Benefit from opening understory, negative impacts are short term.
Penstemon smallii	Small's beardtongue	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.

Table 23. Species Evaluated in the Biological Evaluation and Determinations of Effect

Scientific Name	Common Name	Determination of Effect-Alternative 1	Determination of Effect Alternative 2
Pycnanthemum beadlei	Beadle's mountain mint	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Thaspium pinnatifidum	cutleaved meadow parsnip	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Thermopsis mollis var. fraxinifolia	ashleaf goldenbanner	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Tsuga caroliniana	Carolina hemlock	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.

In addition to Regional Forester Sensitive Species, forest managers have responsibility to maintain occurrences of all native and desired non-native species that are necessary to maintain viable populations of these species on the Forest under RLRMP FW-28. Appendices E and F to the RLRMP FEIS (USDA 2004c) lists species of viability concern known to occur on the Forest. Appendix C describes the existing condition and effects by alternative for each species of viability concern that was found in the area.

Existing Condition Forest Health

Forest health concerns for the CNF include insects, diseases, and potential storm damage. Damage to forest communities occurs in varying degrees depending on community types and species composition, location on the landscape, age of the forested community, past disturbance, and weather conditions.

Gypsy Moth

Gypsy moth (Lymantria dispar) is a major defoliator of hardwood trees in both forest and urban landscapes. It was introduced from Europe into Massachusetts sometime between 1867 and 1869. Because the favored host, oak, is widespread in the eastern deciduous forests, gypsy moth thrives and continues to expand its range west and south each year. By the 1980's, gypsy moth was established throughout the northeast. Today the area considered infested includes parts of Virginia, just north of the CNF. Gypsy moth is projected to occur on the forest between the year 2010 and 2025 (SAMAB 1996). The CNF can anticipate gypsy moth attack on the north end of the forest as early as the year 2010 and for the south end of the forest as early as 2020.

Gypsy moth larvae feed on more than 300 species of trees, shrubs, and vines. Favored hosts include oak, apple, birch, basswood, witch hazel, and willow. Hosts moderately favored include maple, hickory, beech, black cherry, elm, and sassafras. Least favored hosts are ash, yellow poplar, American sycamore, hemlock, pine, spruce, black gum, and black locust. Feeding on less favored host plants usually occurs when high-density larval populations defoliate the favored tree species and move to adjacent, less favored species of trees to finish their development.

Hemlock Woolly Adelgid (HWA)

Hemlock woolly adelgid (Adelges tsugae) was introduced into the eastern U.S. from Asia in the early 1950's near Richmond, Virginia. The HWA was present on some exotic tree species that a private collector planted in his arboretum. The distribution of the HWA remained localized until the 1960's. The population has since spread throughout the Shenandoah Valley into the Blue Ridge Mountains of Virginia, North Carolina, South Carolina, Tennessee, Georgia and the northeastern U.S. The entire range of eastern hemlock is threatened and could be infested within 30 years. There are well-established populations in North Carolina and the Great Smoky Mountains National Park adjacent too much of the CNF. The adelgid has been found in numerous locations on the South Zone of the CNF. The CNF can expect to see much of its hemlock infested in the near future.

Impacts to the host species Tsuga canadensis and T. caroliniana, eastern and Carolina hemlocks, respectively, are severe. Once infested, tree mortality usually occurs in two to five years. Mortality is not restricted to any size or age of hemlock. This insect pest threatens the hemlock resource and also threatens the unique ecosystem it helps comprise. Hemlock provides habitat for a variety of plants and animals and helps to maintain stream temperatures for a variety of aquatic species.

Southern Pine Beetle (SPB)

The SPB (Dendroctonus frontalis) is the most destructive pine bark beetle in Tennessee and the southern U.S. Pine trees are killed singly, in small groups, or in large numbers, sometimes exceeding hundreds of acres. The SPB is a native pest to the South and occurs in small numbers (endemic) until outbreak or epidemic population levels develop. Infestations can develop into outbreak levels when pine forests are stressed by crowded growing conditions, trees are damaged from ice or wind, during drought conditions, or when stands are considered biologically mature. These stress conditions can often prevent the tree from producing adequate resin flow to "pitch out" the attacking insect, which is the tree's main defense in a SPB attack. Once pine stands are weakened, they become more susceptible to attack by SPB. Once populations develop in weakened trees, the beetles may spread to healthy trees that normally would resist attack. When beetle populations become large (epidemic), they can successfully attack healthy, vigorous trees and result in widespread mortality. Natural enemies, including diseases, parasites, and predators (primarily the clerid beetle) can help maintain beetle populations at endemic levels. However, these forces seem to have relatively little effect during the early stages of an epidemic when SPB populations explode faster than parasite and predator populations respond to the availability of new host beetle levels. Ultimately, however, these biocontrol agents catch up with and actually exceed the abundant host beetles (food source) and contribute to the collapse of the epidemic. Most major outbreaks last three to five years and occur in irregular cycles of about seven to ten years, sometimes longer in the mountain region.

The SPB attacks all species of pines including white pine, but prefers loblolly, shortleaf, Virginia, and pitch pines all of which are native to the CNF. Pine is a significant component of the forested communities on the CNF and represents a large portion of the CNF.

Storm Damage

Storm damage to trees; from tornadoes, hurricanes, and snow or ice loading are all similar in that they often cause hardwoods and pines to break off, split, be root sprung, bend and suffer branch and foliage losses. Stresses appear to be much the same, regardless of storm type. Tree crown configuration; age (old, large trees suffer greater damage); size and limberness of stems; branching habit; lean of bole; anchorage based on rooting characteristics and soil; and the presence of root and stem diseases have as much or more to do with tree damage as the intensity of the storm itself.

Elevation can be important in the case of ice and snow damage. Frequently, a variation of one or two degrees in air temperature can result in bands of varying damage on the same hillside at different elevations, depending on the temperatures at the time of precipitation. However, pre-storm management to minimize damage is not possible because of the natural randomness of weather patterns.

Direct and Indirect Effects Forest Health

Alternative 1 (No Action)

"No action" would result in no immediate change in the existing vegetation. If no regeneration occurs, the present species composition of the forest would eventually shift from the current overstory of predominately shade-intolerant species to that of shade-tolerant species. Shade intolerant species such as shortleaf pine, Virginia pine, scarlet oak, black oak, yellow poplar would decrease in abundance. Shade tolerant species such as red maple, black gum, white pine and hemlock would increase in abundance. The assemblage of understory plants would change following the succession of the forest canopy composition.

The long-term effect of no action would be an older, more uniform forest where species composition, age-class distribution, and understory vegetation would continue to change relatively slowly by processes of natural succession.

This alternative would not provide further age-class diversity with the addition of early-successional habitat through timber harvest and regeneration. Barring a major natural disturbance, plant communities favoring oak or shortleaf pine would be replaced under this alternative by the shade-tolerant species currently in the understory. There would be a higher proportional amount of acres in the 70+ age classes which would further imbalance the age-class distribution.

In addition, this gradual shift of shade-intolerant species to that of shade-tolerant species would result in a reduction of some important wildlife elements such as hard and soft mast production, which would decline as the percentage of mature scarlet, black, chestnut and white oak trees declined. Soft mast would also be reduced due to the loss of early-successional habitat.

This reduction in species diversity could further lead to a less healthy forest by compounding any effect caused by an insect or disease to the species present. In other words, when there is a diversity of tree species an insect or disease attack of any particular species present is slowed or reduced by a mixture of tree species. Also, if an insect or disease attack kills a certain species or group of species and there is a mixture of species then the affected area is more likely to regenerate more quickly by the surviving species than if the area was only

occupied by a few species – especially if those were the species affected by the insect or disease.

As the trees grow older, there would be an increased vulnerability to insect and disease, which would result in trees with slower growth and decreased vigor. The Gypsy Moth poses real threats to oaks and hardwood stands in general. The SPB, which was noted as a threat to stands of white and yellow pine in the analysis area, has killed some nearly pure pine stands as well as many scattered pine. Hardwood stands of advanced age may be vulnerable to oak decline.

The older trees in the analysis area would eventually die as natural processes along with insect and disease impacts continue. Woody debris in the form of large trees and limb wood may increase on the forest floor as older trees and suppressed trees finally die and fall.

HWA poses a serious threat to the eastern hemlock found in the analysis area. The CNF HWA Suppression EA and DN (USDA 2005b) includes three hemlock treatment areas within six miles of the Spring Creek analysis area located at Presswood Gap, Big Lost Creek and Wolf Creek. Treatment in these areas is ongoing and will involve biological and chemical control methods. The current treatment areas also have the potential to expand in coverage. These sites were chosen for treatment as part of a landscape level effort to maintain the presence and genetic diversity of hemlock.

There are 38 units (1,256 acres) of SPB killed pine in the analysis area that are scheduled for restoration under previous decisions (CNF, 2005). These units range in size from about 3 to 316 acres. This treatment consists of site preparation followed by planting shortleaf pine. This activity is part of a previous restoration decision and project. The area being treated is considered to be in regeneration and is accounted for in the age class distribution for all alternatives.

White pine, and to a lesser degree eastern hemlock, have benefited from the absence of wildland fire in the analysis area. These species are best suited to occupy lower slope and riparian habitats and do not become established in areas that have periodic fire. Due to the lack of fire in the analysis area, they have seeded in on many upland sites.

"No action" would result in no immediate change in the existing vegetation. The long-term effect of no action would be an older, more uniform forest where species composition, age-class distribution, and understory vegetation would continue to change relatively slowly by processes of natural succession. For example, white pine would continue to expand out of the riparian areas into drier ridgetops competing with more desirable oak species due to white pine's shade tolerance and ability to respond quickly to openings in the tree canopy often out competing adjacent regeneration.

Alternative 2 (Proposed Action)

The forested age class distribution for Spring Creek analysis area would be affected by the even aged and two aged regeneration treatment of stands. These treatments include clearcut with reserves, shelterwood with reserves and seedtree with reserves. The MP areas whose age class distribution would be affected by this alternative are 7.B and 8.B.

There are two proposed treatment stands (147/31 and 148/40) in MP 7.B that would affect age class distribution. These two stands when treated would increase early successional

habitat by 10 acres, in an area of 7.B that is about 7,084 acres. This represents an increase of early successional condition and a change in age class distribution of less than one percent. MP 7.B is suitable for timber management, but has no objectives for early successional habitat.

There are three stands proposed for regeneration (146/14, 146/16 and 146/23) that would affect age class distribution in MP 8.B.

Table 24 indicates the age class distribution for the 8.B MP area in Spring Creek analysis area before and after the proposed harvest activities would occur. These harvest activities would occur in the 8.B MP areas of Compartments 108, 109, 117, 118, 119, 128, 129, 145, 146, 147, and 148, which have about 3,630 forested acres within the analysis area.

Existing early successional habitat is the product of previous even aged regeneration, a small amount of regeneration planned in the Hopper Branch EA, and SPB outbreak mentioned earlier in this section.

The acreage in older successional stages and associated vegetation would decrease by 102 acres or 3 % within these compartments in Alternative 2. The regeneration proposed in Alternative 2 (approximately 3%), combined with the existing 0-10 year old forest (approximately 3%), totals about 6%.

Implementing this alternative over the long-term would lead to a more balanced forest-wide age-class distribution and improve the health and vigor of individual stands through harvesting. The base year for the table is 2010.

Table 24. Age Class Distribution for the Spring Creek 8.B Analysis Area

Age	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101 +	Total
Alt. 1	3%	8%	12%	17%	2%	0%	1%	8%	17%	21%	11%	100%
Alt. 2	6%	8%	12%	17%	2%	0%	1%	7%	15%	21%	11%	100%

The definition of Basal Area is useful for the narrative that follows. Basal area is the cross sectional area of a tree measured at 4.5 feet above the ground. Basal area per acre is the sum of all individual tree basal areas on an acre which is used as a measure of stand density. Basal area is measured in square feet (sq ft).

Seedtree with reserves (62 acres, stands 146/14 and 146/16) This regeneration method would leave 10 to 20 sq ft BA/AC (Basal Area per acre) of well spaced shortleaf pine seed trees where possible. All den trees would be left as well as some mast producing trees in order to make up the leave basal area. Most if not all of the trees left with this regeneration method would remain in the stand through the next stand rotation. This method produces a two-aged stand.

The seedtree with reserves method is similar to the shelterwood with reserves method in that residual trees are left after regeneration. For the purpose of this analysis they are similar in effect. In general, seedtree with reserves method is used to establish pine dominated stands, the shelterwood with reserves method is used to establish oak dominated stands.

Seedtrees which are left produce seed for the regeneration of the next stand. Natural regeneration of shortleaf pine can be unpredictable and planting these species is necessary to

ensure adequate stocking. The seedtree method allows enough sunlight to reach the forest floor to facilitate both the artificial and natural regeneration of shade intolerant species such as shortleaf pine and the oaks. The seed tree with reserves regeneration method would produce a mixed stand of shortleaf pine, mixed with Virginia pine, scarlet oak, black oak, white oak, and other hardwood species.

Stands 146/14 and 146/16 are prescribed for seedtree with reserves regeneration (62 acres) and would be planted with shortleaf pine at approximately 200 trees per acres. These stands are suitable pine sites that currently have a component of shortleaf, white, and Virginia pines.

These stands when regenerated, typically produce upward of 800 seedlings per acre of natural regeneration from seed and sprout origin. This natural regeneration includes the oak species, red maple, black gum, Virginia pine, shortleaf pine, the hickories, sourwood and others. Planting the shortleaf pine at 15 X 15 spacing ensures the presence of this species as a stand component, along with a diverse mix of naturally occurring regeneration.

Shelterwood with reserves (40 acres, stand 146/23) This stand would be harvested with enough trees left in the individual stands to maintain approximately 20 to 40 sq ft BA/AC as a residual stand. The purpose of the leave trees is to provide a limited amount of shelter for the development of the new stand. Leave trees would be selected to approximate the species composition of the uncut stand. Most if not all of the trees left with this regeneration method would remain in the stand through the next stand rotation. This method produces a two-aged stand.

The stands prescribed for shelterwood with reserves (40 acres) would be regenerated naturally without the aid of planting. These hardwood stands have a substantial oak component and would regenerate well naturally on this site. This method would produce diverse stands that are predominantly hardwood.

Clearcut with reserves (10 acres, stands 147/31 and 148/40) These stands would be harvested leaving approximately 10 sq ft BA/AC or less of hardwood. Both stands are mature, planted loblolly pine plantations that are about 90% loblolly pine. The entire existing hardwood component, as much as 10 sq ft BA/AC would be left behind for the residual stand. These stands would regenerate naturally into a mixture of hardwoods appropriate for a river bottom, which would include box elder, river birch, yellow poplar, willow oak, sycamore, sweet gum and other species. The above listed species are generally shade intolerant and are currently present in small amounts in these two stands.

The use of clearcutting as a regeneration method must be shown to be the optimal method for meeting RLRMP management direction [USC 1604 (g) (3) (F) (i)]. Evaluating the optimality of clearcutting (in this case, clear cutting with reserves) involves the evaluation of site-specific ecological and biological factors. These factors must be screened against the RLRMP MP direction to ensure that the regeneration method is truly optimal. The following factors give compelling reasons to consider the use of clearcutting with reserves for this project:

Both stands are plantations composed of greater than 90% loblolly pine that do not contain enough suitable leave trees to facilitate other regeneration methods. It is important to remove all of the loblolly pine to eliminate it as a seed source, and doing so would leave a small stocking of residual hardwood.

The use of the clearcutting with reserves method for regenerating shade intolerant species is discussed in the RLRMP (pg. 395). Loblolly pine is considered a xeric pine forest type (RLRMP, p 39), for which clearcutting is considered an appropriate regeneration method (RLRMP, p 397). The restoration of loblolly pine plantations to appropriate native communities is consistent with RLRMP Objective 17.04.

Based upon the above considerations, the use of clearcutting with reserves is the optimal regeneration method for the stands included in the proposed action for meeting RLRMP goals and objectives.

The use of shelterwood with reserves, seedtree with reserves and clearcutting with reserves would result in some residual trees being damaged during the felling and skidding operations. Most damage would not be severe and most trees would recover quickly from these mechanical injuries. Open wounds are an entry point for insects and disease, and some trees may die as a result. The residual trees are more vulnerable to wind throw and ice damage, and some trees may be lost to these causes.

Manual site preparation with burning (62 acres, stands 146/14 and 146/16) This treatment consist of cutting residual stems not wanted for the residual stand, followed by prescribed burning. A manual site preparation and site prep burn would be done in those stands regenerated by the seedtree with reserves method. This treatment would be conducted to accomplish several goals. It would help to clear the area and ease the planting operations, and it would help to control competing vegetation until seedlings become established. Burning also releases nutrients that benefit the growth and development of seedlings. Oak species sprout and grow well after fire and they would contribute to the stocking of the new stands. Some residual trees would be injured or killed.

Manual site preparation (40 acres, stand 146/23) A manual site preparation treatment would occur in this stand after harvesting by the shelterwood with reserves method. This treatment consists of cutting down the residual trees not needed for the leave tree component. Most of the trees cut in this treatment are the smaller intermediate and suppressed trees, which often do not develop into dominant and co dominant trees. This treatment is needed to reduce low level shade. Low level shade restricts the establishment of pine and oak, which need the sunlight and growing space.

Seedling Release, chemical (102 acres) Chemical release would be used in seedtree with reserves and shelterwood with reserves stands, in both natural regeneration as well as the planted stands. The release treatment would give a competitive advantage to the planted seedlings and desirable natural regeneration in the newly established stands. When forest stands are regenerated, there would be a naturally occurring flush of new growth. This is more pronounced on the higher quality sites. These new sapling stands contain large amounts of red maple, sourwood, black gum, and other species. Usually small amounts of shortleaf pine regenerate naturally, and more are planted to ensure a well-stocked stand. The release treatment using the herbicide triclopyr would give these desirable species a competitive advantage at a critical time in their development.

Release treatments with herbicides are highly effective for improving the growth and survival of seedlings. Chemical release can make the difference between successful or unsuccessful planting. A single herbicide release treatment is as effective as repeated treatments without

herbicides in most cases. Delays in treatment result in a reduction of survival and growth of desirable species.

Release treatments, as well as tree planting, are tools for shaping the species composition of a young stand. These tools would be used to increase the proportion of shortleaf pine and naturally regenerated oak in the stands. Natural regeneration would still provide an important part of the future stand. No tree species would be eliminated from regenerated stands from the use of release treatments.

Triclopyr would be applied using the thinline method. Thinline is spraying a fine stream of herbicide solution from a hand held sprayer, onto the lower stem of a targeted sapling. The thinline method would be used to open a three to five foot radius around the planted northern red and shortleaf pine seedlings. Saplings treated by this method generally die or are stunted to the point that they are no longer competitive. Because the herbicide can be applied directly to targeted stems, very little overspray occurs. The thinline treatment would be applied in the second year after seedlings are planted.

Thinning (62 acres, stands 122/11 and 122/19) Thinning would leave a residual stand of approximately 50 sq ft BA/AC or greater. Thinning increases the growth and health of residual trees by making more space and nutrients available. Increased sunlight on the forest floor would increase the production of browse for wildlife and promote advanced oak regeneration.

With thinning and all the harvesting methods used in this project, some residual trees would be damaged during the felling and skidding operations. Most damage would not be severe and most trees would recover quickly from these mechanical injuries. Open wounds are an entry point for insects and disease, and some trees may die as a result. The residual trees are more vulnerable to wind throw and ice damage, and some trees may be lost to these causes.

Loblolly pine removal (7 acres, stand 146/29) This treatment involves removing mature loblolly pine from a stand that is predominantly bottomland hardwood. This stand began as a loblolly pine plantation similar to the other two loblolly pine stands proposed for clearcutting. Much of the planted loblolly did not survive which allowed a substantial bottomland hardwood component to develop. The hardwood component includes box elder, river birch, sweet gum, yellow poplar, sycamore, white oak and other species. Removing the mature loblolly pine would reduce the seed source in the area and provide room for the growth and development of bottomland hardwoods. Removing the loblolly pine would produce single canopy gaps as well as some small group openings. The residual stand would be a mixture of the bottomland hardwood species mentioned above.

White pine removal (31 acres, stand 146/01) This treatment involves removing mature white pine from a stand that is predominantly hardwood. This mature white pine is beginning to seed into adjoining stands. Removing this mature white pine would reduce the seed source in the area and reduce the establishment of white pine in adjoining upland stands. The residual stands would be a mixture of upland hardwood and yellow pine species. Removing the white pine would produce single canopy gaps as well as some small group openings.

Stand 146/8 was examined for the possibility of non commercial thinning to improve the growth and development of oak species. The stand is predominantly Virginia pine and white pine with a small component of oak and averages about 6 inches DBH. A non commercial

thinning would be expensive and have little effect on the oak component of this stand at this time.

Invasive exotic control Any treatment for invasive exotic weed control for this analysis area has been addressed in a separate forest wide assessment for non-native invasive species control. The effects resulting from these treatments were addressed within that document.

Removing invasive exotic plant species would improve the natural diversity of the analysis area. Removing invasive exotics provides growing space and frees up nutrients for native species.

Invasive exotic control is specifically mentioned as a need in the treatment of the bottomland loblolly stands (147/31, 148/40 and 146/29). These stands currently have small amounts of privet and spirea which could increase if not treated.

Prescribed Burning (2,980 Acres) Dormant season prescribed burning would be done on 2,980 acres that is predominantly shortleaf pine, oak and mixed oak/pine. This type of low intensity burning would reduce the amount of white pine regeneration in the understory. Small hardwood stems in the understory would likely be top killed and then resprout. This type of prescribed burning would likely benefit the development of advanced oak regeneration.

Alternative 2 would establish 6% of the forested acres of M 8.B in the 0-10 age class thereby progressing toward the 10-17% percent range prescribed in the 8.B MP. It would create a small amount (less than one percent) of 0-10 age class in MP 7.B. This alternative provides an amount of managed disturbance that would help improve overall vegetative diversity to the area. Alternative 2 would regenerate 112 acres of forest land by 2- aged methods in this project entry

Alternative 2 would decrease the risk of oak decline, SPB outbreak and gypsy moth infestation by promoting vigorous stands and diversifying age class. These forest health concerns would not be eliminated with Alternative 2. Some stand age related health problems are likely to occur due to the long average stand rotation. In addition, Alternative 2 would improve soft mast production.

Alternative 2 contributes to RLRMP objectives for the control of non-native and unwanted native species (15.02), the restoration of oak or oak pine forest (17.02), restores shortleaf pine (17.03), restores appropriate native communities currently occupied by loblolly pine (17.04), contributes to the reduction of Virginia pine and restoration of fire adapted pine or oak communities (17.05), promotes the health of susceptible forest communities by maintaining basal area (18.02), and the creation of early successional habitat for MP 8.B (8.B-1.01).

Cumulative Effects Forest Health

The area considered for vegetative cumulative effects is all the Spring Creek compartments that contain regeneration activities and all the adjoining compartments. This gives a perspective of effects on age class distribution at a larger level. This includes compartments 127, 145, 146, 147, 148 and 153, which is an area of 7,016 acres of NFS land.

Alternative 1 (No Action)

In the long term, this alternative would create an older, more uniform forest, which would be more susceptible to oak decline, gypsy moth, HWA and SPB.

Oak decline, gypsy moth, HWA and SPB would affect the forest structure and composition. Oak decline and the gypsy moth could affect the analysis area due to the large amounts of mature oak. Approximately 14 percent of the Spring Creek watershed area classified as primarily oak and oak dominated forest types is over the age of 70. The effect would be a decline in the number of oaks and its associated hard mast.

The SPB outbreak (1999 through 2002) has impacted the analysis area and the surrounding landscape. Approximately 1,256 acres of SPB impacted area are planned for restoration in the Spring Creek watershed under another decision document. Approximately 57 percent of this watershed is pine or pine hardwood forest types, and approximately 60 percent of that is over the age of 60 and highly vulnerable to SPB. The probability of another SPB outbreak is high, and would result in a further reduction of pine species.

The watershed contains approximately 689 acres with hemlock as a primary component of the stands. Most of these stands are older than 60 years. HWA is likely to kill most of the hemlock. Their position in the forest canopy is likely to be replaced by white pine and yellow poplar.

Alternative 1 does not respond to the MP 8.B objective of providing 10 to 17 percent of the analysis area in the 0-10 age class for early successional wildlife species. Alternative 1 does not provide measures to improve forest health and reduce forest susceptibility to disease and pest outbreaks.

Alternative 2 (Proposed Action)

See Table 25 for the age class distribution in the previously mentioned compartments, in the various age classes (base year 2010) for all alternatives.

Table 25. Age Class Distribution Percentages for Cumulative Effects

Age	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100	101+	Total
Alt. 1	4%	6%	13%	4%	4%	2%	5%	11%	14%	13%	24%	100%
Alt. 2	5%	6%	13%	4%	4%	2%	5%	11%	13%	13%	24%	100%

Alternative 2 would increase the amount of 0-10 year old habitat from 4 to 5 percent in the larger cumulative effects analysis area. The above table indicates that there is currently very little early successional habitat (0-10 year old). The majority of the area (61%) would still be in the 71+-age class. Timber harvesting in the last forty years has begun to establish a more balanced distribution of age classes and the proposed action contributes to this. There are no other reasonably foreseeable activities in the analysis area for the next 5-10 years.

Chemical release of planted seedlings and natural regeneration would occur on 102 acres using the herbicide triclopyr. Noxious weed control, as allowed under other decisions (USDA 2008), would take place on 10 acres (stands 147/3 and 148/40), and possibly other stands in the analysis area. The total applications of these chemicals would stay within the

allowable amounts stated in the Vegetation Management EIS for the Appalachian Mountains (USDA 1989).

The prescribed burning (2,980 ac) would take place over several years and would not have adverse cumulative effects. Large dormant season burns may have beneficial effects on oak regeneration and nutrient cycling. When oaks grow they expend their carbohydrates into root growth; conversely red maple, yellow poplar and other intolerant species that compete with oak expend their carbohydrates into shoot growth. Part of the use of prescribed fire for oak regeneration is to kill the shoot growth of the intolerant oak competition.

The stands proposed for harvests were evaluated as to the possibility of them being identified as existing old growth. This process followed the *Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region* (USDA 1997). None of the stands were found to qualify as existing old growth.

Alternative 2 would reduce the risk of oak decline, gypsy moth, and SPB at the landscape level. Regeneration harvest diversifies the age class distribution and promotes the development of younger, healthy stands.

Social/Economic Factors

Existing Condition Scenery and Recreation Resources

Visitors come to the CNF to participate in a wide variety of nature-based recreation activities. The Spring Creek analysis area encompasses parts of two adjoining recreation zones, Hiwassee River and Starr Mountain. There are fifteen recreation zones delineated across the CNF. Each zone is defined by its unique waterways, land forms, travel routes, surrounding communities and land uses.

Note Loblolly Pines located across the Hiwassee River to the far right

The Hiwassee River recreation zone is characterized by the Hiwassee River and its surrounding forested and rural landscapes.

The emphasis in this zone is sightseeing, fishing, tubing, boating and hiking. Several commercial outfitter and guide services are locally based in Reliance, TN.

Since the 1930s many recreation facilities have been developed along the Hiwassee River to accommodate visitor use. The photo on the left captures a view from the Hiwassee Picnic Area located off State Highway 30.

The adjoining Starr Mountain recreation zone begins at the base of Starr and Chestnut Mountains near Lost Corral Horse Camp and the Hiwassee River. This zone is characterized by Starr Mountain's 10-mile ridgeline which provides a scenic background when traveling through the valleys on each side of the mountain. Noted travelways include U.S. Highway 411, State Highways 310 and 39 (Mecca Pike), State Highway 315 (Tellico-Reliance Road), NFSR 27, and NFSR 44 (Bullet Creek Road). The mountain itself offers a backcountry setting that is popular for horseback riding and hunting.

Scenery Resources

The affected environment for scenery resources includes the areas of the National Forest viewed from noted travelways and viewing platforms such as a developed recreation facility. During the planning process for the RLRMP, forest-wide scenery inventories were updated to represent the increasing interest in scenery. Forest landscapes were inventoried based on viewing distance, concern level and scenic attractiveness and assigned to a Scenic Class using the Scenery Management System (USDA 1995a). In the Spring Creek analysis area, landscapes are presently classified as Scenic Classes 1, 2, 3, and 5 with Scenic Class 1 representing areas viewed along the Hiwassee River and Scenic Class 5 including areas that are seldom seen by visitors.

A Scenic Integrity Objective (SIO) is specified by Scenic Class for each MP in the RLRMP. Assigned SIOs in the Spring Creek analysis area include High, Moderate, and Low. "Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be 'complete.' The highest scenic integrity ratings are given to those landscapes that have little or no deviation from the character valued by constituents for its aesthetic appeal. Human alterations can sometimes raise or maintain integrity. More often it is lowered depending on the degree of deviation from the character valued for its aesthetic appeal" (USDA 1995).

Recreation Resources

In addition to managing the scenic integrity of affected recreation settings, access to public lands is necessary to provide visitors opportunities to participate in recreation activities. One management objective for the Starr Mountain recreation zone is to improve equestrian trail access. Starr Mountain is one of four recreation zones across the CNF that have been identified as a priority for planning and developing a multiple-day equestrian trail system. These systems should provide a network of trails that offer at least three different 12-mile loops. Trail networks may include open and closed roads if necessary. The zone is also managed to provide access and habitat for hunting opportunities and includes a shooting range located on Spring Creek Road.

Direct and Indirect Effects on Scenery and Recreation Resources

Alternative 1 (No Action)

Under the No Action Alternative, no proposed silvicultural treatments, wildlife habitat improvements, fuel reduction burns, transportation system improvement or recreation trails improvements would be implemented to accomplish project goals.

Scenery Resources

Views into the forest would not be altered by management actions. The assigned SIOs would continue to be met with the exception of areas planted with loblolly pine along the Hiwassee River and Spring Creek. These mature pine plantations are presently in the process of transitioning back toward native riparian hardwoods. Visitors viewing the affected stands of trees from the river, railroad, Spring Creek Road, or across the river from State Highway 30 and developed recreations sites would continue to see the presence of pine trees diminish over time and the undergrowth of hardwoods begin to dominate the tree canopy. See pictures above and below. Presently, the affected area meets an SIO of Moderate. The assigned SIO of High would not be met until the stand transitions to hardwoods.

View of transitioning hardwood stand on the immediate right with a loblolly plantation up ahead

Under the No Action Alternative, the transition process to hardwood trees would continue to evolve over the next 10 to 30 years. The scenic integrity of the area would decrease to Low when the pine tree mortality is most noticeable. It would gradually improve to Moderate and High over the following decades. However, non-native invasive species would not be treated during the transitions and may increase over time, displacing desired native flora. All other affected areas within the analysis area would appear generally the same as hardwoods matured. SIOs would be met from noted travelways, viewing platforms, and trails.

Spot and Linear Wildlife Opening Maintenance

The maintenance of 81 acres of existing spot and linear wildlife openings would increase habitat and thereby have a potential to increase wildlife viewing and hunting opportunities. Linear wildlife openings are likely perceptible as former roads when seen by visitors. None of the roads proposed for treatment are currently open to the public for vehicular access. Actions would be consistent with assigned SIOs.

Recreation Resources

The primary access to the Starr Mountain horse trail system is presently located at Lost Corral Horse Camp and trailhead adjacent to the southern portion of the analysis area across the railroad tracks from Gee Creek Campground. Due to the limitations of terrain and land ownership, only one trail, Coffee Branch #105, currently provides equestrian access from Lost Corral to the top of Starr Mountain where the majority of trails loops are located. This trail requires a long climb and limits opportunities for visitors to travel further on the other designated trails and roads.

The existing equestrian trails located on the east side of Starr Mountain provide easier and more direct access to the majority of networked trails and roads on the mountain. However, there is not a developed trailhead to facilitate visitor and equestrian use. Trail users would

continue to access the trails via County Road 655 and NFSR 44, the Bullet Creek Road. A narrow bridge on CR655 was recently redesigned and reconstructed to better accommodate vehicles with trailers. However, NFSR 44 continues to be a narrow, graveled road offering limited sight distance; blind curves; few areas of adequate size to pull off the road and park; and limited locations to turn vehicles and trailers around when exiting the National Forest.

Under the No Action Alternative, equestrian use of Starr Mountain would continue to be limited. Primary users would be mostly local residents that visit the national forest for day rides. These visitors would continue to access the area from the Bullet Creek side and be satisfied riding the 104/105 trail loop from Lost Corral. The trail system would not attract non-local visitors due to limited riding opportunities from Lost Corral and the difficulty of parking and accessing the Bullet Creek trails.

Alternative 2 (Proposed Action)

Scenic Resources

Scenic resources would be affected differently by the various proposed silvicultural treatments. Design criteria listed in the project file has been developed to guide implementation of the proposed actions in a manner that would conserve the valued landscape aesthetics.

Silvicultural Treatments

Pine Restoration

Scenic Integrity Objectives and Noted Travelways/Viewing Platforms

Comp/Stand	Acres	SIO	Noted Travelways/Viewing Platforms
146/14	37	Low	NFSR 2010 Ruckers Branch Road
146/16	25	Low	NFSR 2010 Ruckers Branch Road
146/23	40	Low	NFSR 2010 Ruckers Branch Road
TOTAL	**102**		

The 102 acres proposed for pine and pine/oak restoration occur in areas of the national forest inventoried as Scenic Class 5 and managed with a Low SIO. The proposed actions would be consistent with the assigned SIO and move the area toward a landscape characterized by native pines. Forest visitors that view the affected areas would notice a decreased canopy cover, an open appearance with increased sunlight, increased visibility into the forest, visible logging debris and stumps, damaged living vegetation from logging activity, and browned or dying vegetation from the use of herbicides. There would also be noticeable changes in forest texture and color due to the open character of the stand and the exposed soil, particularly when viewed in conjunction with areas that would not be treated. Affected ridgelines would appear more sparsely forested which would be typical of pine stands.

Native riparian community restoration

Zoomed view of affected loblolly pine stands located across the river from State Highway 30

Scenic Integrity Objectives and Noted Travelways/Viewing Platforms

Comp/Stand	Acres	SIO	Noted Travelways/Viewing Platforms
147/31	3	High	Foreground views from Hiwassee River and Hiwassee Scenic Railroad
148/40	7	High	Foreground views from Hiwassee River and Hiwassee Scenic Railroad
TOTAL	**10**		

All 10 acres of loblolly pine plantations proposed for clearcutting would occur in areas inventoried as Scenic Class 1 and managed with a High SIO. Noted travelways and viewing platforms include the immediate foreground views from the Hiwassee River scenic railroad excursions, adjoining private property, and more distant views from State Highway 30 located on the other side of the Hiwassee River. See photos.

Actions would remove all pines within the stands and retain any existing hardwoods. These actions would create noticeable changes in the current scenery especially when viewed from the railroad and a dead-end segment of Spring Creek Road accessed from the Tellico-Reliance Road. This road is seldom traveled by national forest visitors. The three and seven-acre created openings would appear unnaturally open for the first one to two years after pine removal. Slash, stumps, skid trails, log landings, damaged residual hardwoods and temporary access roads would be visible.

The current pattern and scale of existing openings in the landscape for agriculture, residences and utilities would help reduce the contrast of the cleared pine stands. Forested ridges behind the affected stands would become more visible when viewed from State Highway 30 and river. This forested background would help absorb some of the visual impacts. See photo above.

Native riparian hardwoods including poplar, birch, sycamore and other fast growing trees would be expected to reach five to six feet in height within the first two years after treatment.

This vegetation would reduce the visibility of the residual slash and stumps during the leaf-on seasons and create desirable fall foliage colors in the fall.

See photo of transitioning hardwood stand above and more mature hardwood stand along railroad to the left.

Loblolly pine stand as viewed from Hiwassee River Scenic Railroad

The level of scenic integrity of the affected area would decrease for at least two to three years until riparian hardwoods reached ten to twelve feet in height. An SIO of High could possibly be attained in five to ten years as hardwoods mature. Actions would be taken to help decrease the initial visual impacts of the clearcuts within the immediate foreground of the railroad and river. However, visual impacts should be expected due the removal of the pine that occupies nearly ninety percent of the affected stands.

Pine removal

Scenic Integrity Objectives and Noted Travelways/Viewing Platforms

Comp/Stand	Acres	SIO	Noted Travelways/Viewing Platforms
146/01	31	Moderate	Foreground view from Spring Creek Road NFSR 27 (White Pine Removal)
146/29	7	High	Foreground views from Hiwassee River and Hiwassee Scenic Railroad (Loblolly Pine Removal)
TOTAL	**38**		

White pine and loblolly pine trees intermixed with predominantly hardwood stands would be removed to restore and maintain the hardwood stands.

The 38 acres proposed for pine and pine/oak restoration occur in areas of the national forest managed with a Moderate and High SIOs.

Noted travelways and viewing platforms include the immediate foreground views from the Hiwassee River scenic railroad and Spring Creek Road near its junction with the Tinker Branch Road, Spring Creek Shooting Range, and private property.

Loblolly pine to be removed from native hardwoods

Forest visitors on noted travelways including the Hiwassee River scenic railroad (146/29 only) would possibly notice areas where pine trees were removed from the stands. The impacts would be scattered throughout the stands creating gaps in the canopy. Logging debris, stumps, damaged living vegetation from logging activity, browned or dying vegetation from the use of herbicides (146/29 only) and skid roads and log landings may be noticeable for the first two years after the initial treatment. Forest growth over a period of several years would continue to decrease any noticeable effects of management activity over time. The riparian buffer along Spring Creek would buffer visitors from viewing the majority of visual impacts in 146/01. SIOs would be met but areas with a High SIO along

the Hiwassee River may temporarily decrease to Moderate for one to two years after pine removal.

Thinning

Scenic Integrity Objectives and Noted Travelways/Viewing Platforms

Comp/Stand	Acres	SIO	Noted Travelways/Viewing Platforms
122/11	33	Low to Moderate	Foreground views from Bullet Creek Road NFSR 44 and proposed Basin Branch Trail (NFSR 2372-1)
122/19	29	Moderate	Foreground views from Bullet Creek Road NFSR 44
TOTAL	**62**		

All 62 acres proposed for thinning would occur in areas managed with a Low to Moderate SIOs. Approximately one half of the acres in Stand 11 are managed for Low and the other half, Moderate. After treatment, forest visitors would notice a decrease in the density of trees, logging debris, some slash, skid trails and log landings. A wildfire in this general area has already decreased the scenic integrity of the surrounding landscape. NFSR 2372-1 was used as a fire line during this event and would be utilized again to access these stands. The proposed Basin Branch Connector Trail connects horseback riders to NFSR 2372-1 so they may notice impacts for the first few years after treatment. SIOs of Moderate and Low would be met.

Recreation Resources

The proposed equestrian trail head would provide visitors with a more convenient and safer parking area to access the Starr Mountain horse trail system from the Bullet Creek area. The parking area would be accessed directly off County Road 655 so visitors would not be required to travel and park further up the narrow and steep section of NFSR 44 as described for the No Action Alternative. A narrow and misaligned bridge on CR655 was recently redesigned and reconstructed and now better accommodates vehicles with trailers. The new parking area would be designed to accommodate vehicles, trailers and the staging of horses. A short connector trail would be constructed to access the existing and proposed equestrian trails directly from the trailhead.

The proposed connector trail between NFSR 2372 and 2372-1 would create another loop opportunity for horseback riders in the Basin Branch area. The addition of another loop would make the Starr Mountain trail system more attractive to visitors and respond to their demand for a network of trails on the mountain. Use would be expected to increase with easy, more visible access for visitors especially those unfamiliar with the area.

Wildlife Habitat Improvements

Some of the proposed wildlife opening maintenance, wetland and ephemeral pool construction, and non-native invasive species treatment areas would visible from open NFS roads and trails. These sites are destinations for hunting and wildlife viewing, and the proposed activities would improve these opportunities. Actions would be consistent with assigned SIOs.

Spot and Linear Wildlife Opening Maintenance

The maintenance of 81 acres of existing spot and linear wildlife openings would increase habitat and thereby have a potential to increase wildlife viewing and hunting opportunities. Linear wildlife openings are likely perceptible as former roads when seen by visitors. The proposed daylighting and thinnings of road corridors and spot adjacent to linear wildlife openings and spot openings would also be visible to Forest users. The proposed thinning and release of mast producing trees would benefit hunters by improving and would improve hunting access. None of the roads proposed for treatment are currently open to the public for vehicular access. Actions would be consistent with assigned SIOs.

Construct ephemeral pools in temporary roads and gated roads in appropriate areas.

The proposed ephemeral pools construction would not likely be visible as most log landings and temporary roads are screened or out of view of travel routes. Actions would be consistent with assigned SIOs.

Fuels Reduction

Prescribed burns are planned in the most of the analysis area. Visitors to this area of the forest may notice linear fire line openings, scorched earth, dead or dying vegetation, or blackened vegetation in the burned area. The effects are likely to be temporary. Perceivable effects after spring re-growth include blackened trunks of trees and standing dead vegetation. Noticeable changes in forest texture and color due to the open character of the stand and the exposed soil would be evident, particularly if viewed in contrast with areas that would not have been treated. The long term effects would be a more open understory allowing views further into the forest and possibly improve scenic viewing and some recreation opportunities such as hunting. Actions would be consistent with assigned SIOs.

Transportation System

Scenic resources would be affected by proposed temporary road construction, new NFSRs, routine maintenance, as well as proposed reconstruction. Although planned to be gated, constructing a permanent road would additional access into the area and would impact its remote characteristics. Even with obliteration and seeding, temporary roads would change the landscape character by creating cut banks and beds that would be distinguishable as corridors for several years. Reconstruction and maintenance of existing roads would expose previously undisturbed areas of mineral soil, increasing viewshed visibility of those roads. Improved vehicular access for visitors may decrease the remote nature of this portion of the Forest. Actions would be consistent with assigned SIOs.

Cumulative Effects Scenery and Recreation Resources

Alternative 1 (No Action)

The SPB outbreak that occurred from 1999 to 2002 impacted the scenic integrity and recreation opportunities across the CNF, especially the south end of the forest. The consequent dead and dying pine trees have either been removed or allowed to fall and remain on the ground. Many of these areas are within the immediate foreground of roads, trails, and waterways. Presently, some of the affected viewsheds display stands of pine trees in various

stages of recovery. Some of these views are dominated by standing dead trees while others display fallen or removed trees.

In foreground views, slash and stumps created by the removal of pine trees may be visible along forest roads and trails. In middle ground views, the landscape patterns established by SPB typically reflect the naturalness of the event and blend into the surrounding landscape. SPB has opened up some new vistas along travel ways that were once blocked by living pine stands. Natural pine regeneration is becoming more visible each year.

Mortality to native hemlock trees due to spreading Hemlock Woolly Adelgid infestations would likely to continue to increase in the reasonably foreseeable future. Only a select number of hemlock stands would be treated across the CNF to help maintain the species. The majority of hemlocks in the Spring Creek analysis area would mostly likely die and decrease scenic integrity. Hazardous trees would be removed from developed recreation areas and along roads, but would likely be left elsewhere. Visitor safety would decrease in dispersed recreation areas throughout the area including trails.

Increased equestrian use in the area would likely be realized as other trail opportunities in the Starr Mountain area are developed and improved. The demand for dispersed recreation opportunities would likely continue. Horseback riders would continue to utilize open and closed roads to create their desired riding experiences.

The No Action Alternative would not result in additional cumulative effects in the analysis areas other than those mentioned above.

Alternative 2 (Proposed Action)

The cumulative effects would be similar to those described for Alternative 1. Assigned SIOs would be attained as described under direct and indirect effects. The new trailhead and connector trails near Bullet Creek would improve the quality of the equestrian recreation opportunities and could increase use of the Lost Corral Horse Camp due to the additional day-ride opportunities.

Existing Condition Cultural Resources

Cultural resources are the non-renewable, physical remains of prehistoric and historical human activities. They are subject to damage or destruction from land disturbing activities, including those associated with vegetation manipulation and road construction. Area disturbance can damage or destroy the historical, cultural, or scientific integrity of historical or prehistoric resources. Disturbance of historical sites, such as old cabins, can reduce the ability to reconstruct the recent history of settlement in the local area. Disturbance of ethnographic sites, such as traditional Native American campsites or burial grounds, can reduce the interpretive significance of the site or can infringe on religious rites.

The current direction on the CNF is to protect significant cultural resources from adverse impacts that may occur as the result of land disturbing activities, and to inventory NFS lands in order to locate and evaluate all cultural resources. This policy is based on adherence to Federal and state laws and regulations. Cultural resources are closely coordinated with the State Historic Preservation Officer (SHPO).

In compliance with executive order 11593, the National Historic Preservation Act, the National Environmental Policy Act, and the USFS regulations (Forest Service Manual 2360), a cultural resource inventory was performed to determine if potentially significant cultural resources would be affected by the project.

Direct and Indirect Effects Cultural Resources

Alternative 1 (No Action)

This alternative would have no effect on cultural resources. There is limited potential for discovery of currently unknown sites.

Alternative 2 (Proposed Action)

This alternative would not affect cultural resources as long as site(s) that have potential eligibility for inclusion in the National Register of Historic Places (NRHP) are avoided during project implementation. If additional cultural resources were to be discovered during project implementation, the project would be halted until the resource(s) is/are evaluated

Cumulative Effects Cultural Resources

All Alternatives

There are no known cumulative effects.

Civil Rights

None of the alternatives would have disproportionate adverse health or environmental impacts to minority groups, women, or low-income populations. It is difficult to assess the degree of impact each alternative presents to these groups due to other variables. The best information suggests that when assessing the effects of each alternative on minority and low-income groups, the effects are minimal and not disproportionate to these groups when compared to other groups.

Existing Condition Economics

An analysis of the economic efficiency of the alternatives was conducted in order to provide a reliable means to contrast the relative costs and benefits of the proposed activities. The results of the analysis provide the Responsible Official with the assurance that economic efficiency was considered. It also provides some information about the potential economic impacts of the alternatives.

Cost and unit estimations are derived from field data, maps, and actual prices from similar projects. The economic analysis only looks at stumpage related benefits and the costs involved in preparing and implementing a timber sale. Timber harvesting activities may result in changes, both positive and negative, to other resources such as wildlife or recreation. These changes can have an associated economic value, but they are often difficult to quantify in amount or value, and are therefore not considered in this analysis. However, these items would be considered in the decision making process, along with the economics of the sale.

Direct and Indirect Effects Economics

Alternative 1 (No Action)

Alternative 1 does not produce revenues or incur financial costs. There would be no benefits to the local economy with the No Action Alternative.

Alternative 2 (Proposed Action)

Economic effects are presented in Table 26. This table follows direction given in Forest Service Handbook (FSH) 2409.18,30 (USDA 1995). Some calculations that were used to arrive at the values in the table were derived using a computer spreadsheet (Project File).

Table 26. Benefit Cost Ratio

	ALT 2
REVENUES	
Timber	286,785
Recreation	0
Wildlife	0
Other	0
Total Present Value Revenues	286,785
FINANCIAL COSTS	
Harvest Administration	20,220
Sale Preparation	93,012
Analysis and Documentation	10,110
Other Resource Support	10,110
Brush Disposal (FS Component)	0
Road Design & Construction	31,500
Reforestation	19,494
KV Other	0
Silvicultural Exams	3,538
Stand Improvement	9,917
Transportation Planning	500
Total Present Value Financial Costs	198,401
Present Net Value	$88,384

Cumulative Effects Economics

Alternative 1 (No Action)

The No Action Alternative does not provide an economically efficient timber harvest.

Alternative 2 (Proposed Action)

Alternative 2 has a present net value of $88,384. Alternative 2 would produce 4.04 CCF (2.02 MMBF) of forest products. CCF is the notation for “hundred cubic feet” and MBF is

the notation for "thousand board feet". Alternative 2 provides an economically efficient timber harvest, which benefits the local economy, provides jobs, and provides payments to local and federal governments. This timber sale would provide a positive impact on the local economy by providing high quality sawtimber and pulpwood. This alternative contributes to RLRMP objectives for providing sawtimber (Objective 19.01) and pulpwood (Objective 19.02).

Physical Factors

Watershed Description

The Spring Creek Assessment Area is located in Polk County, Tennessee in the Blue Ridge Mountains. The assessment area is a portion of the Ocoee River Basin. The area is partially located in the Southern Metasedimentary Mountain Eco-region and partially in the Southern Sedimentary Ridges Eco-region.

The physical character of the analysis area is greatly influenced by the geology associated with the Blue Ridge Physiographic province. Geology is a mixture of Precambrian-age metamorphic and sedimentary materials such as bouldery colluvium; Precambrian sandstone, siltstone, shale, quartzite, greywacke, arkose, phyllite, slate and schist and Quaternary sandy shaly colluvium; Cambrium shale, sandstone, siltstone, quartzite and conglomerate.

Elevation in the area ranges from about 2,200 feet along Starr Mountain to about 800 feet at the confluence of Spring Creek with the Hiawassee River.

The area has an average annual temperature of 55 degrees Fahrenheit. January is usually the coldest month with an average temperature of 35 degrees Fahrenheit, while July is usually the hottest month with an average temperature of 75 degrees Fahrenheit. The area averages about 55 inches of precipitation annually, which is distributed fairly evenly throughout the year. March is usually the wettest month with an average of 5.9 inches of precipitation, while October is usually the driest with an average of 3.0 inches of precipitation. The length of the growing season is approximately 180 days per year. Prevailing winds in eastern Tennessee are predominantly from the southwest.

Existing Condition Water

Drainages within the assessment area include Spring Creek, Ellis Branch, Tinker Creek, Bullet Creek, and several other, small tributary streams. Approximately 69 percent of the Spring Creek Watershed is in public (National Forest) ownership. The majority of this ownership is in the upper portions or headwaters of the watershed.

Valley types within this assessment area exhibit moderate relief, are generally stable, and have moderate side slope gradients. The upper reaches of streams can be described as A3 types by the use of the classification system developed by Rosgen (Rosgen, 1994). Stream gradients are generally steep in the upper reaches of the watershed (10% +) with low stream sinuosity. Channel materials are predominantly cobble with a mixture of bedrock, boulders, gravel, and sand. Larger streams generally have a decrease in gradient, and stream types change from an A3 to B or C channels. Each of these stream types is generally stable.

Stream flow varies seasonally with rainfall and the effects of evapo-transpiration. Higher discharges generally occur in the winter and spring months while low flows generally occur

in the late summer and fall. Streams within the assessment areas have not been gauged in the past to determine an average annual discharge.

The water quality of streams within the watershed can generally be characterized as low in conductivity, low in alkalinity, slightly acidic, low in nutrients, and generally free from excessive sediment. The water quality of streams within the assessment area has been found to meet their use classifications.

The Tennessee Eco-region Project has completed an initial effort to establish reference conditions for water quality by eco-region (TDEC, 2000). A summary of selected water quality statistics for the Blue Ridge Eco-region represented in the assessment area is displayed in the project file. The data values and statistics shown represent sites within the entire eco-region, and provide a first approximation of reference water quality.

Stream Channel/Riparian Areas/Wetlands

Stream channels in the analysis area are generally in good physical condition. Erosion from the existing road system, trails, dispersed recreation sites, and other areas results in some sediment deposition into streams.

It is quite likely that small wetland areas are associated with springs and seeps within the analysis area. If so, these would be identified and protected during project implementation.

Direct and Indirect Effects Water

Scope of Analysis

In general the entire Spring Creek Watershed was considered during assessment. However, two subwatersheds were specifically analyzed to determine effects from the proposed activities. These two subwatersheds were chosen because a higher percentage of ground disturbing activities were occurring in these subwatersheds than in others. The size of this area is about 2 square miles. The time-period considers the past ten years and future actions that could occur within five years.

Alternative 1 (No Action)

On the National Forest, road management, and natural events are expected to continue. Minimal, geologic erosion would continue from undisturbed forest lands. Other than geologic erosion, accelerated erosion would primarily continue from existing roads and trails.

Road maintenance operations such as blading the road surface and cleaning ditch lines can lead to increases in soil erosion and increases in sediment production. However, these operations in combination with structural improvements, hardened surfaces, and vegetation establishment would reduce soil erosion and sediment production from these roads over the long term.

Alternative 2 (Proposed Action)

Timber Harvesting

Perennial and intermittent streams are close to, adjacent or within stands where harvesting is proposed. Streamside management zones (riparian corridors and filter zones) would be established around these streams as specified in the RLRMP. Filter zones would be

established along scoured ephemeral streams. Temporary roads and skid trails would be located mostly on ridge top and side slope locations, where most of the erosion that does occur would filter out in the undisturbed forest floor before reaching stream channels. Roads, log landings, and primary skid trails would be constructed outside of stream management zones.

The RLRMP (Page 163 and 164) provides for site-specific determination of riparian corridors by an interdisciplinary analysis. A change in riparian corridor width from RLRMP guidelines, due to the existing conditions, has been reviewed by an interdisciplinary team and is documented in the project file.

Best practices that are employed during and after timber harvest activities to reduce erosion and sediment yield potential are an important consideration. Extensive research and effectiveness monitoring have proven the value of properly applied practices in greatly reducing erosion and sediment yield potential (Patric 1994; Curtis et al. 1990).

Changes in water yield would occur in response to timber harvest, skid trail development, and silvicultural activities such as mechanical slashdown of vegetation. These activities would increase water yield by decreasing the interception of precipitation by trees and the loss of soil water due to transpiration. Stream flow increases do not last long in the southeastern U.S. due to the rapid regeneration of dense new stands on cut areas. Although increased yields are possible from 5 to 10 years after harvest, almost all of the increase is over after 5 years for clearcuts and within 1 to 3 years when less than 50% of the basal area is removed (Swank, Vose and Elliot 2001).

Timber harvesting increases stormflows in relation to the amount of basal area removed, the number of acres of a given watershed treated, inherent watershed hydrologic response factors (such as soil depth), and the magnitude and frequency of storms following treatment. Research at Coweeta Hydrologic Lab indicate that timber harvest (clearcutting) with minimal forest floor disturbance and a low density of carefully located and designed roads produce only small and acceptable (about 15 %) increases in mean stormflow volumes and peak flow rates (Swank, Swift and Douglas 1988).

As proposed, the percentage of harvest acres to watershed acres is low; therefore, little, if any, effect to water yield would occur in these watersheds. Any augmented flows from the streams in the analysis area would merge imperceptibly into Big Creek. Periodic high flows also act as a flushing mechanism to move sediments downstream through a channel system. Table 27 displays the acres of commercial timber harvesting by treatment within each sub-watershed and percentage of harvest activity.

Table 27. Timber Harvest in Watersheds by Treatment

Watershed	Watershed Size in Acres (GIS calculated)	Thinning Acres	Seedtree Acres	% With Harvest Activity
Ellis Branch	1032	62	--	6
Unnamed Tributary of Hunter Creek	198	---	37	18.6

The chemistry of water flowing through forests changes as water passes through the canopy, forest floor, and soil. Forest harvesting reduces interception losses, allowing more water to reach the soil, thereby diluting nutrient concentrations (all else equal). The removal of mature trees would result in a temporary decrease in the demand for nutrients therefore; more nutrients are available and are potentially free to move off site. Nutrients can be dissolved in precipitation and infiltrate into underlying mineral soil. Subsequent drainage through the soil can carry some nutrients such as nitrogen, calcium and magnesium to nearby streams. The duration of this possible effect is generally considered to be less than five years. After this time period, sprouts, seedlings and other vegetative growth reestablish the cut area and effectively tie up available nutrients.

Long term measurements of chemical changes in water quality at Coweeta Hydrologic Lab are summarized as follows:

> Based on observations beginning in 1972, none of the harvested areas or other disturbances at Coweeta produced nutrient concentrations that would have an adverse impact on water quality for municipalities or downstream fisheries.
>
> Compared to other forested regions of the U.S. increases in nutrient concentrations of streams at Coweeta were small, even for the most drastic vegetative disturbances.
>
> Nitrate-N is a sensitive indicator of forest disturbance and although concentrations are quite low (<0.2 mg/1), elevated levels in streams draining clearcuts appear to persist for 20 years after cutting. However the increase is substantially diminished by the fifth year after cutting and appears to approach pre-logging levels (Swank 1988).

Implementation of forest BMP's such as SMZ's would greatly reduce the amount of nutrients reaching the stream. Vegetation within the buffer zone would quickly absorb any available nutrients. Any chemical changes that might occur from the project should be examined in the context of the streams natural or background chemical composition. Streams draining the affected area are low in dissolved solids and fertility. Any small infusion of fertility into these streams that are nutrient poor would have benign or possibly positive effects in terms of aquatic habitat.

Stream temperature would not be affected by the proposed action. SMZ's would be left beside perennial and intermittent streams in any stand affected by timber harvest. These corridors would provide shade strips where trees would be left uncut and soil disturbance would be kept to a minimum.

Available research indicates that pH is not sensitive to most forest management activities. There is no evidence that acid-bearing rock is present in the affected area. If any were to be encountered during project implementation, appropriate steps (project cessation and/or mitigation) would be taken immediately to address the hazard.

Herbicide

Chemical treatments would be used for second year shortleaf release and to control non-native invasive plants. Specific herbicides that could be used are covered in the Non-Native Invasive Plant EA. A variety of ground application methods could be used, but each method would directly apply chemical to the targeted plants.

In general, herbicides can enter surface waters via three main routes including:

1. Movement or leaching through the soil profile to subsurface water and travel until contact is made with surface systems,
2. Absorption to a soil particle and movement to surface water systems during heavy rains and;
3. Direct contact with surface water during application.

The herbicides that would be used in the analysis area are low-toxicity chemicals. The quantity of herbicide to be used, on-site degradation processes, the method of application, the relatively short persistence of the herbicide in the soil, in-stream dilution and degradation, and mitigation measures to be used would result in minimal risk of surface and ground water quality impact. No herbicide would be applied within 30 feet of open water except for selective treatments that use herbicides labeled for aquatic use. This along with careful control over the weather conditions during which the herbicide would be applied would prevent direct contamination of surface water. Many of the herbicide treatments would be applied directly to targeted species and very little herbicide would make ground contact. As a result, infiltration into the soil and movement via soil water (subsurface) would be minimal. The greatest hazard to surface and ground water quality would result from a possible accident during transportation, storage, mixing and disposal of the chemicals.

Roads

Effects of NFS roads on the water resource are disclosed in the No Action Alternative.

1.6 miles of existing roadways would be authorized. These roads would be gated and closed to all but administrative use. Gating these roads would decrease the amount of traffic and reduce the potential for resource damage that may occur from road use.

Temporary roads constructed on low to moderate slopes away from streams have limited hydrological effects. There would be minimal long term effects as long as road closures prevent continued use by vehicles, and measures to reduce erosion and control water are in place. Some closed temporary or unauthorized roads, wildlife openings and log landings would be disked to maintain quality wildlife food, cover and hunting opportunities with limited risk to water resources. Standards and BMPs address road activities and avoidance or

restrictions in road location or practices would be employed when crossing streams or within the riparian corridor. Temporary roads used for harvest operations contribute to erosion and sediment in the short term (up to 3 years), but the effects to soil and water can be mitigated to a great extent with effective erosion control measures.

Prehaul maintenance operations such as blading the road surface, cleaning ditch lines, improving structures, hardening surfaces, and replacing gravel can lead to short term increases in soil erosion and increases in sediment production. However, prehaul maintenance would reduce soil erosion and sediment production from these roads over the long term. Prehaul maintenance is needed to prevent road degradation from high trafficking of heavy loaded vehicles.

In general, daylighting linear wildlife roads would increase sunlight to the roads increasing vegetative cover on the roads which would lead to a dryer, less erosive road. In this case there would be no effect on the water resource. However, in some instances depending on soil type, site preparation, soil compaction, and seeding rates vegetative cover could be limited. In this instance day lighting wildlife roads would lead to an increase in erosion. Effects on the water resource would depend on many factors such as location of the road, number of stream crossings, slope of the road, and drainage structures.

Wildlife Activities

Activities proposed in this alternative as wildlife activities would have minimal effects on the water resource. These areas are generally on upland sites away from surface waters. In general waterholes, vernal ponds, or wetlands are created on uplands sites in openings, skid trails, log landings, and/or in the upper portions of ephemeral drainages. These sites are usually small ephemeral watering areas that hold water for a short period of time after a rain event or during wetter months of the year. Effects from the constructed water sources would be negligible.

Prescribe Burning

Prescribe burn activities have the potential to increase the solubility of some cations in the forest floor, but would not diminish water quality (Knoepp and others 2004). Streamside areas would be minimally impacted by the burns since no harvest would occur in riparian corridors and logging slash would not exist. Fires would be allowed to back down into streamside areas, but typically do not carry far into these damper areas. Very little vegetation is killed in riparian areas by the low intensity fire. There would be little, if any, change in runoff from the burned areas.

The blading or plowing of firelines around recently regenerated or privately owned areas may be needed in some instances to facilitate the protection from prescribed burning activities. Fireline blading or plowing exposes the mineral soil by removing vegetation, leaf litter and duff. Blading or plowing would increase the exposed area's susceptibility to soil erosion and displacement of nutrients and organic matter offsite. Firelines can recover quickly when they accumulate litter from a forest canopy and/or treated with erosion control measures to control concentrated flow and reduce soil exposure through revegetation efforts. Firelines that are needed for frequent or regular burning cycles are best designed and maintained on the landscape to provide for both long term use and ability to control concentrated flow and erosion by employing relatively permanent drainage dips, reverse

grades, out-sloping and lead-off ditches along with reinstalling and maintaining of other erosion control measures when not used.

Cumulative Effects Water

Alternative 1 (No Action)

The Existing Condition describes conditions that would be associated with Alternative 1. Past, present, and reasonably foreseeable future activities on NFS lands and/or private lands (see page 12) in conjunction with Alternative 1 may continue to have effects on the water resource.

Past vegetation management on federal lands in the area has consisted of timber harvesting activities and periodic prescribed burning. Timber harvesting activities have mostly been associated with salvage operations from pine beetle damage. Effects from these activities should be minimal considering RLRMP standards and guidelines were followed. When properly implemented, BMPs have been effective at protecting water quality and associated resources (Adams and Hook, 1993, Adams, 1994). The Hopper Branch Timber Sale is likely to occur in this area in 2012. Prescribed burn effects are generally minimal depending largely on burning methods, conditions, and rotation. These areas normally recover before the next burning rotation. Prescribed burns are likely to continue in the future. Vegetation management along utility ROW's has occurred in the past and would continue in the future. Although ROW's intersect streams and/or drainages they are vegetated and should not contribute a measurable amount of sediment to streams or drainages. Noxious weed treatments are currently being done within this watershed and are expected to continue into the future. With the current herbicide types and methods of application no cumulative effects to the water resource are expected.

Recreational uses such as dispersed hunting/fishing, campsite development, hiking, and horseback riding have occurred in the past and would likely continue in the future. Effects from these activities are usually localized therefore; no cumulative effects should be associated with these uses.

NFSRs are generally aggregate surfaced and are generally on sideslope and ridgetop locations. The roads are, however, the main source of erosion and sediment yields from NFS lands within this analysis area. Effects largely depend on location of the road, the road condition, time of year, and the amount of use the road receives. Scheduled road maintenance such as drainage improvements and additional road hardening with gravel is done to improve the condition of these roads and to reduce road-related erosion.

Approximately 31% of the Spring Creek watershed is comprised of private lands. Past and present land use types and activities such as, agricultural crop and animal production, home construction, land clearing, road construction and maintenance, and timber harvesting. The nature of the disturbance that is associated with some of these land uses is known to create the potential for greatly accelerated erosion and sediment rates. It is likely that this condition exists, and influences the quality of some surface waters within the analysis area. Effects from similar activities in the reasonably foreseeable future would continue to occur.

The loss of hemlock in the Southern Appalachians may also result in hydraulic changes. Evapo-transpiration would decrease with the declining number of mature hemlocks. Four

hydraulic consequences are predicted: (1) increased soil moisture, (2) increased discharge, (3) decreased diurnal amplitude of streamflow, and (4) increased width of the variable source area (Ford and Vose 2007).

Alternative 2 (Proposed Action)

Cumulative watershed effects that result from past and current conditions in affected watersheds are described in Alternative 1. Alternative 2 would result in additional disturbance within the watersheds from specified road construction and prehaul maintenance activities associated with timber harvest. Actual ground disturbance on NFS lands would be a very low percentage of any sub watershed within the analysis area and would be dispersed over the landscape.

Prescribe burning should create a mosaic type effect where areas of slash would burn severely, but most of the sites should have creeping ground fires and some areas would not burn at all. There would be limited potential to change runoff or water chemistry as a result from the burning since only a small percentage of the areas would burn severely.

Prehaul maintenance on 4.6 miles of roads would reduce the road sediment that enters into intersecting steams and drainages for a few years into the future. Duration of benefit would greatly depend on the amount of use the road receives over time and weather. No other Forest Service activity that could affect the hydrologic condition of these watersheds is known or planned. Effects to streams within the Spring Creek Watershed are likely to continue from private land activities.

Implementation of Alternative 2 considered together with past and reasonably foreseeable future activities is not expected to have a cumulative effect on the water resource. Best practices that would be used during project implementation is a primary factor leading to this determination.

Existing Condition Soils

Diverse parent material along with other factors such as aspect, topography, and climate has resulted in many different soil types forming across the landscape. Upland soils that are well drained and have moderate permeability most frequently occur within the analysis area. However, the depth to bed rock may vary greatly depending on landscape position and past events such as landslides. Seeps and springs commonly occur in many soil types that are found on benches, foot slopes, toe slopes, colluvial fans, and coves. Soils that exhibit anaerobic conditions are associated with the few isolated wetlands found within the analysis area.

Some soil types due to steep slopes and low strength are subject to slippage and slumping. Other soil types within the stand have a severe risk of erosion mainly due to their textures and slope. Slopes range from 5% to 50% with some areas exceeding 50 %. The topography is moderately dissected by drainages and streams.

Soils within the proposed stand boundaries have undergone intensive management in the past and have remained stable and productive. However, the soil types found within the stand boundaries have limitations that should be considered before ground disturbing activities take place. Soil compaction, rutting, displacement, erosion, and severe burning of surface organics are the key factors that affect soil productivity. The soils found within the proposed stands

are slightly to not eroded. The surface textures are silt loam, fine sandy loam, loam, and cobbly sandy loam in texture and have a moist soil consistence that is very friable to friable. These characteristics allow for good root penetration and nutrient uptake. The subsurface textures are loam, sandy clay loam, cobbly sandy clay loam, and cobbly clay loam with a consistence of friable.

Soil series percentage in the proposed treatment stands include Junaluska (63%), Junaluska-Brasstown complex (18%), Citico (7%), Brevard (5%) and several other soil series are also found in the treatment area but at low percentages, about (7% combined).

Direct and Indirect Effects Soils

Scope of Analysis

In general scope of this analysis includes the entire Spring Creek Watershed. Site specific analysis such as acres of soil types is derived only from areas where vegetation management is proposed. The time-period considers the past 10 years and future actions that could occur within five years.

Alternative 1 (No Action)

With the exception of road maintenance there would be no ground disturbing activities. Current rates of soil building and erosion would continue. In general, the area has no severe chronic hillslope erosion problems.

Road maintenance operations such as blading the road surface and pulling the ditches can lead to increases in soil erosion and increases in sediment production. During road maintenance activities, soil may be displaced and exposed. Soil movement would occur, however, mitigation measures designed to stabilize the road surface, such as adding aggregate surfacing by armoring the soil or limiting distance and amount of concentrated flow by installing water diversion devices (dips, reverse grades, outslopes, leadoff ditches, culverts) would reduce adverse effects. The detachment and distance soil particles move would be reduced by limiting water concentration and movement on disturbed surfaces and/or fill materials.

Alternative 2 (Proposed Action)

Timber Harvesting

Timber harvesting involves various types and intensities of ground disturbing activities that can potentially affect the soil resource. Erosion hazard and steepness of slope are the primary soil concerns that could limit management activities. Soil concerns associated with logging and other connected actions center around rutting, soil compaction, displacement/erosion, soil exposure and nutrient reduction. Soil disturbance and compaction during timber harvest vary depending upon both the type of soil[1] and harvest method (Swank and others 1989). Timber harvesting can directly affect the physical, chemical, and biological properties of the

[1] Refer to the Project File for soil limitations and hazard ratings by soil mapping unit and for soil mapping unit acres and location by compartment and stand.

soil (Swank and others 1989). Effects from this action may include immediate changes in soil and/or organic matter displacement, water infiltration rates, and soil compaction.

Approximately 5 percent of the soils found within this area consist of the Brevard soil series. These soil types are made up of colluvium material which is susceptible to slippage and slumpage when disturbed. Extra caution should be used when disturbing these soils. Adequate road drainage such as out sloping, cross drains, and/or rolling dips is important when building roads on these soil types. Soil descriptions and limitations are listed in the project file.

Loss of organic matter can result in disruption to nutrient recycling in the soil and reduced nutrient availability for trees and other plants. Nutrient removal varies with the intensity of the activities and degree those organic materials that are removed.

Compaction can limit root growth and development in the soil, decreasing tree growth (Swank and others 1989) and increase risk for blow down or tree stress. Water infiltration rates may be reduced due to compacted soils. Soil rutting and erosion can reduce soil productivity and result in permanent loss of soil.

Where soil compaction is severe and unmitigated, soil productivity would be reduced due to loss of soil structure. Compaction is most likely to occur on those areas where heavy equipment operates repeatedly, especially when soils are wet.

Areas subject to compaction include skid trails, temporary roads, and log landings. While subject to many variables, it is estimated that about 10% of a given area harvested by conventional logging equipment

The potential effects of soil erosion, sediment yield, and compaction have a spatial and temporal context. The amount produced depends upon the topographic, soil, and climatic characteristics of the affected area along with the intensity of management practices being implemented. Erosion that results from timber harvest would be greatly modified through time in that disturbance would be temporary and generally a single pulse over a long period of time. Research has repeatedly shown that sediment production during timber harvest may accelerate temporarily to about 0.05 to 0.50 tons per acre per year (Patric 1976 and 1994). Any given area to be disturbed by regeneration harvest would be cut and site prepared within a year's time. After this, it is unlikely the area would be disturbed (barring natural disturbance) for at least 50 to 60 years.

Indirect effects occur with time such as accelerated weathering of the soil, increased erosion, and accumulation of soil in depressional areas, nutrient leaching and alteration of organic matter formation.

With proper mitigation applied, all effects of timber harvest on soil loss, sediment yield and compaction would return to precutting conditions within 2 to 5 years. If any areas suffer severe compaction, however, the effects of the compaction could last much longer. Impacts to soils would be reduced by following existing RLRMP standard and guidelines (USDA 2004a), and implementing Tennessee BMP's.

Prescribe Burning

Site preparation burns after harvesting is completed can be of high intensity and severity because of the increased amount of woody fuels present. Care must be taken to avoid

burning areas too hot, affecting soil properties, nutrients, and organisms that may lead to loss in soil productivity.

Fire generally affects soil erodibility if mineral soil is exposed. Reports show little to no erosion after light to moderate intensity fires in the southeastern U.S. (Swift et al. 1993). However, burns with previous soil disturbance such as skidding of logs would increase the probability of soil erosion after burning (Swift et al. 1993)

Effects to the organic layers and soil organisms depend greatly on heat penetration into the soil. Heat penetration depends upon duration of heating and soil moisture (Swift et al. 1993)

The types of burning employed by the Forest Service limit the effects to the soil resource by burning under prescription when the duff and humus soil layers can be protected. By burning within strict parameters and lighting ridges and upper slopes, the fire burns dryer sites and extinguish in the moist streamside and bottomland areas. Other than dozer or handline, there would be little, if any, mineral soil exposure resulting from the low intensity burning.

Burning activities (site preparation burns and periodic prescribed burning to meet other resource objectives) normally use existing roads and natural barriers (riparian areas, creeks, streams and rivers) and established firelines. However, existing firelines often need to be re-bladed (remove vegetation prior to burning) or otherwise treated during the burning activities. Most firelines that are reused would have drainage features as dips, lead-outs, or reverse grades at regular intervals to reduce concentrated water flow, erosion, and sediment.

All firelines would be seeded following the burn. Special attention would be used for firelines that connect to streams to avoid entry of storm water or sediments. Forest wide standards (USDA 2004a) would be followed during implementation.

Roads

Effects of roads and road maintenance are disclosed in Alternative 1.

Some soil types within the Spring Creek watershed are better suited for road building. Proper location of roads would reduce the risk of road failure. Following RLRMP standards and guidelines (USDA 2004a) would reduce the effects to the soil resource.

Decommissioning roads allows the soil building process to begin on the road surface. As soils develop vegetative growth enhances. This process allows decommissioned roads to recover to a more natural state over time.

Wildlife Activities

For wildlife openings and linear wildlife strips, annual to periodic disking is common on some areas, and not on others. Disking at regular intervals can cause excessive erosion and productivity losses. These adverse effects are at acceptable levels normally by limiting these activities to slopes less than 10%. Additional measures such as no till, contour farming, or leave strips can be used to further reduce soil exposure or concentrated flow that contributes to erosion.

Some of the soils within the proposed stands are not suited for constructing ephemeral pools. Effects from the construction of ephemeral pools on flat ground would be minimal. Great care need be taken to avoid unstable soils on slopes, fill slopes and other areas that could be hydraulically overloaded, resulting in failure. Direct effects would be the removal of the

surface soil horizons, and an increase in water retention within the localized area. There would be some soil displacement from the removed soil. Indirect effects may be an eventual change from aerobic to anaerobic conditions of the soil within the wetland. This would depend on how well the depression holds water.

Herbicides

Chemical release treatments would have minimal effects on the soil resources due, in part, to the application methods. Minimal amounts of chemical would come in contact with the soil as most are targeted for application on the leaf surface or directed at the stem. These application methods do not require disturbance to the soil litter or duff layer and therefore, erosion is not a concern.

Triclopyr would be applied to the base of target trees. The streamline or hack and squirt application method would be used. Only the individual trees or other competing vegetation, requiring treatment, would be targeted. Therefore, contact to soil should be minimal.

Cumulative Effects Soils

Alternative 1 (No action)

Alternative 1 does not propose any new ground disturbance. Effects to soils generally occur because of ground disturbing activities. Cumulative effects from past and present activities generally result in a localized loss in soil productivity due to compaction, rutting, and/or soil displacement. However, soil erosion may also occur which may contribute to sedimentation. Activities, on NF, that are reasonably foreseeable would be implemented under the standards for protecting soils listed in the CNF (USDA 2004a); therefore, cumulative effects from these actions are minimal. Activities on private lands would be site specific to those lands and no cumulative effects would occur to the soil resource from those actions.

Alternative 2 (Proposed Action)

Little timber harvesting has occurred over the last 10 years on federal lands; however, periodic prescribed burns have been implemented in portions of the analysis area. Cumulative impacts on soil conditions relative to compaction, displacement and subsequent erosion from past prescribed burning and connected actions are considered minimal for the majority of areas. Soil would recover over time depending on burn severity. Severely burned areas loose productivity and are subject to erosion.

Impacts on soils resulting from timber harvests normally recovered before a new cycle of harvesting begins, and as a result, cumulative impacts relative to compaction and displacement from successive harvesting operations would be expected to be minimal for the majority of harvested areas. Areas that are repeatedly used for logging decks and skid trails in stands that have frequent entries, have the potential to suffer more continuous periods of decreased soil productivity and decreased water infiltration. Although rehabilitation of these sites decreases the duration of the recovery period for soils and lessens the potential for cumulative degradation of soil conditions, the re-opening and use of these areas during successive harvest operations generally results in some decreased soil quality on these sites. These areas are a small fraction of the analysis area.

Activities in the reasonably foreseeable future include the Hopper Branch timber sale and prescribed burning. Other activities include road maintenance on NFSRs.

Other activities on Federal lands within the proposed treatment areas include a variety of maintenance measures. For roads and ROWs, activities are performed to ensure the safety of the public and to prevent degradation of infrastructure and the environment. Road maintenance operations such as blading the road surface and pulling the ditches can lead to increases in soil erosion and increases in sediment production. However, these operations may be combined with structural improvements and improvements to drainage structures which reduce soil erosion and sediment production from the road surfaces over the long term. Disking wildlife openings at regular intervals can cause excessive erosion and productivity loss. Limiting these activities to lesser slopes, vegetating, and fertilizing would keep these adverse effects at acceptable levels.

Implementation of Alternative 2 considered together with past and reasonably foreseeable future activities is not expected to have a cumulative effect on the soil resource. Mitigation that would be used during project implementation is a primary factor leading to this determination.

Existing Condition Climate Change

Climate change can affect the resources in the analysis area and the proposed project can affect climate change through altering the carbon cycle. Climate models are continuing to be developed and refined, but the two principal models found to best simulate future climate changed conditions for the various regions across the country are the Hadley Centre model and the Canadian Climate Centre model (Climate Change Impacts on the United States 2001). Both models indicate warming in the southern region of the US. However, the models differ in that one predicts little change in precipitation until 2030 followed by much drier conditions over the next 70 years. The other predicts a slight decrease in precipitation during the next 30 years followed by increased precipitation. These changes could affect forest productivity, forest pest activity, vegetation types, major weather disturbances (droughts, hurricanes), and streamflow. These effects would likely be seen across the Forest, though some sensitive areas (such as high elevation communities) may be affected sooner than others.

Scope of Analysis

The scope of this analysis for direct, indirect, and cumulative effects on climate change includes the 14,330 acres of NFS lands in Compartments 102, 104, 105, 106, 117, 118, 119, 120, 121, 122, 126, 127, 128, 145, 146, 147, and 148. The time frame used in this analysis is up to ten years after completion of the activities.

Direct and Indirect Effects Climate Change

Alternative 1 (No Action)

In general terms, Alternative 1 (No Action) would result in no change to the current trend for carbon storage or release. Forested stands are expected to be less resilient to possible climate change impacts, such as changes in productivity or insect and disease.

Alternative 2 (Proposed Action)

It is not expected that the proposed action would substantially alter the effects of climate change in the analysis area. The proposed fuels treatment may contribute towards moving the burned area towards a community closer to its historic fire regime which is expected to be more resilient to changes in climate. The regeneration in the areas to be harvested, would provide more structural diversity to the area, and establish a young, vigorous stand of timber that may be more resilient to the changes in climate.

The proposed action and alternatives would alter the carbon cycle in that it affects the carbon stock in any one of the pools. This alternative would remove biomass as a result of timber harvest and prescribed burning. This would reduce the amount of carbon stored in the treated stands. A portion of the carbon removed would remain stored for a period of time in wood products.

The action affects greenhouse gases in that the associated prescribed burning would release carbon into the atmosphere and carbon would be released during decomposition. However, overall forestry practices (including harvesting and prescribed burning) have been shown to act as a net carbon sink (EPA 2009).

There would be a direct, short-term increase in carbon emissions during the prescribed burn and a short term increase due to an increase in dead vegetation following the burn. However the short term loss of biomass resulting from a fire may be offset by the burned area's increased ability to produce herbaceous biomass. There is a direct beneficial effect on climate change of decreased green house gas emissions from the acres to be burned because the risk of acres being burned by uncharacteristically severe wildfires would be reduced. There is also an indirect beneficial effect by treating these acres because live stands of trees would retain higher capacity to sequester carbon dioxide compared to stands killed by uncharacteristically severe wildfires, especially if not immediately reforested.

Regeneration harvests would reduce existing carbon stocks at the harvest sites. The harvest of live trees, combined with the likely increase in down, dead wood would temporarily convert stands from a carbon sink that removes more carbon from the atmosphere than it emits, to a carbon source that emits more carbon through respiration than it absorbs. These stands would remain a source of carbon to the atmosphere until carbon uptake by new trees and other vegetation exceeds the emissions from decomposing dead organic material. The stands would likely remain a carbon source for several years, and perhaps for more than a decade, depending on the amount of dead biomass left on site, the length of time before new trees become reestablished, and their rate of growth once reestablished. As the stands continue to develop, the strength of the carbon sink would increase until peaking at an intermediate age and then gradually decline but remain positive. Similarly, once new trees are established, carbon stocks would accumulate rapidly for several decades. The rate of accumulation would slow as the stands age. Carbon stocks would continue to accumulate, although at a declining rate, until impacted by future disturbances.

Recent scientific literature confirms this general pattern of changes in net ecosystem productivity (NEP)[2] and carbon stocks over the period of forest stand development. Most mature and old stands remained a net sink of carbon. Pregitzer and Euskirchen (2004) synthesized results from 120 separate studies of carbon stocks and carbon fluxes for boreal, temperate, and tropical biomes. They found that in temperate forests NEP is lowest, and most variable, in young stands (0-30 years), highest in stands 31-70 years, and declines thereafter as stands age. These studies also reveal a general pattern of total carbon stocks declining after disturbance and then increasing, rapidly during intermediate years and then at a declining rate, over time until another significant disturbance (timber harvest or tree mortality resulting from drought, fire, insects, disease or other causes) kills large numbers of trees and again converts the stands to a carbon source where carbon emissions from decay of dead biomass exceeds that amount of carbon removed from the atmosphere by photosynthesis within the stand.

The impacts of the action alternative on global carbon sequestration and atmospheric concentrations of CO2 are miniscule. However, the forests of the U.S. significantly reduce atmospheric concentrations of CO2 resulting from fossil fuel emissions. The forest and wood products of the U.S. currently sequester approximately 200 teragrams3 of carbon per year (Heath and Smith, 2004). This rate of carbon sequestration offsets approximately 10% of CO2 emissions from burning fossil fuels (Birdsey et al., 2006). U.S. forests currently contain 66,600 teragrams of carbon. The short-term reduction in carbon stocks and sequestration rates resulting from the proposed project are imperceptibly small on global and national scales, as are the potential long-term benefits in terms of carbon storage.

The currently large carbon sink in U.S. forests is a result of past land use changes, including the re-growth of forests on large areas of the eastern U.S. harvested in the 19th century, and 20th century fire suppression in the western U.S. (Birdsey et al. 2006). The continuation of this large carbon sink is uncertain because some of the processes promoting the current sink are likely to decline and projected increases in disturbance rates such as fire and large-scale insect mortality may release a significant fraction of existing carbon stocks (Pacala et al. 2007; Canadell et al. 2007). Management actions - such as those proposed – that improve the resilience of forests to climate-induced increases in frequency and intensity of disturbances such as fire, and utilize harvested trees for long-lived forest products and renewable energy sources may help sustain the current strength of the carbon sink in U.S. forests (Birdsey et al. 2007).

[2] Net ecosystem productivity, or NEP, is defined as gross primary productivity (GPP) minus ecosystem respiration (ER) (Chapin et al. 2006). It reflects the balance between (1) absorbing CO_2 from the atmosphere through photosynthesis (GPP) and (2) the release of carbon into the atmosphere through respiration by live plants, decomposition of dead organic matter, and burning of biomass (ER). When NEP is positive, carbon accumulates in biomass. Ecosystems with a positive NEP are referred to as a carbon sink. When NEP is negative, ecosystems emit more carbon than they absorb. Ecosystem with a negative NEP are referred to as a carbon source.

[3] 200 teragrams, or Tg, equals 196,841,306 US tons.

Cumulative Effects Climate Change

All Alternatives

For all alternatives, the release of stored carbon may be an obvious concern; the contribution of the proposed project areas to the carbon cycle is extremely small. When combined, the carbon from these projects has minimal cumulative effect not only at the local level, but at the larger level. When implemented, the risk and rate of additional carbon release through regeneration is minimal for the reasonably foreseeable future.

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APPENDIX B

BIOLOGICAL EVALUATION
Spring Creek Vegetation Management
Compartments 102, 104, 105, 106, 107, 117, 118, 119, 120, 121, 122, 126, 127, 128, 146, and 148
USDA FOREST SERVICE, SOUTHERN REGION
CHEROKEE NATIONAL FOREST
OCOEE RANGER DISTRICT

INTRODUCTION

The purpose of this biological evaluation (BE) is to document any potential effects of the project on threatened, endangered, or sensitive (TES) species or their habitat, and to ensure land management decisions are made with the benefit of such knowledge. The objectives of this evaluation are to:

1) Ensure Forest Service actions do not contribute to a loss of viability of any plant or animal species or cause a trend toward federal listing of any species.
2) Comply with the requirements of the Endangered Species Act that actions by federal agencies not jeopardize or adversely modify critical habitat of federally listed species.
3) Provide a process and a standard by which TES species receive full consideration in the decision-making process.

PROPOSED ACTION AND ALTERNATIVES

The Ocoee Ranger District of the Cherokee National Forest proposes vegetation management, prescribed burning, wildlife opening maintenance, herbicide use, ephemeral pool creation, and road construction and reconstruction. Each alternative is described below.

1) Restore shortleaf pine and shortleaf pine-oak communities through silvicultural treatments on approximately 102 acres of existing forested stands that have been altered from desired conditions due to previous land use. These are mostly ridge sites that would support "xeric pine and pine-oak forests" within which fire has historically played an important role in shaping species composition. To ensure desired conditions are achieved, herbicide applications (triclopyr) would be applied in the second year after planting. Activities would occur in the stands listed in Table 1.

Table 1 Pine restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
146/14	37	Seedtree w/reserves	Slashdown, site preparation burn, plant shortleaf, 2nd year chemical release
146/16	25	Seedtree w/reserves	Slashdown, site preparation burn, plant shortleaf, 2nd year chemical release
146/23	40	Shelterwood w/reserves	Natural regeneration by seeding and sprouting, slashdown with 2nd year chemical release
Total	102		

2) Restore native riparian community through silvicultural treatments on approximately 10 acres of existing forested stands that have been planted to loblolly plantations (Table 2).

Table 2 Native riparian community restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
147/31	3	Clearcut w/reserves	Natural regeneration by seeding and sprouting, invasive/exotic plant control using herbicides
148/40	7	Clearcut w/reserves	Natural regeneration by seeding and sprouting, invasive/exotic plant control using herbicides
Total	10		

3) Restore forest health, tree vigor, and wildlife browse by diversifying stands heavily stocked with white pine on approximately 31 acres. Thinning would remove the white pine in an upland site allowing other more appropriate tree species to develop. Activities would occur in the stands listed in Table 3.

Table 3 Pine removal

Comp/Stand	Acres	Type of Harvest	Reforestation
146/01	31	White Pine Removal	None
146/29	7	Loblolly pin removal, invasive/exotic plant control using herbicides	
TOTAL	38		

4) Thin stands on 62 acres to promote the forest health and improve tree vigor (Table 4).

Table 4 Thinning

Comp/Stand	Acres
122/11	33
122/19	29
TOTAL	62

4) Maintain approximately 78 acres of existing spot and linear wildlife openings. Maintenance activities typically include, but are not limited to, mowing, fertilizing, sowing, day-lighting, burning and rehabilitation.

5) Seed 62 acres of areas of timber harvest that are site prep burned with a non invasive grass seed mixture immediately following burn.

6) Install ephemeral pools in temporary roads and gated roads in appropriate areas.

7) Open road corridors and spot openings (Table 5) by removing timber commercially or non-commercially up to 50 feet either side of the following linear wildlife openings and spot

openings. Areas with immature oaks, particularly white oaks would be thinned to release mast producing trees.

Table 5 Road daylighting

Road Name/Number	Miles of road or acres of spots	Treatment
White Cliff Spur/220K and 3 spots	1.2 mi./4.4 ac.	Non commercial road and spot daylighting
Hogback Ridge/1106 and 3 spots	2 mi./6.8 ac.	Non commercial and commercial road and spot daylighting
Round Mtn/11215 and 1 spot	1 mi./0.3 ac.	Non commercial and commercial road and spot daylighting
Hogback Br/2372	1 mi./0.3 ac.	Non commercial road daylighting

9) Prescribe burn unit O-02 (Starr Mountain), during the dormant season, totaling approximately 2,980 acres to reduce hazardous fuels. Roads and dozer line (approximately 2,850 feet) would be used as fire lines.

The activities described above would contribute to meeting the following RLRMP Goals and Objectives which are defined in the Purpose and Need section above:
Goals 21, 23 and 24; Objectives 21.01, 21.02, and 24.01.

10) Add three unauthorized roads to the transportation system as roads #2010E (0.6 miles), #2010F (0.5 miles) and #27D (0.5 miles) and reconstruct these roads (approximately 1.6 miles) to access units treated by commercial timber sales. Roads would be the minimum standard needed to remove timber and would be administrative use only after the sales.

11) Construct 0.4 miles (T1 = 0.1; T2 = 0.3) of temporary roads to access timber stands

12) Perform maintenance on 6.2 miles of NFSRs needed for timber haul**.**
The activities described above would contribute to meeting the following RLRMP Goals and Objectives which are defined in the Purpose and Need section above:
Goals 30, 31, 33, 47, 48, and 51

13) Develop a new horse trailer parking area (1.5 acres) east of Starr Mountain away from occupied residences and new trail construction (3.0 miles) to create a loop trail.

Mitigation common to action alternative:

FW-3, FW-6, FW-7 FW-9, and FW-10: Filter strips would be used between ground disturbance and streams.

FW-14, FW-15, and FW-16: Herbicides would be used during timber stand improvement and site preparation activities following these standards.

FW-28 Protect individuals and locations of federally listed threatened and endangered species, and individuals and locations of other species needed to maintain their viability within the

planning area. Site specific analysis of proposed management actions will identify any protective measures.

FW-34: The following points apply to roost tree retention for Indiana bat:
GENERAL. For Indiana bat, snags with exfoliating bark are not intentionally felled unless needed to provide for immediate safety of the public, employees, or contractors. Exceptions may be made for small-scale projects such as insect and disease control, salvage harvesting, and facility construction.

FOREST REGENERATION TREATMENTS > 10 ACRES. When implementing regeneration treatments in hardwood-dominated forest types, a minimum average basal area of 15 square feet per acre is retained throughout the rotation. In some portion of the treatment area, residual basal area should be clumped or left in travel corridors. All snags and all shagbark hickory over 6 inches DBH are retained except those that are immediate hazards. If additional trees are needed to meet the basal area requirements, priority should be given to hollow/den trees or trees that exhibit, or are likely to develop, characteristics favored by roosting Indiana bats. Snags do not count toward the leave basal area. Borders of clearcut units will be irregularly shaped.

FOREST REGENERATION TREATMENTS < 10 ACRES. No residual retention basal area (live trees) is required. All snags will be retained unless they are immediate hazards. Shagbark hickory greater than 6 inches DBH is retained.

FW-35: During all silvicultural treatments in hardwood forest types, retention priority is given to the largest available trees that exhibit characteristics favored by roosting Indiana bats.

FW-36: To avoid injury to non-volant young Indiana bats, prescribed burning of potential maternity roosting habitat between May 1 and August 15 is prohibited except where site-specific inventories coordinated with USFWS indicate Indiana bats are not likely to be present, unless otherwise determined by project-level consultation with USFWS.

FW-40: Known black bear den sites will be protected for as long as they remain suitable by prohibiting vegetation management and ground-disturbing activities within a minimum 100 feet around the den.

FW-41: Potential black bear den trees will be retained during all vegetation management treatments. Potential den trees are those that are greater than 20” DBH and are hollow with broken tops.

FW-44: Protection zones are delineated and maintained around all bald eagle nest and communal roost sites, until they are determined to be no longer suitable through coordination with USFWS. The protection zone extends a minimum of 1500 feet from the nest or roost. Activities that modify the forest canopy within this zone are prohibited. All management activities not associated with bald eagle management and monitoring are prohibited within this zone during periods of use (nesting season is October 1 to June 15; roost use periods are determined through site-specific monitoring). Where controlled by the FS, public access routes into or through this zone are closed during the seasons of use

FW-53: Retain soft mast-producing species (dogwood, black gum, hawthorn, grapes, serviceberry, etc.) during vegetation cutting treatments to the extent possible, within constraints of meeting treatment objectives.

FW-60: Forests dominated by Eastern hemlock will not be subject to regeneration harvest. Hemlock will be retained as patches (a minimum of 0.25 acres) during all silvicultural treatments.

FW-67: When seeding temporary openings such as temporary roads, skid trails, and log landings, use only native or non-persistent nonnative species.

FW-97: Dormant season burns have a cutoff date of May 1st or the break of dormancy, as recommended by multi-disciplinary review and TWRA with decision by line officer.

Riparian Prescription Standards-RX11-1, RX11-8, RX11-29, RX11-30, RX11-31, and RX11-32: Vegetation Management within defined riparian corridors will emphasize maintenance of large trees for woody debris recruitment as the desired condition.

Additional Mitigation for the action alternative:

This species was found at four locations during the botanical surveys, two within close proximity of each other within stand 122/11, and two more associated with day-lighting along the Hogback Ridge linear wildlife opening. A no-cut zone surrounding the populations will be designated on the cutting cards for unit 122/11 and the Hogback Ridge day-lighting with directional felling and skidding away from the populations.

AFFECTED AREA

The project area is approximately seven miles southeast of Etowah, nine miles northeast of Benton, and three miles northeast of Reliance, Tennessee. The area encompasses approximately 14,339 acres within the Hiwassee River watershed. The area varies widely in topography, from sloping hills and flatter areas around the streams to steeper slopes on ridges in the area. Elevations are from around 800 feet to 1,400 feet ASL. Dry upland sites occupied by yellow pine, upland hardwood, and mixed stands are characteristic of the overall area; cove sites are also present and include yellow poplar, white pine, white oak and hemlock as predominant overstory species. Common shrub zone species including mountain laurel, blueberry, huckleberry, and greenbriar are present. Common herbaceous species include galax, poison ivy, ferns, trillium, and smilax. There are currently 202 acres (6%) within the 0-10 year age class (base year 2010) of the total forested acres.

Perennial water sources are readily accessible from all parts of the compartments. Openland, grassy wildlife openings within the compartments include approximately 78 acres of linear and spot openings.

The Spring Creek project can be found on the Etowah, Mecca, McFarland, Oswald Dome, and Parksville quadrangle maps north of Ocoee River. No special habitat features including caves, talus, boulders, spray cliffs and waterfalls, or seeps and springs have been located in the activity areas.

SPECIES EVALUATED AND METHODS USED

Using information from project area habitat conditions, species habitat requirements, and species distributions and limiting factors, the entire 2001 Cherokee National Forest TES list was reviewed along with the species habitat list to determine if any TES species were likely to occur in or near the project area. The TES Database Maps (both State Natural Heritage and Cherokee's GIS) were examined to locate any records of TES species present in the project area.

Snail, salamander, bat, botanical and butterfly surveys were completed in 2007. Botanical resources in relation to burning were also assessed by Pistrang (2005). Forest-wide surveys used for this analysis include bat surveys (Cochran et al. 1999, Cochran et al. 2000, Copperhead Environmental Consulting 2007, Sewell et al. 2006, Harvey et al. 1991, Kiser and Kiser 1999, Leftwich et al. 2007, Libby 2004, Libby 2005, 3-D International 1998), small mammal surveys (Harvey et al. 1991), snail surveys (Brian Cole unpublished data, Cherokee National Forest snail survey database, Copperhead Environmental Consulting 2007, Gumbert et al. 2006, Leftwich et al. 2007), and bird surveys (Bartlett and Buehler 1994, Buehler and Bartlett 1995, Buehler and Klaus 1996, Buehler and Klaus 1997, Buehler and Klaus 1998, R8 Bird, and ongoing surveys).

Attachment A is the Project Review Form for BE's. Each species was evaluated and given a Project Review Code (PRC) on the Form based on the Project Review Code List (Attachment B). Species known from the area are *Collinsonia verticillata, Monotropsis odorata, Platanthera integrilabia, Thermopsis fraxinifolia, Ichthyomyzon greeleyi*, *Percina burtoni*, *Phoxinus tennesseensis*, *Epioblasma florentina walkeri* and *Villosa trabalis*. There is an historical record of *Villosa* trabalis downstream of the analysis area in Hiwassee River, however this species has not been found in the area since 1918. The plants are not within any anticipated impact site other then burning. If projects causing ground disturbance occur near the plant species, they will be protected from impacts of the proposed action. Some species were not found during surveys but habitat is available within the burn areas. Thus they were given a review code of 4a (see Attachment A) and analyzed. *Cheumatopsyche helma, Gomphus consanguis, Gomphus viridifrons, Macromia margarita*, *Ophiogomphus incurvatus alleghaniensis*, *Ophiogomphus edmundo* and *Ophiogomphus incurvatus* are possible in or near the project area. These and the five aquatic species listed above would be protected by the riparian mitigation and thus there would be no effects to them. The *Platanthera integrilabia* population is excluded from the burn unit and thus there would be no effects. These species are not further evaluated here.

Table 6 lists the species requiring further analysis and a determination of effects based on the analysis in the Project Review Form.

Table 6. Species Requiring Further Analysis

Scientific Name	Common Name
Insects	
Speyeria diana	Diana fritillary
Mammals	
Corynorhinus rafinesquii	Rafinesque's big-eared bat
Myotis leibii	Eastern small-footed bat
Myotis sodalis	Indiana bat
Snails	
Paravitrea placentula	Glossy supercoil
Patera archeri	Ocoee covert
Vertigo bollesiana	Delicate vertigo
Vertigo clappi	Cupped vertigo
Non-vascular Plants	
Ditrichum ambiguum	A moss
Homaliadelphus sharpii	A moss
Vascular Plants	
Aster georgianus	Georgia aster
Berberis canadensis	American barberry
Botrychium jenmanii	dixie grapefern
Buckleya distichophylla	piratebush
Collinsonia verticillata	whorled horsebalm
Delphinium exaltatum	tall larkspur
Diervilla rivularis	riverbank bush-honeysuckle
Fothergilla major	large witchalder
Gentiana austromontana	Appalachian gentian
Isotria medeoloides	small whorled pogonia
Lysimachia fraseri	Fraser's yellow loosestrife
Monotropsis odorata	sweet pinesap
Penstemon smallii	Small's beardtongue
Pycnanthemum beadlei	Beadle's mountain mint
Thaspium pinnatifidum	cutleaved meadow parsnip
Thermopsis mollis var. fraxinifolia	ashleaf goldenbanner
Tsuga caroliniana	Carolina hemlock

HABITAT RELATIONSHIPS

This section of the BE describes relationships between species and their habitats. Species do not occur at random, but are related to specific habitat types.

Speyaria diana Diana fritillary

The original range of this species was possibly as far north as western Pennsylvania; presently it ranges to the Virginias. To the west, its range was formerly mostly through the Ohio Valley to Illinois, and south to northern Louisiana and north Georgia, though distribution has been somewhat spotty. Diana fritillary is currently very rare outside of Appalachia. This species has

been found recently primarily in the mountains from central Virginia and West Virginia through the western Carolinas and eastern Tennessee into extreme northern Georgia and adjacent Alabama (NatureServe 2001). Habitat for this species includes glades and other open areas within rich, moist mountain forests (Glassberg 1999). The Diana fritillary routinely lays eggs near violets, the larvae's host food. The caterpillars hatch, hibernate over the winter as pupae, and then crawl to nearby violets in the springtime (P. Lambdin personal communication). Adults are present from late June to September with males emerging before females. One brood is produced per year. The adult's food consists of dung and flower nectar from plants including common and swamp milkweeds, ironweed, red clover, and butterflybush (Butterflies and Moths of North America http://www.butterfliesandmoths.org/ accessed 2006).

***Corynorhinus rafinesquii* Rafinesque's big-eared bat**
This species ranges widely over the southern states from Virginia, West Virginia, Ohio, Indiana, and Illinois south to the Gulf of Mexico; west to Louisiana, Oklahoma, and eastern Texas. It inhabits forested regions. Hibernation in the north and in mountainous regions most often occurs in caves or similar sites; small caves are selected, and the bats stay near the entrance (often within 30 m) and are thought to move about in winter. Winter habitat in the south is poorly known. Summer roosts often are in hollow trees, occasionally under loose bark, or in abandoned buildings in or near wooded areas, instead of being restricted to caves (NatureServe 2001).

***Myotis leibii* Eastern small-footed bat**
This species is found in rocky mountainous areas from Quebec southwest along the Southern Appalachians to northern Georgia, and west to Oklahoma. Abundance is extremely difficult to assess, and populations and occurrences are relatively scattered and small throughout its range. Several bachelor colonies and two maternity colonies have been observed in bridges, mines and rock crevices during the period 2000-2003 (G. Libby, Personal communication). Summer roosts include rock outcrops and cliffs, rock faults and crevices, bridge expansion joints, and abandoned mines and buildings. Rocky areas or bridges with sun exposure in a forested landscape may be important maternity site features. These bats hibernate singly or in small groups in caves, mines and buildings and are often found under talus and rocks on cave floors or wedged into cracks and crevices. Known threats include direct human disturbance of roosts, and landscape changes that alter habitat parameters of roosts or hibernacula. Snag retention is important.

***Myotis sodalis* Indiana bat**
The distribution of Indiana bats is generally associated with limestone caves in the eastern U.S. Within this range, the bats occupy two distinct types of habitat. During summer months, maternity colonies roost under sloughing bark of dead and partially-dead trees of many species, often in forested settings (Callahan et al. 1997). Reproductive females require multiple alternate roost trees to fulfill summer habitat needs. Adults forage on winged insects within three miles of the occupied maternity roost. Swarming of both males and females and subsequent mating activity occurs at cave entrances prior to hibernation. During this autumn period, bats roost under sloughing bark and in cracks of dead, partially-dead and live trees.

***Paravitrea placentula* glossy supercoil**
The range of this species is Tennessee, North Carolina, Virginia, and Kentucky. Its habitat is under leaf litter on wooded hillsides and ravines (NatureServe 2005).

***Patera archeri* Ocoee covert**
This snail has been found in Polk County in leaf litter under rock ledges in ravines (NatureServe 2005).

***Vertigo bollesiana* delicate vertigo**
This species is found in leaf litter on wooded hillsides and marshes (Hubricht 1985). The range of delicate vertigo is scattered from Maine west to Minnesota, and south to Tennessee and North Carolina (NatureServe 2004). Two records of delicate vertigo on the CNF occur in Monroe County and one record in Johnson County.

***Vertigo clappi clappi* cupped vertigo**
This snail is found on steep, often north facing slopes with mixed woodlands, boulders and rock outcrops (Cole unpublished data). Its range includes Kentucky, Tennessee, Virginia, and West Virginia (NatureServe 2005). There are 5 known occurrences on the Cherokee in Monroe County.

***Ditrichum ambiguum* a moss**
Ditrichum ambiguum is a moss species that is known from scattered locations in eastern North America, through Canada to California and disjunct to India. In the east, the species is known to occur on bare soil of moist banks of roads or streams in wooded, upland, or montane habitats (Crum and Anderson 1981). This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Homaliadelphus sharpii* Sharp's homaliadelphus**
Homaliadelphus sharpii is currently known from only three counties in Tennessee and one county each from Missouri, North Carolina, and Virginia. It is also known from Mexico, Japan, and Vietnam (Crum and Anderson 1981) In Tennessee, the known sites are in the Ridge and Valley physiographic province; however, it is also known to occur in the Blue Ridge Mountains in North Carolina. Habitat is described as vertical surfaces and ledges of calcareous cliffs and boulders. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Aster georgianus* Georgia aster**
This species is known to occur from central North Carolina, south to central Georgia and Alabama. Disjunct populations occur in Florida. This species is not currently known to occur on the Cherokee National Forest, but is possible in southeastern Tennessee. Habitats are described as dry, rocky, open woods and roadsides in areas that probably had a previous history of periodic fire. This species is considered to be associated with historic post oak and blackjack oak woodlands (Weakley 2004). NatureServe (2005) states that there are approximately 60 known extant populations for this species, most of which are small, consisting of stands of only 10-100 stems. "Many populations are vulnerable to accidental destruction from road maintenance activities such as herbicide application, and from road expansion. Other populations are threatened by residential development and/or encroachment of invasive exotic plants. This species has also suffered from fire suppression" (NatureServe 2005). This plant was not found

during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Berberis canadensis* American barberry**
American barberry ranges from Pennsylvania south to Alabama and Georgia and west as far as Missouri. Considered rare south of Virginia, this species is a broad southern Appalachian Ozarkian endemic. American barberry is generally known from open rocky woods, openings, and streambanks, usually over mafic or calcareous rock. (Weakley 2004). NatureServe (2005) states that "*Berberis canadensis* occurs in open woods, on bluffs and cliffs and along river banks in the eastern and central United States. Formerly an inhabitant of savannas and open woodlands, fire suppression has significantly restricted its habitat to sites with shallow soil (such as glades and cliffs) or areas with mowing or other canopy-clearing activities (such as powerline corridors, railroad/road right-of-ways and riverbanks). *Berberis canadensis* is found in 19 mountain counties in southwest Virginia. Occupied habitat includes dry, open woodlands over limestone, dolomite, richer sandstone or shale substrates, rocky and cliffy areas and open areas and glades with naturally thin soil. In Georgia, occupied habitat is described as dry, hard soil on upper, west-facing slopes and dry, rocky woods." (NatureServe 2005). No locations for this plant are currently recorded for the Cherokee National Forest. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Botrychium jenmanii* dixie grapefern**
This plant ranges from Virginia south to Florida through Tennessee, Alabama, and Louisiana. Like most other *Botrychiums*, specific habitat is difficult to categorize, and may include dry to moist forests and disturbed areas. NatureServe (2005) states that this species is moderately widespread across the southeast. It occurs in a variety of habitats including hardwoods, pine woods, open grassy places, and disturbed areas and is rare across most of its range. No locations for this plant are currently recorded for the Cherokee National Forest. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Buckleya distichophylla* piratebush**
This is a southern Appalachian endemic that occurs on open, dry, rocky bluffs. Piratebush is only known to occur at a few, widely scattered locations in the mountains of southern Virginia, western North Carolina, and northeastern Tennessee (Weakley 2004). There are currently 14 known sites for this species on the Cherokee National Forest. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Collinsonia verticillata* whorled horsebalm**
Collinsonia verticillata has a rather fragmented range, known from southeastern Virginia to east Tennessee, south to western North Carolina, northwest South Carolina, central Georgia, and Mississippi. Disjunct populations have also been reported in Ohio. The species is known to occur in rich forests ranging from moist coves to rather dry oak forests over mafic or calcareous rock. (Weakley 2004). This species was found at four locations during the botanical surveys, two within close proximity of each other within stand 122/11, and two more associated with day-

lighting along the Hogback Ridge linear wildlife opening. *Collinsonia verticillata* was not known from the Forest at the time the forest plan was revised, thus was not assessed in the forest wide viability analysis (Cherokee National Forest 2004c). Since that time approximately 10 locations have been documented on the Forest though at the time of this writing they have not yet been added to the State Natural Heritage database.

***Delphinium exaltatum* tall larkspur**
This larkspur is known to occur primarily west of the Blue Ridge Mountains from southwest Pennsylvania and Ohio, to Missouri, then east to eastern Tennessee, the mountains of southern Virginia, and the mountains and Piedmont of North Carolina. The species occurs in dry to moist habitats over calcareous or mafic rock, usually in full or partial sun, often on forest edges or within grassy balds (Weakley 2004). NatureServe (2005) states that this species' habitats include rich woods (and edges of woods), rocky slopes, semi-open woodlands, glades and prairie openings. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Diervilla rivularis* riverbank bush-honeysuckle**
Riverbank bush-honeysuckle is a southern Appalachian endemic, currently known to occur in Tennessee, Georgia, Alabama, and North Carolina. This species usually occurs on bluffs, rock outcrops, or riverbanks, from moderate to high elevations. (Weakley 2004), but is also found in our area along the Ocoee River at approximately 1,000' elevation. There are currently 12 known sites for this species on the Cherokee National Forest. This plant was found during previous surveys of the area. None were found during botanical surveys of stands prescribed for vegetation management involving ground disturbance. However, two records exist for areas along roadsides. Habitat is also available in the burn areas and thus it will be analyzed in this document.

***Fothergilla major* large witchalder**
This species ranges from Arkansas east to Tennessee, Alabama, Georgia, and the Carolinas. It is typically found in dry, ridgetop forests of moderate elevations especially along the Blue Ridge escarpment (Weakley 2004). There are currently four known occurrences of this species on the Cherokee National Forest. The effects of fire on this species are not known (TN Dept. of Ag. 1994) however, the location of populations, on dry ridgetops, suggest some natural fire effects. The related species, *Fothergilla gardeni*, is adapted to fire maintained communities in the Coastal Plain and Piedmont (Kral 1983). This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Gentiana austromontana* Appalachian gentian**
This is a southern Appalachian endemic known from West Virginia and Virginia, south to the mountains of North Carolina and Tennessee. Plants are typically found at high elevations in open forests, or grassy balds (Weakley 2004). There are currently 70 known locations on the Cherokee National Forest, many of which occur along forest roads and trails. This is a species of forest openings and edges and is likely suppressed under a closed canopy. This plant was not

found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Isotria medeoloides* small whorled pogonia**
Small whorled pogonia is a federally Threatened species that has an historic range that includes most of the eastern United States, however, it is extremely rare throughout its range. According to NatureServe (2005) this is "a widely distributed species with one hundred four extant sites known, sixty-six centered around the Appalachian Mountains of New England and coastal Massachusetts, eighteen centered around the southern Appalachians, thirteen in the Coastal Plain and Piedmont of Virginia, Delaware, and New Jersey, and seven widely scattered outlying sites, including one in Ontario, Canada which was last seen in 1987. Populations are typically very small and the total number of individuals is estimated to be less than 3000." This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Lysimachia fraseri* Fraser's yellow loosestrife**
This species is a regional endemic, occurring in eastern Tennessee, the Carolinas, Alabama, and Georgia with disjunct populations in southern Illinois and northwestern Tennessee. The species is known from hardwood forests, forest edges, roadbanks, and thin soils near rock outcrops. Flowering seems dependent upon treefall gaps or other openings in the canopy (Weakley 2004), and also from wet areas such as alluvial meadows, moist stream and river banks, flats along streams, moist pastures, and roadside ditches (NatureServe 2007) *Lysimachia fraseri* is largely a disturbance adapted plant, often occurring in areas where a disturbance regime, such as periodic fire or flood, creates and maintains favorable habitat. Flowering seems dependent upon treefall gaps or other openings in the canopy and the greatest threats to populations in general are shading and competition from successional growth (NatureServe 2007). The species is previously known from ten locations on the Forest (F2). This plant was found during previous surveys of the area. None were found during botanical surveys of stands prescribed for vegetation management involving ground disturbance. However, records exist for areas along roadsides and floodplains. Habitat is also available in the burn areas and thus it will be analyzed in this document.

The forest wide viability analysis (Cherokee National Forest 2004c) indicates high to moderate risk levels for this species depending upon the associated habitat. Previously known locations of this species fall under the following mapped prescription allocations: Administrative Sites, Scenic Byway Corridors, and Dispersed Recreation Areas

***Monotropsis odorata* sweet pinesap**
Monotropsis odorata has a range from Maryland and West Virginia south to Georgia and Alabama, though it seems to be centered in the Appalachians (Weakley 2004). It typically inhabits dry to mesic pine and mixed pine-hardwood woodlands. The species is micotrophic (deriving it's nutrition from another vascular plant via fungal hyphae) thus the distribution of this species may be tied, in part, to the distribution of particular fungi species and other vascular plants. Where found, populations often occupy only a few square meters, thus only a tiny fraction of available habitat is utilized. Although it has a wide distribution and fairly non-specific habitat requirements, it remains an extremely rare plant throughout its range. There are

currently ten known sites for this species on the Cherokee National Forest. Effects from fire are generally undescribed in the literature, however this author has observed vigorous colonies of this plant growing in recently burned areas and it is noted that this species grows in habitats in which fire plays a role (TN Dept. of Ag. 1994). This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Penstemon smallii* Small's beardtongue**
This species is a southern Appalachian endemic that occurs in woodlands, cliffs, glades, and roadsides from northwest North Carolina and northeast Tennessee, south to northwest South Carolina and northern Georgia (Weakley 2004). There are currently no records of this species on the Cherokee National Forest. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Pycnanthemum beadlei* Beadle's mountain mint**
Beadle's mountain mint is a southern Appalachian endemic that is known to occur in forests and woodland borders from southwest Virginia south through east Tennessee to southwest North Carolina and northwest South Carolina. There are currently no documented sites for this species on the Cherokee National Forest though there is a report (James T. Donaldson personal communication 2000) that this species occurs in Carter County, Tennessee. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Thaspium pinnatifidum* cutleaved meadow parsnip**
This species is known from Kentucky and Ohio, south to western North Carolina, eastern Tennessee and northern Alabama where it occurs in forests and woodlands over calcareous rock (Weakley 2004). There is currently one documented site for this species on the Cherokee National Forest. This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

***Thermopsis mollis var. fraxinifolia* ashleaf goldenbanner**
Thermopsis fraxinifolia is a southern Appalachian endemic that is known from North Carolina and Tennessee, south to northern portions of Georgia and South Carolina. Habitat includes forest openings in dry woodlands and along ridges. Many of the locations on the Cherokee National Forest are associated with roads and trails. There are currently 34 known sites for this species on the Cherokee National Forest with several other locations recently reported from the Hogback project area. This plant was not found during previous surveys of the area. However, habitat is available in the burn areas and thus it will be analyzed in this document.

The forest wide viability analysis (Cherokee National Forest 2004c) indicates moderate risk levels for this species. Previously known locations of this species fall under the following mapped prescription allocations: Designated Wilderness; Recommended Wilderness Study Areas; Scenic Areas; Dispersed Recreation Areas; Black Bear Habitat Management; Management, Maintenance, and Restoration of Plant Associations to Their Ecological Potential; and Remote Backcountry Recreation, Few Open Roads

***Tsuga caroliniana* Carolina hemlock**
This southern Appalachian endemic is known from over 50 locations on the Forest and ranges from Virginia, south through Tennessee and North Carolina, to northern portions of Georgia and South Carolina. This tree occurs on ridge tops, rocky bluffs, and open forests, generally on drier, rockier sites than Tsuga canadensis, though the two species have been found intermixed in humid gorges (Weakley 2004). This plant was not found during botanical surveys of stands prescribed for vegetation management, however habitat is available in the burn areas and thus it will be analyzed in this document.

EFFECTS

Direct and Indirect Effects

Alternative 1: No action
With the no action alternative, the forest would continue to age with natural succession occurring. Trees would die, fall from the canopy and leave more debris and logs on the ground. Canopy gaps would become more common, followed by successional growth of maples, black gum, white pine, and sourwood. In the short-term, this may create grassy habitat utilized by *Speyaria diana*. Plant species that are less shade tolerant may benefit from the canopy gaps.

In areas of the forest in early to mid successional stages, plants that benefit from increased sunlight on the ground may lose vigor as the forest ages and canopies close. These species include *Aster georgianus, Berberis canadensis, Botrychium jenmanii, Delphinium exaltatum, Penstemon smallii,* and *Pycnanthemum beadlei*. The decrease in sunlight may benefit other plants, including most of the mosses and liverworts. Other TES species will not be impacted.

Alternative 2:
The effects from 13 different activities associated with the proposed action will be analyzed for impacts to the above listed species. These are the effects of the ground disturbance created during the timber removal, planting, trail construction, parking area construction, prescribed burning from August 15-May 1, maintenance of wildlife openings, herbicide use, seeding, creation of ephemeral pools, and road construction and reconstruction.

Speyaria diana
If any butterfly caterpillars are present during ground disturbing activities, those individuals would likely be destroyed. Prescribed burning may increase habitat, especially in the woodland restoration areas, by increasing grassy areas favored by the butterflies. Given this species preference for moist habitats which would be less likely to be impacted and the short-term disturbance, few individuals would be directly negatively affected by the burning. Maintenance of wildlife openings and seeding burned areas would benefit the species by providing grassy openings. Herbicide use in the transmission line to establish a more native community would benefit the butterfly by increasing native plants, especially native plants that are host food to caterpillars. The other proposed actions would not affect the species. The project is not likely to cause a trend to federal listing or a loss of viability.

Corynorhinus rafinesquii* and *Myotis leibii
Suitable roosting and foraging habitat occurs within the affected areas for Rafinesque's big-eared bat and suitable foraging habitat occurs within the affected areas for Eastern small-footed bat. No suitable hibernacula (caves, mines, old buildings) are known to occur within or near the areas. If any bats are in the areas during ground disturbance, individuals utilizing snags may be dislodged. This would result in movement from the area, but mortality is not likely. Indirect effects would include potential changes in forage availability and snag availability due to canopy removal. However, the RLRMP standards aimed at protecting Indiana bat including provisions for snag retention (FW-34) and prescribed burning (FW-36) would also benefit these species. Herbicide use, planting, and maintenance of wildlife openings would not affect the bats. Creation of ephemeral pools would benefit the bats by providing water sources. Long-term population changes are not expected due to the small impact area and scale of the projects. Suitable habitat would remain around the affected areas. The project is not likely to cause a trend to federal listing or a loss of viability.

Myotis sodalis
Suitable roosting and foraging habitat occurs within the affected areas for Indiana bat. No suitable hibernacula (caves, mines, old buildings) or summer roost sites are known to occur within or near the areas. If any bats are in the areas during ground disturbance, individuals utilizing snags may be dislodged. This would result in movement from the area, but mortality is not likely. Indirect effects would include potential changes in forage availability and snag availability due to canopy removal. However, the RLRMP established standards aimed at protecting Indiana bat including provisions for snag retention (FW-34) and prescribed burning (FW-36). Herbicide use, planting, and maintenance of wildlife openings would not affect the bats. Creation of ephemeral pools would benefit the bats by providing water sources. Long-term population changes are not expected due to the small impact area and scale of the projects. Suitable habitat would remain within and around the affected areas.

The proposed action is consistent with the Cherokee National Forest Revised Land and Resource Management Plan (2004). Alternative B is not likely to adversely affect the *Myotis sodalis*, because the project is consistent with the protective measures for Indiana bat set forth in the RLRMP. The USFWS concurs with this finding (2008).

Snails
Areas of suitable habitat for the Ocoee covert, glossy supercoil, delicate vertigo and cupped vertigo may occur within the affected areas though none were found during surveys. Because these species occur within leaf litter, some individual losses could occur as a result of any ground disturbance. Where burning takes place, habitat conditions would be altered as available leaf litter is reduced. Protective cover would be lost making individuals more susceptible to predation resulting in movements to more favorable habitat (unburned areas). Not all suitable habitat would be impacted within an area. The prescribed burn should not impact moist ravines, coves, springs and seepage areas, and rock outcrops. Individuals at these sites would not be impacted, allowing populations to persist in the area. Any impacts from the burns should be short-term and habitat suitability would increase towards previous levels as leaf litter accumulates over time. Herbicide use, planting, and maintenance of wildlife openings would not affect the snails.

Plants

Non-vascular plants: ***Ditrichum ambiguum, Homaliadelphus sharpii***
These species were not found during botanical surveys. *Ditrichum ambiguum* and *Homaliadelphus sharpii* are mosses that have been included in this analysis based upon their published habitat descriptions which are sufficiently vague to possibly include the areas considered for prescribed burning. If present within prescribed burn areas, these species would be found associated either with mesic microsites or rock outcrops within the more xeric habitats. These areas are not likely to burn. Some individuals may be impacted, but affects would be minimal. The use of prescribed fire will not negatively impact rare plant populations that naturally occur on these sites. The use of prescribed fire during the growing season is designed to restore these plant communities to a more natural species assemblage, and will likely have a long-term beneficial effect on rare plant species and other organisms that are associated with xeric woodlands.

Vascular plants:

Collinsonia verticillata
Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the planning area will be protected. Since the newly found occurrences of *Collinsonia verticillata* represent some of the first known populations of this species on the Forest, protection of the site is warranted. A no-cut zone surrounding the populations will be designated on the cutting cards for unit 122/11 and the Hogback Ridge day-lighting with directional felling and skidding away from the populations.

Potential effects to *Collinsonia verticillata* from harvest activities within unit 122/11 and the Hogback Ridge day-lighting would be minimized with the implementation of the mitigation described above. It is possible that some outlying individuals could be damaged during harvest activities but expected that the population would persist after project completion. Proposed fuel reduction burns would be implemented during the dormant season and thus would have very limited effects to *Collinsonia verticillata* if it were present in the burn area. Herbicides will be used to control specific populations of invasive plant species within this alternative. Herbicides may also be used for timber stand improvement in the form of individual tree release. No herbicides will be used in the vicinity of the known populations of *Collinsonia verticillata*. The intent of treating invasive plant populations is to increase the probability that native species will occupy those habitats. Areas treated may provide potential habitat for *Collinsonia verticillata* in the future. Based upon the above information, the implementation of alternative 2 may affect individuals but will not lead toward a trend to federal listing or a loss of viability for the species.

Aster georgianus, ***Berberis canadensis***, ***Botrychium jenmanii***, ***Buckleya distichophylla***, ***Delphinium exaltatum Diervilla rivularis***, ***Fothergilla major, Gentiana austromontana***, ***Isotria medeoloides***, ***Lysimachia fraseri***, ***Monotropsis odorata, Penstemon smallii***, ***Pycnanthemum beadlei***, ***Thaspium pinnatifidum, Thermopsis mollis var. fraxinifolia*** and ***Tsuga caroliniana***
These plants are evaluated here for effects of prescribed burning. Six of the plant species evaluated (*Aster georgianus, Berberis canadensis, Diervilla rivularis, Gentiana austromontana, Lysimachia fraseri*, and *Thaspium pinnatifidum*) respond favorably to fire in their habitat as documented in current literature. Seven more species (*Buckleya distichophylla, Tsuga*

caroliniana, Delphinium exaltatum, Fothergilla major, Isotria medeoloides, Monotropsis odorata, and *Thermopsis mollis* var. *fraxinifolia*) have at least anecdotal information in the literature or observations that would suggest a favorable or neutral response. The remaining species either have vague habitat descriptions and were thus considered in this analysis as a means of being thorough (*Botrychium jenmanii,* and *Pycnanthemum beadlei*) or occur in xeric habitats (*Penstemon smallii*) but no information on the effects of fire on the species could be found.

Proposed fire lines generally tie into existing roads or other natural fire breaks (riparian area), and do not impact habitats for the non-vascular species. The proposed burns would likely be dormant season burns that are designed to consume small fuels, but not affect large down wood or mature trees. These fires generally will not carry through moist habitats or areas without adequate small fuels. Some burns may take place during the growing season, especially in site preparation burns or in areas designated as woodland restoration areas. Habitats for the non-vascular and the vascular species that occupy moist habitats including seeps, streams, moist rock, rotten wood, and humid areas may occur within a large burn block but would not be affected by the burns. Similarly, the timing and intensity of the fires would protect vascular plant species and their habitats from negative effects.

The use of prescribed fire during the growing season is designed to restore these plant communities to a more natural species assemblage, and will likely have a long-term beneficial effect on rare plant species and other organisms that are associated with xeric woodlands. Some individuals could be damaged, but roots should remain intact. Dormant season burning would not affect the plants.

Cumulative Effects

Cumulative effects analysis is based on the activities in Table 7 in addition to the proposed action.

Table 7. Past, Present, and Reasonably Foreseeable Activities in the Spring Creek Project Area

Past	Present	Reasonably Foreseeable
Timber salvage from pine beetle damage		Hopper Branch Timber Sale 2010
	Impacts from Hemlock Wooly Adelgid	Impacts from Hemlock Wooly Adelgid
Impacts from Southern Pine Beetle	Restoration of areas impacted from Southern Pine Beetle	Restoration of areas impacted from Southern Pine Beetle
Recreational Uses: Dispersed hunting/fishing, c campsites, hiking, horseback riding, shooting range,	Recreational Uses: Dispersed hunting/fishing, campsites, hiking, horseback riding, shooting range,	Recreational Uses: Dispersed hunting/fishing, campsites, hiking, horseback riding, shooting range,
Private land current development, mostly farmland pasture not row crops	Private land current development, mostly farmland pasture not row crops	Private land current development, mostly farmland pasture not row crops
Utility ROW's /electronic sites	Utility ROW's electronic sites	Utility ROW's electronic sites
Prescribed Burns		Prescribed Burns

Past	Present	Reasonably Foreseeable
Wild Fires	Wild Fires	Wild Fires
	Noxious Weeds Treatments	Noxious Weeds Treatments
		Road maintenance from stimulus package
Gee Creek Wilderness Area	Gee Creek Wilderness Area	Gee Creek Wilderness Area
Bullet Creek Botanical Area	Bullet Creek Botanical Area	Bullet Creek Botanical Area

Alternative 1: No action
There would be no cumulative effects by non-action.

Alternative 2:
***Speyaria diana*, Snails, Bats**
Given the short term impacts, dispersed locations, and small impacted area of the past, present, and reasonably foreseeable activities in the Spring Creek project area no cumulative impacts are expected. Any areas impacted by hemlock wooly adelgid are not likely to be in the same areas as the activities of the proposed actions.

Plants
Plants would incur no cumulative effect from the proposed action and past, present, and reasonably foreseeable activities. The activities are short term, in widely dispersed locations, and/or have a small impact area. Impacts from hemlock wooly adelgid are unknown at this time, however effects are not imminent. Any areas impacted by hemlock wooly adelgid are not likely to be in the same areas as the activities of the proposed actions. In addition, Eastern hemlock is to be retained according to Forestwide Standard 60, thus retaining the community in this proposal.

Collinsonia verticillata is only recently known from the Cherokee National Forest. Four new locations were found for this species during the botanical surveys. These sites will be protected through the use of a no-cut buffer around the populations. This species will continue to have viable populations on the Cherokee National Forest and no negative cumulative effects are expected.

DETERMINATIONS OF EFFECT
Table 8 summarizes the determinations of effect for each species.

Table 8. Determinations of Effect

Scientific Name	Determination of Effect-Alternative 1	Determination of Effect-Alternative 2
Plethodon aureolus	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Plethodon teyahalee	No effect. No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Speyeria diana	No effect: No activities would occur; no habitat would be	May impact individuals, but not likely to

	affected.	cause a trend to federal listing or a loss of viability. Negative effects short term.
Corynorhinus rafinesquii	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Myotis leibii	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Myotis sodalis	No effect: No activities would occur; no habitat would be affected.	Alternative 2 is not likely to adversely affect the *Myotis sodalis*. The proposed action is consistent with the Cherokee National Forest RLRMP.
Paravitrea placentula	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Patera archeri	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Vertigo bollesiana	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Vertigo clappi	No effect: No activities would occur; no habitat would be affected.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Ditrichum ambiguum	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Homaliadelphus sharpii	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Aster georgianus	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Berberis canadensis	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Botrychium jenmanii	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Buckleya distichophylla	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.
Collinsonia verticillata	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Delphinium exaltatum	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Diervilla rivularis	No effect: No activities would occur; no habitat would be affected	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Fothergilla major	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.

Gentiana austromontana	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Isotria medeoloides	No effect: No activities would occur; no habitat would be affected.	Not likely to adversely effect (pers. comm. Jim Widlak 4/25/05)
Lysimachia fraseri	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Monotropsis odorata	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Benefit from opening understory, negative impacts are short term.
Penstemon smallii	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Pycnanthemum beadlei	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term.
Thaspium pinnatifidum	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term beneficial.
Thermopsis mollis var. fraxinifolia	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability.
Tsuga caroliniana	No effect: No activities would occur; no habitat would be affected.	May impact individuals but not likely to cause a trend toward federal listing or loss of viability. Negative impacts are short-term. Long-term probably beneficial.

Alternatives 1 and 2 will have no direct, indirect or cumulative effects on the Endangered *Myotis grisescens.* Alternative 1 will have no direct, indirect or cumulative effects on the Endangered *Isotria medeoloides*, or *Myotis sodalis.* Alternative 2 is not likely to adversely affect the *Isotria medeoloides* or *Myotis sodalis.* The USDI, Fish and Wildlife Service concurs with these findings.

The implementation of the proposed activities may affect individuals of Sensitive species, however, this would not likely lead to a loss in rangewide viability or trend toward federal listing. No other Threatened, Endangered or Proposed species that occur on the Cherokee National Forest will be affected. Formal consultation with the USDI, Fish and Wildlife Service is not required.

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/s/ Mary Dodson 9/30/2009
MARY M. DODSON Date
South Zone Wildlife Biologist

Attachment A
CHEROKEE NATIONAL FOREST
Threatened, Endangered and Sensitive Species 2001 List
Revised 5/14/2009 by jah

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
Amphibians							
1a	Desmognathus carolinensis	Carolina Mountain Dusky Salamander	NC & TN; Doe River Valley SW to Pigeon River Valley	Common in Carter, Unicoi, Greene, Cocke, Washington Counties	Seeps, springs, headwater streams, wet rock faces at lower elevations; more terrestrial at higher elevations; v. common in spruce/fir & northern hardwood forests; 900-6600 ft	S	G4
1a	Desmognathus santeetlah	Santeetlah dusky salamander	NC & TN; Unicoi, Great Smoky, &Great Balsam Mtns. Monroe to Cocke Co.	4 records; Monroe Co. & SW Cocke Co.	Mid-high elevation seeps, stream headwaters, rock faces; 640-1805 m, primarily > 3200 ft	S	G3QG4Q
1a	Eurycea junaluska	Junaluska salamander	W NC & SW TN; Sevier Co. & Monroe Co., TN	8 Monroe Co. records Tellico, Bald & North Rivers, Citico & Slickrock Creeks; potentially Hiwassee River drainage; total 17 streams rangewide	Large streams with sand-gravel substrate, large rocks & adjacent riparian forests. Low elevation, 1100-2000 ft.	S	G3
6a	Plethodon aureolus	Tellico salamander	Unicoi Mtns & adjacent valleys of TN and NC, between Little TN & Hiwassee Rivers	1 Monroe Co. record; also in Polk Co.	Hardwood and pine-hardwood forest; terrestrial breeder in leaf litter humus/rotting logs	S	G2G3
6a	Plethodon teyahalee	Southern Appalachian salamander	TN, NC, SC, GA; W of French Broad in Cocke Co. to Unicoi Mtns in Polk & Monroe Co.	Polk, Monroe, Cocke Cos.	Deciduous, mesic forest; terrestrial breeders (underground); <5000 ft.	S	G2G3
1a	Plethodon welleri	Weller's salamander	SW VA to NE TN & NW NC; Johnson, Carter & Unicoi Co.	11 TDEC records; Johnson, Carter, Unicoi Cos.	Spruce-fir, birch-hemlock and other mesic, rocky forests; boulderfields; grassy open areas; terrestrial breeder-moss mats & rotting logs; > 2200 ft.	S	G3
Arachnids							
1a	Microhexura montivaga	Spruce-fir moss spider	Mountains of NC, TN	3 TDEC records; Roan Mtn.; Carter Co.	Moss and liverwort mats on rocks/boulders in mature spruce-fir forest > 5400 ft.	E	G1
Birds							
1a	Falco peregrinus	Peregrine Falcon	US and CAN	2 TDEC records; hacking Big Bald 1987-89. Carter, Greene, Unicoi Cos.	Nests at ledges of vertical rocky cliffs. Feeds in fields, lakeshores, and river mouths.	S	G4
1a	Haliaeetus leucocephalus	Bald eagle	US and CAN	2 TDEC records; active nest at Parksville Lake 2006-7; hacking S. Holston Lake 1991-94; other recent nests Tellico Lake. Carter, Johnson, Unicoi, Sullivan, Monroe Washington, Polk Cos.	Nests in large "supercanopy" trees along lake & river shores. Prefers roosts in conifers & protected areas along open water in winter.	S	G5
1a	Lanius ludovicianus migrans	Migrant loggerhead shrike	ME to MN south, from GA to AR; OK, TX; CAN: PE to MB	O TDEC records; occurs thruout E. Tennessee; Greene Co. near Forest	Low elevation crop & grasslands and old fields with scattered trees, shrubs, posts	S	G5T3Q
Fish							
1a	Cottus baileyi	Black sculpin	SH	20 occ. in tribs to Beaverdam and Laurel Crks,	Cool and cold water rivers and streams to headwater springs. Rare in Streams over 15m wide. Utilize riffles,runs, and pools with gravel, stone, and boulder substrates. Mod. To high gradient.	S	G4Q
1a	Cyprinella caerulea	Blue shiner	C	5 occ Conasauga R #1 & #2; Jack's R; Sheeds Cr & Mooneyham Cr	Large streams, small to medium-sized rivers, moderate gradient, low elevation	T	G2
1a	Erimonax monachus	Spotfin chub	LT,FB,SH	1 occ Experimental pop. in Tellico R #1.	Large streams, moderate gradient, low elevation	T	G2
1a	Etheostoma acuticeps	Sharphead darter	N	1 occ. Nolichucky R.	Large creeks to medium rivers, moderate gradient, cool warm water	S	G2G3

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	Etheostoma brevirostrum	Holiday Darter	C	2 occ. Conasauga & Jack's Rivers	Large streams to medium rivers, moderate gradient, low elevation	S	G2
1a	Etheostoma sitikuense Formerly known as Etheostoma percnurum	Citico darter Formerly known as Duskytail darter	LT	2 occ Citico C r#1 & Experimental pop. in Tellico R #1.	Large creeks & small-med rivers 10-80 m wide; moderate gradient, warm	E	G1
1a	Etheostoma vulneratum	Wounded darter	LT, FB (extirpated)	2 occ Citico Cr #4 & Tellico R #1	Small to large rivers, low to moderate gradient, low to moderate elevations	S	G3
2a	Ichthyomyzon greeleyi	Mountain brook lamprey	H,O, LT, FB, N, W	3 occ. Hiwassee R . #4 & #5; Spring Cr.; poss in many other streams	Small streams to small upland rivers, moderate to high gradient	S	G4
1a	Noturus baileyi	Smoky madtom	LT	2 occ Citico Cr #1 & Experimental pop. in Tellico R #1.	Large streams, low gradient, low elevation.	E	G1
1a	Noturus flavipinnis	Yellowfin madtom	LT	2 occ Citico Cr #1 & Experimental pop. in Tellico R #1..	Large streams to large rivers, low gradient, low elevation	T	G1
1a	Percina antesella	Amber darter	C	0 occ	Large streams and small rivers, low gradient, low elevation	E	G1G2
2a	Percina burtoni	Blotchside logperch	H, SH (extirpated)	2 occ. Spring Cr. & Hiwassee R.	Large streams to small rivers, moderate gradient, low elevation	S	G2G3
1a	Percina jenkinsi	Conasauga logperch	C	2 occ Conasauga R #1 & Jack's R	Medium river, moderate gradient, low elevation	E	G1
1a	Percina palmaris	Bronze darter	C	3 occ Conasauga R #1 & #2; Jack's R	Small to medium rivers, moderate gradient, low elevation.	S	G4
1a	Percina squamata	Olive darter	H, FB, N, W	1 occ. Hiwassee R. #4;	Small to medium rivers, moderate to high gradient, moderate elevations	S	G3
1a	Percina tanasi	Snail darter	O, H, LT	2 occ Hiwassee R #1 & Citico Cr #1	Large streams to medium rivers, low to moderate gradient, low elevation.	T	G2G3
1a	Percina williamsi	Sickle darter	SH, W, FB	0 occ	Large streams to medium rivers, moderate gradient, low to moderate elevations.	S	G2
1a	Phenacobius crassilabrum	Fatlips minnow	P, FB, N, W, SH	2 occ Nolichucky R #1 & #3	Large streams to medium rivers, moderate to high gradient, moderate elevation	S	G4
2a	Phoxinus tennesseensis	Tennessee dace	O, H, LT, N, W, SH; Ridge & Valley of upper TN system in VA in TN	40 occ. O=13; H=15; LT=11; SH=1	1st order spring-fed streams (1-2 m wide) of R&V region & mountain fringes; low to moderate gradients, low to moderate elevation	S	G3
Insects							
2a	Cheumatopsyche helma	Helma's net-spinning caddisfly	Known from at least one occurrence in 8 states: NH, PA, WV, KY, NC, TN, AL, AR; most recently discovered in Arkansas and in Abrams Cr in the GSMNP, TN	1 occ. Big Lost Cr (Hiwassee)	Large streams, low gradient, low elevation	S	G1G3
1a	Dixioria fowleri	A millipede	VA, TN, Laurel Fork drainage in VA; Beaverdam Crk in TN	1 occ., Holston Mtn near Backbone Rock	Leaf litter, deciduous forests	S	G2
2a	Gomphus consanguis	Cherokee clubtail	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; 15 known occurrences	2 occ. (TDEC records); known from Polk and Sullivan Counties	Small, spring-fed streams, mod to high gradient	S	G3
2a	Gomphus viridifrons	Green-faced clubtail	Known from 16 states and 1 Canadian province with as many as 6 occurrences in some states; some populations are protected from habitat degradation	1 occ. Chestoa, Nolichucky R. 2001	Small-large rivers, moderate gradient	S	G4
2a	Macromia margarita	Mountain river cruiser	Known from at least one occurrence in 6 states: VA, NC, SC, TN, GA, AL; at least 13 occurrences; occurs in Blount Co., TN	0 records	Small streams to large rivers, rocky with silt deposits	S	G3

Attachment A
CHEROKEE NATIONAL FOREST
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Revised 5/14/2009 by jah

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	Megaleuctra williamsae	Smokies needlefly	Known from at least one occurrence in 4 states: VA, NC, SC, TN; at least 3 occurrences in VA; known from Mt. Rogers & GSMNP	0 occ.	Springs and seeps at high elevations (>4000 feet).	S	G2
2a	Ophiogomphus incurvatus alleghaniensis	Allegheny Snaketail	Known from at least one occurrence in 4 states: WV, VA, TN, AL; at least 5 occurrences in TN; considered a subspecies of O. incurvatus by some.	2 occ. Monroe, Polk Cos. (TDEC records)	Spring-fed Piedmont streams	S	G3T2T3
2a	Ophiogomphus edmundo	Edmund's snaketail	Known from at least one occurrence in 3 states: TN, NC, GA; probably restricted to the Conasauga River in TN	1 occ. Conasauga R.	Large streams, low gradient, low elevation	S	G2
2a	Ophiogomphus incurvatus	Appalachian snaketail	Known from at least one occurrence in 4 states: PA, TN, NC, GA	1 occ Sheeds Cr #1	Small streams, low gradient	S	G3
4a	Speyeria diana	Diana fritillary	WV to AL	39 TDEC records, Monroe, Cocke, Greene, Carter, Johnson, Sullivan, Unicoi, Washington Cos.	Mature mesic forests, edges & grassy openings; caterpillar host is Viola sp.	S	G3G4
Mammals							
4a	Corynorhinus rafinesquii	Rafinesque's big-eared bat	OH to MO, south to FL and LA; OK, TX	1 TDEC record; Cocke Co.	Caves & mine portals; summer roosts in hollow trees, under loose bark, & abandoned buildings; forages primarily in mature forest	S	G3G4
1a	Glaucomys sabrinus coloratus	Carolina northern flying squirrel	Mountains of NC, TN, VA	4 TDEC records; Monroe and Carter Cos.	Mature spruce fir and adjacent northern hardwood/hemlock forests above 4000 feet; abundant snags & woody debris, fungi	E	G5T1
1a	Microtus chrotorrhinus carolinensis	Southern rock vole	Mountains of MD, NC, TN, VA, WV	0 TDEC records; likely Monroe, Carter, Unicoi Cos.	Cool, damp coniferous and mixed forest; moist/mossy talus and logs at higher elevations	S	G4T3
2a	Myotis grisescens	Gray bat	VA to KS south, from TN to OK; SC to FL, AL	4 TDEC records, Cocke & Greene Cos.; pvt in Carter & Sullivan Cos.	Uses caves year round; forages along riparian areas/shorelines with forest cover	E	G3
4a	Myotis leibii	Eastern small-footed bat	ME to OH south, from SC to AL; AR, MO, OK; CAN: ON, QC	18 TDEC records, Polk, Monroe, Cocke, Greene, Unicoi, Carter, Johnson, Sullivan Cos.	Bridges, cliffs, mine portals, buildings; summer roosts buildings, hollow trees, loose bark	S	G3
4a	Myotis sodalis	Indiana bat	VT to MI south, to SC, AL; IA to AR, OK	1 TDEC record; Monroe Co; addtl. ANABAT records Monroe Co.	Hibernates limestone caves; maternity roosts primarily hollow trees or trees with loose bark; forages riparian areas and upland water holes	E	G2
2a	Sorex palustris punctulatus	Southern water shrew	Mountains of MD, NC, PA, TN, VA, WV	4 TDEC records Monroe Co.	Swift rocky streams in northern & cove hardwoods; often hemlock, mossy rocks, rhododendron; riparian dependent	S	G5T3
Mussels							
1a	Alasmidonta raveneliana	Appalachian elktoe	N, P, FB,LT	1 occ. Nolichucky R.	Small to medium rivers, moderate gradient, moderate elevation	E	G1
2a	Epioblasma florentina walkeri	Tan riffleshell	H	2 occ Hiwassee R. #4 & #5	Small to large rivers, low gradient, low elevation	E	G1T1
1a	Epioblasma metastriata	Upland combshell	C	O occ Critical Habitat	Large streams to medium rivers, low to moderate gradient, low elevation	E	GH
1a	Epioblasma othcaloogensis	Southern acornshell	C	O occ Critical Habitat	Large streams to medium rivers, low to moderate gradient, low elevation	E	GHQ
1a	Fusconaia barnesiana	Tennessee pigtoe	H, LT, N, FB, W, SH	2 occ Hiwassee R. #4 & #5; LT habitat is inundated by Tellico Res.	Small to medium rivers, moderate to high gradient, low elevation	S	G2G3

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1a	Hamiota altilis	Finelined pocketbook	C	2 occ Conasauga R #1 & #2	Large streams to medium rivers, low to moderate gradient, low elevation	T	G2
1a	Lasmigona holstonia	Tennessee Heelsplitter	H, FB	1 occ Hiwassee R #4	Small streams to small rivers, low to moderate gradient, low elevation	S	G3
1a	Lasmigona subviridis	Green floater	W	0 occ	Large streams to small rivers, low gradient, low elevation	S	G3
1a	Lexingtonia dolabelloides	Slabside pearlymussel	H,N,FB,P,LT	2 occ Hiwassee R. #4 & #5	Small streams to large rivers, moderate to high gradient, low elevation	S{C}	G2
1a	Medionidus acutissimus	Alabama moccasinshell	C	O occ Critical Habitat	Large streams, low gradient, low elevation	T	G2
1a	Medionidus parvulus	Coosa moccasinshell	C	O occ Critical Habitat	Large streams, low gradient, low elevation	E	G1Q
1a	Pleurobema decisum	Southern clubshell	C	O occ Critical Habitat	Large streams to medium rivers, low to moderate gradient, low elevation	E	G2
1a	Pleurobema georgianum	Southern pigtoe mussel	C	2 occ. Conasauga R #1 & #2	Medium rivers, moderate gradient, low elevation	E	G1
1a	Pleurobema hanleyianum	Georgia pigtoe	C	1 occ Conasauga R #1	Small streams to large rivers, moderate to high gradient, low elevation	S{C}	G1
1a	Pleurobema oviforme	Tennessee clubshell	H,SH,FB,N,LT	3 occ Hiwassee R #4 & #5; Citico Cr #1	Large streams, low gradient, low elevation	S	G2G3
1a	Pleurobema perovatum	Ovate clubshell	C	O occ Critical Habitat	Large streams, low gradient, low elevation	E	G1
1a	Ptychobranchus greenii	Triangular kidneyshell	C	1 occ Conasauga R #1	Large streams, low gradient, low elevation	E	G1Q
1a	Strophitus connasaugaensis	Alabama creekmussel	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3
1a	Villosa nebulosa	Alabama rainbow	C	2 occ. Conasauga R #1 & #2	Large streams, low gradient, low elevation	S	G3
2a	Villosa trabalis	Cumberland bean pearly mussel	H, N	2 occ Hiwassee R. #4 & #5	Large streams and small rivers, low gradient, low elevation	E	G1
1a	Villosa vanuxemensis umbrans	Coosa combshell	C	2 occ. Conasauga R #1 & #2	Small and large streams, low gradient, low elevation	S	G4T2
Reptiles							
1a	Glyptemys muhlenbergii (S. pop)	Bog turtle	MA south to GA, TN	1 TDEC record Johnson Co.; CNF record Carter Co.	Slow, shallow, mucky rivulets of sphagnum bogs, seeps, wet cow pastures, & shrub swamps	T (SA)	G3
Snails							
1a	Pallifera hemphilli	Black mantleslug	MI, NC, TN, GA,VA	0 TDEC records; Field Museum records Polk (2), Carter (4) Cos.	Spruce fir and mesic forests with moist litter, downed wood and rock cover; high elevation	S	G3
7a	Paravitrea placentula	Glossy supercoil	VA, TN, NC, KY Off-forest Cocke Co.; unk location Sullivan Co.	0 TDEC records; Field Museum & CNF records Polk(2), Monroe(2), Carter(2), Unicoi(1) Cos.	Leaf litter of deciduous forests and streamside forests with moist litter, downed wood & rock cover.	S	G3
7a	Patera archeri	Ocoee covert	Polk County , TN	3 CNF records Polk County	Leaf litter under rock ledges in ravines; Ocoee River drainage endemic	S	G1
1a	Ventridens coelaxis	Bidentate dome	NC, TN, KY, VA Off-CNF & unk locations Carter, Johnson, Sullivan Cos.	Field Museum & CNF records; Unicoi (1), Carter (5) and Johnson (3) Cos.	Mesic deciduous forest, mid-high elevation	S	G3
7a	Vertigo bollesiana	Delicate vertigo	ME south to TN, NC	2 records Monroe Co.; 1 Field Museum record Johnson County	Rich coves, acidic coves, other deciduous forests with downed wood	S	G4
7a	Vertigo clappi	Cupped vertigo	KY, TN, VA, WV	5 TDEC records Monroe Co.; 1 TDEC record Carter Co.	leaf litter and debris on steep wooded slopes with boulders and rotting timber	S	G1G2

*PRC**	**Scientific Name**	**Common Name**	**Range/Watersh/Co***	**CNF Records**	**Habitat Information**	**TES**	**G-Rank**
Non-vascular Plants							
1a	Acrobolbus ciliatus	A liverwort	Mountains of NC, TN, SC, GA. AK, Japan, Taiwan, and India. Monroe Co.	1 Record	On rock in moist ravines, spray cliffs, cascading streams, and spruce/fir forests; Riparian dependent except when in the spruce/fir forest zone.	S	G3?
7a	Aneura maxima (=A. sharpii)	A liverwort	Mountains of VT, south to NC and TN	0 Records	Humus or gravelly soil at base of wet outcrops, along streams, and waterfalls. Mostly riparian dependent	S	G1G2
2a	Aspiromitus appalachianus	A hornwort	TN, NC, SC	Undocumented records have been reported.	On rock in streams. Riparian dependent.	S	G1
2a	Bartramidula wilsonii	Dwarf apple moss	Macon & Jackson Counties, NC and Monroe County, TN	O Records. Known from Monroe County however site is undocumented.	Wet, acidic rock in the mtns, especially road cuts. Also on spray cliffs and in humid gorges. Mostly riparian dependent.	S	G3?
2a	Bazzania nudicaulis	A liverwort	Mountains of VA, TN, and NC	2 locations; Roan Mountain	On rock and bark of *Abies fraseri, Picea rubens, Betula lutea, Prunus pennsylvanica,* and *Sorbus americana* in spruce/fir forests.	S	G2G3
2a	Brachydontium trichodes	Peak moss	Europe, Mount Rainier, NH, NC, and TN	Unknown # on Roan Mountain	Moist, shady, acidic rock, especially sandstone; rocky seepage along mountain trails.	S	G2
1a	Buxbaumia minakatae	Hump-backed Elves	Nova Scotia, MA, NY, MI, VT, VA, NC and Japan	0 Records	Swampy areas; habitats occupied by *Nowellia, Lophocolea*, and *Tetraphis;* rotten logs or stumps; found on elm, ash and yellow birch logs.	S	G2G3
2a	Cephalozia macrostachya ssp australis	A liverwort	NC to MS	0 Records	On soil in rock crevices along streams. Riparian dependent.	S	G4T1
1a	Cephaloziella massalongi	A liverwort	Europe, VT, TN, and NC	0 Records	Rock crevices and soil above 5,500'. Often with copper or sulphur deposits.	S	G2G3
1a	Cheilolejeunea evansii	A liverwort	NC, SC, AL, and TN. Monroe Co.	1 Record	On tree bark in humid gorges. Variety of mesic to dry-mesic hardwoods including *Quercus* spp., *Liriodendron tulipifera, Nyssa sylvatica, Carya* spp., *Liqyuidambar styraciflua, Fraxinus* spp., and *Ilex opaca*. The moss *Fissidens subbasilaris* is nearly a constant associate.	S	G1
1a	Chiloscyphus appalachianus	A liverwort	KY, NC, SC, and TN. Monroe Co.	1 Record	On wet rock, usually near cascades or waterfalls. Riparian dependent.	S	G1G2
1a	Diplophyllum apiculatum var taxifoliodes	A liverwort	NC, TN The variety *taxifolioides* is known from several locations in NC and from Mt. Leconte in TN.	0 Records.	On moist soil or rocks at moderate to high elevations. *Diplophyllum* collected below 3,000 feet is likely to be *D. apiculatum* (Hicks 1992*)*. The variety is thought to be a hybrid of *D. apiculatum* and *D. taxifolioides* (Shuster 1974).	S	G5T1Q
1a	Diplophyllum obtusatum	A liverwort	Newfoundland, MN, mountains of NC & TN	0 Records.	In crevices of rock outcrops in spruce/fir forests; >5,500 ft. Always associated with damp, shaded rocks. It is also known to occur within mixed mesophytic forest in NC (Shuster 1974).	S	G2?
4a	Ditrichum ambiguum	A moss	CA, MT, NC, NH, NY, OR, VT, WA; BC, QC, SK	0 Records.	On bare soil of moist banks of roads or streams in wooded, upland, or montane habitats. Also acidic coves.	S	G3?
1a	Drepanolejeunea appalachiana	A liverwort	Mountains of VA, TN, NC, SC, and GA; PR	4 Records.	On rock and the bark of trees and shrubs along streams, mixed mesophytic forest, and in humid gorges. Most often found on *Kalmia Rhododendron, Clethra,* and *Ilex.* Substrates for the CNF pops include rock, *Quercus alba,* and *Betula allegheniensis.*	S	G2?
2a	Entodon concinnus	Lime entodon	NC, TN; AB, BC, NS	0 Records.	On moist calcareous rock.	S	G4G5

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2a	Fissidens appalachensis	Appalachian pocket moss	NC and TN. Monroe Co.	1 Record.	In rock crevices submerged in swift running, shallow water. Riparian dependent.	S	G2G3
1a	Frullania appalachiana	A liverwort	Mountains of TN, NC, GA, and SC	0 Records.	Usually on the bark of hardwoods (*Acer spicatum, Betula allegheniensis, Sorbus americana*) above 3,500 ft. in spruce/fir zone. Also known from mesic forests and escarpment gorges on the bark of *Castanea dentata* and *Liriodendron tulipifera*.	S	G1?
1a	Frullania oakesiana	A liverwort	Northern Europe, Japan, and Mountains of VT to NC and TN	0 Records.	Tree bark in spruce/fir forests.	S	G3?
1a	Gymnoderma lineare	Rock gnome lichen	TN, NC, SC, GA	1 Record, Roan Mountain	High elevation rocky summits and rock outcrops.	E	G2
4a	Homaliadelphus sharpii	Sharp's homaliadelphus	Japan, Vietnam, Mex; MO, VA, NC, and TN	0 Records.	Vertical surfaces and ledges of calcareous cliffs and boulders. Dry mafic or calcareous rocks in gorges.	S	G3
2a	Hydrothyria venosa	An aquatic lichen	CA to MT and Canada; Appalachians from Canada to TN & NC. Monroe Co.	1 Record	On rock substrates in clear, cold mountain streams. Riparian dependent.	S	G3
2a	Lejeunea blomquistii	A liverwort	Mountains of NC, TN, and GA. Monroe Co.	2 Records.	Rock and bark in humid gorges, and dead trees or vertical rock faces of spray cliffs.	S	G1G2
2a	Lejeunea dimorphophylla	A liverwort	The Caribbean; coastal plain of FL and NC	~~1 possible Record, Monroe County~~. This has proven to be *Lejeunea ulicina* ssp. *bullata*.	On bark of trees in the outer coastal plain. Riparian dependent.	S	G2G3
1a	Leptodontium excelsum	Grandfather Mountain leptodontium	VA, TN, NC, and GA	Unkown # on Roan Mountain	Bark of trees in high elevation, spruce/fir forests.	S	G2
1a	Leptohymenium sharpii	Mount Leconte moss	TN, NC, and SC	0 Records.	On shaded, moist or wet rock (often cliffs and waterfalls) and within hemlock/hardwood cove forests. Elevation ranged from 1900- 5400'.	S	G1
1a	Lophocolea appalachiana	A liverwort		see Chiloscyphus appalachianus	See Chiloscyphus appalachianus	S	G1G2?
1a	Marsupella emarginata var. latiloba	A liverwort	Range unknown	0 Records.	Moist rocks in humid gorges, waterfall spray zones, wet rock & seeps along streams, or humid microclimates at high elevation. Riparian dependent.	S	G5T1T2
7a	Megaceros aenigmaticus	A hornwort	NC, TN, and GA. Monroe and Cocke Co's.	25+ Records (often abundant in areas where found).	Shaded rocks in small streams and springs, or spray cliffs. Riparian dependent.	S	G2G3
1a	Metzgeria fruticulosa (= M. temperata)	A Liverwort	Asia, Europe; PNW US; VA, NC, and TN	1 Record, Roan Mountain	Rock and bark of trees from spruce/fir zone to hemlock/hardwood forests above 3000'.	S	G2Q
1a	Metzgeria furcata var. setigera	A liverwort	NC and SC, possibly TN	0 Records.	In humid gorges or on damp, shaded rocks in spruce/fir forests.	S	G4T1
1a	Metzgeria uncigera	A liverwort	PR; SE coast to mountains of NC	0 Records.	On *Rhododendron* bark in mountains.	S	G3
2a	Nardia lescurii	A liverwort	VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	3 Records	Low elevations in mountains, on peaty soil over rock near shaded streams. Riparian dependent.	S	G3?
2a	Pellia appalachiana	A liverwort	MN, NC, SC, TN, and GA. Monroe and Polk Co's.	3 Records.	Permanently damp or wet sites and moist outcrops, usually near waterfalls. Mostly riparian dependent	S	G1?
2a	Plagiochila austinii	A liverwort	NH and VT to NC and TN	0 Records.	On shaded, moist rock outcrops in the mountains	S	G3
2a	Plagiochila caduciloba	A liverwort	Mountains of TN, NC, SC, and GA. Monroe Co. (Historic record from Greene County)	2 Records.	Damp, shaded rock faces, usually along streams in mountain gorges and on spray cliffs; 1000-4900 ft. Riparian dependent.	S	G2

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1a	Plagiochila echinata	A liverwort	Mountains of TN, NC, and SC. Monroe and Polk Co's.	4 Records.	Damp, shaded rock faces and crevices in mountain gorges, above cascades and near waterfalls. Riparian dependent.	S	G2
1a	Plagiochila sharpii	Sharp's leafy liverwort	TN, NC, SC, and GA	0 Records.	Shaded, moist rocks in humid gorges. Riparian dependent.	S	G2G3
1a	Plagiochila sullivantii var spinigera	A liverwort	Mountains of VA, WV, NC, SC, and TN. Monroe Co.	1 Record.	Moist, shaded rock outcrops, under cliff ledges, and in rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T1
1a	Plagiochila sullivantii var sullivantii	Sullivant's leafy liverwort	Mountains of VA, WV, KY, TN, NC, SC, and GA. Monroe Co.	1 Record.	Moist, shaded rock outcrops, cliff ledges and rock crevices; spray cliffs and spruce/fir forests; > 2500 ft.	S	G2T2
2a	Plagiochila virginica var caroliniana	A liverwort	VA, NC, SC, and TN	2 Records, no varietal info.	On moist rock near waterfalls; humid gorges, and rocky banks of shaded streams. Riparian dependent. Generally at lower elevations.	S	G3T2
2a	Plagiochila virginica var virginica	A liverwort	WV, to NC, SC, TN, GA, and MS	2 Records, no varietal info.	On shaded rock along streams and moist rock faces, especially limestone. Riparian dependent. Generally at lower elevations.	S	G3T3
2a	Plagiomnium carolinianum	Carolina plagiomnium	TN, NC, SC, and GA	0 Records.	Moist, granitic or humus covered rock, especially on cliff ledges near streams or waterfalls; rocks or streambanks in humid gorges. Riparian dependent.	S	G3
2a	Platyhypnidium pringlei	A moss	Mexico, AZ; NC, SC, and suspected in TN	0 Records.	Attached to acidic rock in running water, permanent seeps, or spray cliffs of waterfalls in hemlock/hardwood forests. Riparian dependent.	S	G2
1a	Polytrichum appalachianum	Appalachian haircap moss	TN and NC	0 Records.	High elevation rocky summits, rock outcrops, and shrub balds.	S	G3
2a	Porella wataugensis	Watauga porella	KY, TN, NC, and SC. Monroe Co.	2 Records	Rock faces in humid gorges & wet rock near small streams above inundation. Riparian dependent.	S	G2
2a	Radula sullivantii	A liverwort	Mountains of NC, SC, TN, and GA	0 Records.	Shaded rock outcrops near streams and waterfalls in mountain gorges. Riparian dependent.	S	G2
1a	Radula voluta	A liverwort	Europe, South America; mountains of NC and TN. Monroe Co.	1 Record	Shady rock faces in spray areas around waterfalls. Riparian dependent.	S	G3
1a	Riccardia jugata	A liverwort	Mountains of NC and TN. Monroe and Polk Co's.	3 Records.	On moist wood and humus in mesic areas and humid gorges.	S	G1G2
1a	Sphenolobopsis pearsonii	A liverwort	Europe, Africa, Asia, Atlantic and Pacific Islands, Pacific NW; NC and TN	Roan Mountain (Undocumented)	On rock and bark of *Abies fraseri*, *Picea rubens*, *Prunus pennsylvanica*, and *Sorbus americana* in spruce/fir forests.	S	G2
1a	Sticta limbata	A foliose lichen	Canada to CA; mountains of NC and TN	0 Records.	Bark of hardwoods in high elevation northern hardwood forests	S	G3G4
1a	Taxiphyllum alternans	Japanese yew-moss	Asia; MD to FL, NC, and LA	0 Records.	Soil, humus, or bark in wet, swampy areas; on limestone in the spray area of waterfalls. Riparian dependent. .	S	G3?
1a	Tortula ammonsiana	Ammons' tortula	Africa; WV, NC, and TN	0 Records.	Cliff overhangs and crevices with seepage in rich hardwood forests. Riparian dependent.	S	G2?
Vascular Plants							
1a	Aconitum reclinatum	Trailing white monkshood	South and central mountains of NC, PA, TN, VA, WV. Carter Co.	1 Record.	Rich forest habitats on seepage slopes, boulderfields, streambanks, and coves at high elevations, associated with mafic rock.	S	G3
4a	Aster georgianus	Georgia aster	AL, FL, GA, NC. Suspected in SE TN	0 Records	Dry, rocky, open woods and roadsides in areas with a history of frequent fire; Likely associated with historic post or blackjack oak woodlands.	S	G2G3

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4a	Berberis canadensis	American barberry	PA to IL, south to AL, GA; IL, MO. Monroe, Johnson, Sullivan, Washington, Carter, and several ridge and valley counties.	0 Records	Open rocky woods, openings, and streambanks, usually over mafic or calcareous rock; occurring in thin soil. Historic habitats were fire maintained.	S	G3
4a	Botrychium jenmanii	Dixie grapefern	MD to FL; TN, AL, MS, LA. Monroe, Hamblen, Putnum Co's.	0 Records	Dry to moist forests; open, grassy areas; and disturbed areas.	S	G3G4
4a	Buckleya distichophylla	Piratebush	Mountains of NC, TN, VA. Carter, Cocke, Greene, Sullivan, Unicoi, Washington Co's.	14 Records.	Open, dry, rocky woods and bluffs, typically calcareous-shaley soils; Known sites occur between 1900-3300 ft.	S	G2
1a	Calamagrostis cainii	Cain's reed grass	Mountains of NC, TN. Sevier Co.	0 Records	High elevation rocky summits and disturbed areas 4000-6000 ft.	S	G1
1a	Cardamine clematitis	Small mountain bittercress	Mountains of AL, NC, SC, TN, VA. Carter, Johnson, Unicoi, Washington, Monroe, Sevier Cos.	13 Records	Wet, rocky areas; springs, seeps, and streambanks; moss or moist soil; > 3,500'; Mostly riparian dependent.	S	G2G3
1a	Carex misera	Wretched sedge	Mountains of GA, NC, TN. Blount, Sevier, Carter, Unicoi	4 Records	Medium to high elevation cliffs, balds and rocky areas	S	G3
1a	Carex roanensis	Roan sedge	GA, KY, NC, TN, VA. Carter, Johnson, Unicoi, Cocke, Sullivan	25 Records	Mesic forests; often associated with birch and beech at high elevations.	S	G1
1a	Cimicifuga rubifolia	Appalachian bugbane	AL, IL, IN, KY, TN. Monroe, Sullivan, & several Ridge and Valley cos.; Primary Cumberland Plateau in TN.	0 Records	River bluffs, ravines, and rich cove forests over talus and rocky calcareous soils; typically north facing slopes; 800-1500 ft.	S	G3
7b	Collinsonia verticillata	Stoneroot	MD to GA; OH, KY, TN. Monroe, McMinn, Blount, Sevier, Johnson, and several counties to west.	0 Records	Rich forests in moist coves to dry oak forests over mafic or calcareous rock.	S	G3
7a	Coreopsis latifolia	Broadleaf tickseed	Mountains of GA, NC, SC, TN. Polk, Carter, Greene	6 Records	Rich, moist cove and slope forests 1,500 to 4,500 ft. Flowering triggered by canopy gaps.	S	G3
2a	Danthonia epilis	Bog oat-grass	GA, NC, NJ, SC, TN. Cocke	0 Records	Seeps around rock outcrops in the mountains. Riparian dependent.	S	G3?
4a	Delphinium exaltatum	Tall larkspur	OH, PA south to TN, NC; AL, MO, ME. Mostly Ridge and Valley Co's, but reported from Cocke Co.; Known from the Blue Ridge in NC.	0 Records;	Dry to moist habitats over mafic rock, usually in full or partial sun (grassy balds or forest edges). Also rich woods (and edges of woods), rocky slopes, semi-open woodlands, glades and prairie openings.	S	G3
4a	Diervilla rivularis	Riverbank bush-honeysuckle	Mountains of AL, GA, NC, TN. Unicoi, Washington, Polk, and some Ridge and Valley Co's.	12 Records	Bluffs, rock outcrops, and riverbanks	S	G3
4a	Fothergilla major	Large witchalder	AL, AR, GA, NC, SC, TN. Polk, Sevier, Greene, and some west of Blue Ridge	3 Records	Dry ridge top and bluff forests of moderate elevations.	S	G3
4a	Gentiana austromontana	Appalachian gentian	Mountains of NC, TN, VA, WV. Carter, Greene, Johnson, Sullivan, Unicoi, Washington Cos.	70 Records	High elevations in open forests, grassy balds, and along roads and trails.	S	G3
1a	Geum geniculatum	Bent avens	Mountains of NC, TN. Carter Co.	5 Records	High elevation peaks, seeps, wet boulderfield forests, grassy balds, cliff bases, and stream banks.	S	G2
1a	Geum radiatum	Spreading avens	Mountains of NC, TN. Sevier, Blount, Carter.	3 Records	Thin soil on rocky summits, cliffs, & ledges; open, grassy balds near *Rhododendron catawbiense*; >4200'.	E	G1
1a	Glyceria nubigena	Great Smoky Mountain mannagrass	Mountains of NC, TN. Sevier.	0 Records	Moist to soggy ground at higher elevations, especially seepage areas on heath balds and high ridges and miry places in spruce-fir forests	S	G2

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*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	Hedyotis purpurea var. montana	Roan Mountain bluet	Mountains of NC, TN. Carter	1 Record	Habitat includes crevices in rock outcrops and gravelly soils at the edges of grassy balds.	E	G5T2Q
1a	Helianthus glaucophyllus	Whiteleaf sunflower	AL, NC, SC, TN. Carter, Greene, Johnson, Unicoi Cos.	12 Records	Mesic forests and woodlands at medium elevations. Flowering associated with increased light.	S	G3
1a	Heuchera longiflora var. aceroides	Maple-leaf alumroot	Range for H. longiflora is AL, KY, NC, OH, TN, VA, WV. No published range info for variety. Cocke, Greene Cos.	9 Records	Moist ravines and rich cove forests, especially over mafic or calcareous rock.	S	G4T2Q
2a	Hymenophyllum tayloriae	Taylor's filmy fern	NC, SC, TN, GA. Sevier, Fentress, Overton.	0 Records	Humid gorges, moist ceilings of rock grottoes and spray cliffs. Riparian dependent.	S	G1G2
1a	Hypericum graveolens	Mountain St. Johnswort	Mountains of NC, TN. Sevier, Unicoi, Carter, Johnson.	3 Records	High elevation grassy balds and forest openings.	S	G3
1a	Hypericum mitchellianum	Blue Ridge St. Johnswort	Mountains of NC, TN, VA, WV. Unicoi, Carter, Cocke, Greene, Johnson, Sevier, Blount, Monroe.	12 Records	Grassy balds, seeps, and forest openings.	S	G3
1a	Ilex collina	Longstalked holly	NC, VA, WV. Suspected in TN	0 Records	Wetlands, seeps, or streambanks >2,000 ft often in association with *Tsuga canadensis, Betula lenta, Ilex montana, Picea rubens,* and *Rhododendron maximum*. Also moist, rocky slopes in northern hardwood or mixed spruce/hardwood forests.	S	G3
4a	Isotria medeoloides	Small whorled pogonia	ME to GA; Midwestern US and CAN. Washington, Hamilton.	0 Records	Open deciduous, or mixed pine-deciduous forests, often on dry to moist leaf litter.	T	G2G3
2a	Juglans cinerea	Butternut	Central and eastern US and southeastern CAN. All Blue Ridge counties and scattered throughout TN.	11 Records	Moist, rich forests especially along rivers in bottomlands and floodplains.	S	G3G4
2a	Lilium grayi	Gray's lily	Mountains of NC, TN, VA. Carter and Johnson Co's.	8 Records	Bogs, seeps, grassy balds, moist forest edges, and wet meadows at medium to high elevations.	S	G3
4a	Lysimachia fraseri	Fraser's yellow loosestrife	Regional endemic of AL, GA, NC, SC, TN; KY, IL. Polk, Sevier, Cocke, Hamilton, and a few counties in west TN.	10 Records	Forest edges, road banks, Along streams and rivers, and thin soil near rock outcrops. Locally abundant in the Ocoee River Gorge. Dependent upon cyclical natural disturbances to maintain open conditions.	S	G2
2a	Minuartia godfreyi	Godfrey's stitchwort	Regional endemic AL, AR, FL, NC, SC, TN. Carter, Johnson.	3 Records	Wet ditches, meadows, seeps, streams banks, and springs; associated with calcareous soils. Riparian dependent.	S	G1
4a	Monotropsis odorata	Sweet Pinesap	DE to FL, AL, KY, TN, WV; Centered in Appalachians. Polk, Monroe, Blount, Sevier, Cocke, Greene, and a few counties west.	8 Records	Dry to mesic pine and mixed pine/hardwood forests.	S	G3
4a	Penstemon smallii	Small's beardtongue	Mountains of AL, GA, NC, SC, TN. Polk, Cocke, Greene, Washington, Unicoi, Carter, and several counties west.	0 Records	Woodlands, cliffs, glades, and roadsides.	S	G3
1a	Pityopsis ruthii	Ruth's golden aster	Southeast TN	12 Records; Polk Co.	Crevices in phyllite & graywacke boulders in historical flood zone Ocoee & Hiwassee Rivers.	E	G1

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2a	Platanthera integrilabia	White fringeless orchid	VA to GA, KY to AL, MS. Polk, Monroe and several Cumberland Plateau counties	2 Records	Forested wetlands with open or semi-open canopy. Wet, flat, boggy areas at the head of streams or seepage slopes. Often found in association with *Sphagnum* and *Osmunda cinnamonea, Woodwardia areolata*, and *Thelyptris novaboracensis*, in acidic muck or sand, and in partially, but not fully shaded areas.	S	G2G3
2a	Potamogeton tennesseensis	Tennessee pondweed	OH, PA, TN, VA, WV. Polk, Monroe, Blount and counties west	1 Record	Slow moving streams and rivers. Riparian dependent.	S	G2
1a	Prenanthes roanensis	Roan Mountain rattlesnake root	Mountains of NC, TN, VA. Polk, Sevier, Greene, Unicoi, Carter, Johnson	48 Records	High elevation rich woods, grassy balds, and forest openings.	S	G3
4a	Pycnanthemum beadlei	Beadle's mountain mint	Mountains of southwest VA to GA, TN. Carter	0 Records	Forests and woodland borders.	S	G2G4
1a	Rosa obtusiuscula	Appalachian Valley rose	TN endemic. Only known collection from Cocke Co.	0 Records; not tracked by TDEC; NY Botanical Garden Database lists one record (1897) in Cocke County near French Broad River between Paint Rock and Del Rio.	Listed by TN Natural Heritage (1999) as a rare endemic, known from wooded slopes and riverbanks. Taken off after Rare Plant Advisory Committee meeting (1999) until taxonomic issues are resolved. It could be *Rosa palustris*. At this point it is considered to be "State Historic".	S	G1G3Q
1a	Rugelia nudicaulis	Rugel's Indian plantain	Mountains of NC, TN. Cocke, Sevier, Blount	0 Records	Spruce/fir and northern hardwood forest openings	S	G3
2a	Saxifraga caroliniana	Carolina saxifrage	Mountains of GA, NC, TN, VA, WV. Carter, Cocke, Johnson Cos.	4 Records	Moist rock outcrops and cliffs; wet soil at the base of rocks; cool, shaded, rocky woods. Almost always in steep terrain and often in areas misted by spray from nearby waterfalls or in areas where water trickles down the rocky slopes.	S	G2
2a	Scutellaria arguta	Hairy skullcap	GA, KY, NC, TN, VA. Unicoi	0 Records	High to mid elevation forests and moist talus slopes	S	G2?Q
7a	Scutellaria saxatilis	Rock skullcap	CT to IN, south to AL, GA, SC, AR. Polk, Blount, Unicoi, Carter, Johnson, Cocke, Greene	43 Records	Rocky, dry to mesic forests and open areas	S	G3
7a	Sedum nevii	Nevius' stonecrop	AL, GA, TN. Polk	9 Records all restricted to the Ocoee River Gorge.	Shaded, rocky bluffs and cliffs	S	G3
1a	Sida hermaphrodita	Virginia fanpetals	KY, MD, OH, PA, TN, VA, IN, MI, Ontario. Cocke, Washington, Claiborne	0 Records	Sandy or rocky riverbanks	S	G2
1a	Silene ovata	Blue Ridge catchfly	AL, AR, GA, IL, IN, KY, MS, NC, SC, TN, VA. Polk, Sevier, Cocke, Greene, Unicoi and west.	4 Records	Mid elevations over mafic or calcareous soils. Rich cove and oak/hickory forests.	S	G2G3
1a	Solidago spithamaea	Blue Ridge goldenrod	Mountains of NC, TN. Carter Co, Roan Mtn.	1 Record	Rocky places (outcrops, ledges, cliffs, balds) above 4500 ft.	T	G1
1a	Spiraea virginiana	Virginia spiraea	AL, GA, KY, LA, NC, OH, PA, TN, VA, WV	1 Record, no longer extant; Unicoi Co., Nolichucky River	Riverbanks and riverside shrub thickets; rocky areas susceptible to flood scour. Riparian dependent.	T	G2
1a	Stachys clingmanii	Clingman's hedge-nettle	AL, IN, MD, NC, SC, TN, WV. Monroe, Sevier, Blount, Cocke, Unicoi	7 Records	Rich boulderfields, cove, northern hardwood, and spruce/fir forests, and clearings at high elevations.	S	G2Q
4a	Thaspium pinnatifidum	Cutleaved meadow parsnip	AL, GA, KY, NC, OH, TN, VA. Greene, Cocke, Hamilton	1 Record	Forests and woodlands over calcareous rock	S	G3?
4a	Thermopsis mollis var. fraxinifolia	Ashleaf goldenbanner	Mountains of GA, NC, SC, TN; AL. Polk, Monroe, Blount, Greene	28 Records	Openings and ridges in dry woodlands. Often on road banks.	S	G4? T3?

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*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
7a	Trillium rugelii	Southern nodding trillium	Mtns & Piedmont of AL, GA, NC, SC, TN. Carter, Cocke, Unicoi, Washington, Polk, Blount, Sevier	6 Records	Rich forests and coves often over mafic or calcareous substrates.	S	G3
7a	Trillium simile	Sweet white trillium	Mountains of GA, NC, SC, TN. Polk, Monroe, Sevier, Blount, Cocke	Several Records, not in database.	Rich soils of slopes or coves over mafic or calcareous rock.	S	G3
4a	Tsuga caroliniana	Carolina hemlock	Mountains of GA, NC, SC, TN, VA. Carter, Johnson, Sullivan, Unicoi, Washington	51 Records	Ridge tops, rocky bluffs and open forests. Generally dry conditions.	S	G3

*PRC = Project Review Code; to get the appropriate code for each species use the Project Review Code Key.
*Range abbreviations refer to the major watersheds on the Cherokee NF: Conasauga, Ocoee, Hiwassee, Little Tennessee, Pigeon, French Broad, Nolichucky, Watauga, and South Holton.
*Forest Occurrence Data is based upon currently known records. It is NOT necessarily reflective of potential occurrence, especially for plants.
*Habitat Information is only a summary. For a more thorough discussion on species, refer to the individual species write-ups that have been provided. For streams the following definitions apply:

Orders	**Gradients**	**Elevations**
small 3, 4	low <=2%	low<=1200'
medium 5, 6, 7	moderate>2% - <=4%	high>1200'
large 8, 9	high>4%	

Attachment B
List for determining the Project Review Code (PRC) for each TES Species

1a = The project is located out of the species known range, or suitable habitat does not exist in the project area.

2a = All requisite habitat has been identified and excluded from disturbance associated with the project. Therefore, the project is expected to have no effects regardless of the number and location of individuals in the area affected by the project.

3a = The project is being implemented for the benefit of the species, and is expected to have totally beneficial effects regardless of the number and location of individuals in the area affected by the project.

4a = It is assumed that the species is present. Additional information on the number and location of individuals is not needed to improve the design and/or application of mitigation to reduce adverse effects, or to allow a better assessment of effects to viability of the population.

5a = The species is already covered by a current site-specific inventory for the project area and additional inventories are not needed.

6a = Inventory methods are not technically or biologically feasible and effective for providing substantial information on the number and location of individuals. It is assumed that the species is present. Determination of Effect: May impact individuals, but not likely to cause a trend to federal listing or a loss of viability.

7a = A site-specific inventory was conducted, but the species was not found in the project area.

7b = A site-specific inventory was conducted, and the species was found in the project area.

APPENDIX C

Viability Concern Species

In addition to Regional Forester Sensitive Species, forest managers have responsibility to maintain occurrences of all native and desired non-native species that are necessary to maintain viable populations of these species on the Forest (Forest Wide Standard 28). Appendices E and F to the Final Environmental Impact Statement for the RLRMP lists species of viability concern known to occur on the Forest (USDA FS 2004c).

Existing Condition Plant Viability Concern Species

The following sections describe the affected environment and effects by alternative for each plant species of viability concern that was found in the area. Site specific information is drawn directly from the botanical survey reports (Copperhead Environmental Consulting, Inc 2008). Note that the following descriptions provide a summary of important information for each species. The botanical reports (Project File) contain comprehensive data, maps, and locations for each species and surveyed area.

Existing Condition *Eupatorium steelei* (Steele's Joe Pye weed)

Eupatorium steelei is a southern Appalachian endemic ranging from eastern Kentucky and western Virginia south to western North Carolina and east Tennessee. Habitat is described as cove hardwood and northern hardwood forests (Weakely 2004). On the northern half of the Cherokee National Forest (north of the Great Smoky Mountains National Park) this species is frequently found along roadsides and trails above 2,000' elevation within suitable habitat. One new location was noted for this species during the botanical surveys within stand 146/1 however according to the botanical report (Copperhead 2008) there was some uncertainty in the identification of the species. *Eupatorium steelei* differs from *E. purpureum* by having glandular pubescence throughout the stem (limited to within the inflorescence in *E. purpureum*) and on the underside of the leaves (*E. purpureum* has sessile resin dots on underside of leaves).

Populations on the CNF were estimated to number between 6 and 20 locations (F2) during Forest Plan revision. The forest wide viability analysis (USDA FS 2004c) indicates high to moderate risk levels for this species. The Tennessee Natural Heritage Program discontinued tracking this species as a rare element in 2007 based upon the number of records in their rare species database. Currently there are at least 68 reported localities for this species on the Cherokee National Forest.

Direct and Indirect Effects *Eupatorium steelei*

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The identification of the species at the one site found during the botanical surveys is questionable (Copperhead Environmental Consulting, Inc 2008) and could be the more common *Eupatorium purpureum*. Based upon this, no mitigations are proposed.

Alternative 1 (No Action)

Under Alternative 1, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon this, implementation of Alternative 1 would have no effect on the viability of *Eupatorium steelei*.

Alternative 2 (Proposed Action)

Under this alternative the new site of *Eupatoreum steelei* could be directly impacted through management actives. The identification of the species at the site is questionable (Copperhead Environmental Consulting, Inc 2008) but even assuming it is correct, this species is abundant enough on the forest (68 known occurrences) that damage to this site would not likely affect the overall species viability.

Cumulative Effects – All Alternatives

Eupatoreum steelei is a southern Appalachian endemic that is fairly common within its limited range. Based upon the above analysis, it is expected that this species would continue to have viable populations on the CNF regardless of the selected alternative. No negative cumulative effects are expected.

Existing Condition *Mertensia virginica* (Virginia bluebell)

Mertensia virginica is a fairly common species in the northeastern United States that reaches the southern extreme of its range in Mississippi, Alabama, and Georgia. Habitat is described as nutrient rich, moist alluvial forests (Weakely 2004). *Mertensia virginica* is not tracked by the State as a rare species, thus records on known locations have not been documented. Populations on the CNF have been estimated to number between 6 and 20 locations (F2). The forest wide viability analysis (USDA FS 2004c) indicates moderately high to moderate risk levels for this species. One population of this species was found just outside the boundary of stand 146/23 within the riparian forest community along Spring Creek.

Direct and Indirect Effects *Mertensia virginica - All Alternatives*

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The one site found during the botanical surveys is actually outside the area of influence from the proposed activities, thus there will be no effect to this species as a result of implementing any alternative.

Cumulative Effects – All Alternatives

Mertensia virginica is a fairly common species in the northeastern United States that reaches the southern extreme of its range in Mississippi, Alabama, and Georgia. Based upon the above analysis, it is expected that this species would continue to have viable populations on the CNF regardless of the selected alternative. No negative cumulative effects are expected.

Existing Condition *Rhododendron cumberlandense* (Cumberland azalea)

Rhododendron cumberlandense is a southern Appalachian endemic known primarily east of the Blue Ridge from eastern Kentucky and western Virginia south to east-central Tennessee, northern Georgia, and northeast Alabama (Weakley 2004). NatureServe (2007) also includes North and South Carolina within its range. Habitat is described as "balds and exposed or moist slopes" (Weakley 2004). *Rhododendron cumberlandense* is a problematic species to identify if not seen when the flowers emerge (critical for distinguishing from *R. calendulaceum*). *Rhododendron cumberlandense* is not tracked by the State as a rare species, thus records on known locations have not been consistently documented. Populations on the CNF have been estimated to number between 6 and 20 locations (F2). The forest wide viability analysis (USDA 2004c) indicates moderate risk levels for this species. Plants identified as this species were found within stands 146/1 (several plants) and 146/16 (one plant).

Direct and Indirect Effects *Rhododendron cumberlandense*

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The "azalea" Rhododendrons often bloom in canopy gaps and other openings and thus may react positively to timber harvest activities. While no information on the effects of fire on *Rhododendron cumberlandense* could be found in the literature, Coladonato (1992) states that the related species *Rhododendron periclymenoides* may be top-killed by fire but re-sprouts from the rootstock. Based upon this, no mitigations are proposed.

Alternative 1 (No Action)

Under Alternative A, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon the above information, implementation of Alternative 1 would have no effect on the viability of *Rhododendron cumberlandense*.

Alternative 2 (Proposed Action)

The "azalea" Rhododendrons often bloom in canopy gaps and other openings and thus may react positively to timber harvest activities. Some incidental damage could occur during tree fall, but no lasting damage should occur. While no information on the effects of fire on *Rhododendron cumberlandense* could be found in the literature, Coladonato (1992) states that the related species *Rhododendron periclymenoides* may be top-killed by fire but re-sprouts from the rootstock. Proposed fuel reduction burns may affect individuals, but populations would be expected to recover. Herbicides would be used to control specific populations of invasive plant species within this alternative. Herbicides may also be used for timber stand improvement in the form of individual tree release. No herbicides would be used in the vicinity of the known populations of *Rhododendron cumberlandense*. Based upon the above information, the implementation of Alternative 2 may affect individuals but will not lead toward a loss of viability for *Rhododendron cumberlandense.*

Cumulative Effects – All Alternatives

Rhododendron cumberlandense is a southern Appalachian endemic that is very difficult to distinguish from the much more common *Rhododendron calendulaceum*. Based upon the above analysis, if present, it is expected that this species would continue to have viable populations within the Spring Creek analysis area and on the CNF. No negative cumulative effects are expected.

Existing Condition *Stewartia ovata* (mountain camelia)

Stewartia ovata is known from all the southeastern states from Virginia and Kentucky south through Mississippi to Florida (NatureServe 2007). It typically occurs within openings in mesic forests, especially acidic bluffs or Rhododendron thickets (Weakley 2004). *Stewartia ovata* is not tracked by the Tennessee Division of Natural Heritage as a rare species, thus many records of known locations have not been documented. Populations on the CNF have been estimated to number between 20 and 100 locations (F3). This species was found at one location within stand 122/11 during the botanical surveys. Plants were associated with a small stream drainage within the stand. The forest wide viability analysis (USDA FS 2004c) indicates moderately high to low risk levels for this species.

Direct and Indirect Effects *Stewartia ovata* (mountain camelia)

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. The new site for *Stewartia ovata* within stand 122/11 is located along a small drainage that would be protected through the adherence to riparian standards. No additional mitigations are proposed.

Alternative 1 (No Action)

Under Alternative 1, no changes to the existing environment would occur beyond those attributed to natural disturbances. Based upon the above information, implementation of Alternative 1 would have no effect on the viability of *Stewartia ovata*.

Alternative 2 (Proposed Action)

Potential effects to *Stewartia ovata* from harvest activities would be mitigated with the adherence to riparian standards. It is expected that the population would persist after harvest activities. Proposed fuel reduction burns are designed to avoid riparian areas and would have no effect on this species. Herbicides would be used to control specific populations of invasive plant species within this alternative. Herbicides would also be used for timber stand improvement in the form of individual tree release. No herbicides would be used in the vicinity of the known population of Stewartia ovata. Based upon the above information, the implementation of Alternative 2 would have no effect on the species.

Cumulative Effects - All Alternatives

Stewartia ovata occurs throughout the southeastern states and is not considered to be rare by the Tennessee Division of Natural Heritage. One new location was found for this species within the Spring Creek analysis area that would be protected by riparian standards. It is expected that this species would continue to have viable populations within the Spring Creek analysis area and on the CNF. No negative cumulative effects are expected.

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