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Environmental Assessment

Middle Citico

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Monroe County, Tennessee

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Table of Contents

Introduction 1
Document Structure 1
Background 1
Purpose and Need for Action 3
Proposed Action 5
Decision Framework 11
Public Involvement 11
Issues 12
Alternatives, including the Proposed Action 12
Alternatives 13
Alternatives Not Considered in Detail 14
Mitigation Common to All Alternatives 14
Comparison of Alternatives 14
Environmental Consequences 17
Biological Factors 17
Social/Economic Factors 75
Physical Factors 88
Consultation and Coordination 97
References 100

INTRODUCTION

Document Structure

The Forest Service, U.S. Department of Agriculture 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. These alternatives were developed based on significant issues raised by the public and other agencies. 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

The analysis area is comprised of Compartments 9, 10, 11, 13, 14, 15, 16, 17, 22, 23, 24, 25, 31, 32, 33, 40, 41, 42, 51, 402, 403, 404, 405, 406, 428, 429 and 430 and located northeast of Tellico Plains, Tennessee (Figure 1).

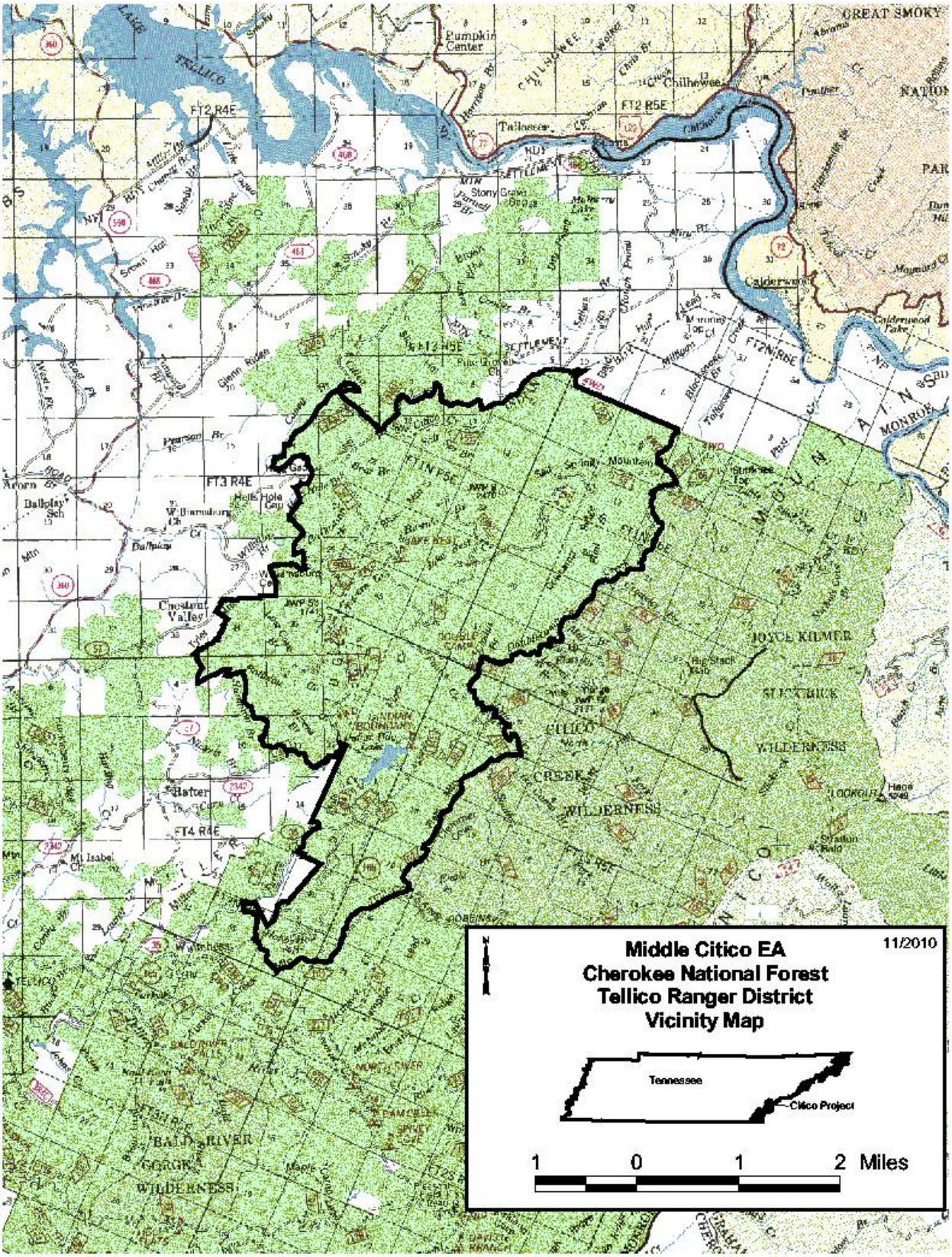


Figure 1. Vicinity Map

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 NFS 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 27 compartments that comprise the Middle Citico project area are predominantly assigned to MP 8.A.1 Mixed Successional (34%). The remainder of the project area is allocated to the following MPs: 1.A Designated Wilderness (1%), 1.B Recommended Wilderness Study Area (1%), 7.A Scenic Byway Corridors (13%), 7.B Scenic Corridors (less than 1%), 7.D Concentrated Recreation Zones (less than 1%), 8.B Early Successional (15%), 8.C Black Bear Habitat Management (14%) and 11 Riparian (22%). These are estimations only, especially of the Riparian Prescription.

The RLRMP, pages 134 to 142, describes the DFC and standards for management activities/practices that will lead to the DFC of the MPs 8.A.1, 8.B and 8.C. Where the MPs are silent on specific goals, objectives and standards, the forest-wide goals, objectives and standards (pgs. 21-72) should be applied.

MP 8.A.1 emphasizes providing habitat for a variety of plant and animal populations, including eastern wild turkey, and black bear, associated with a mix of successional forest habitats. Management activities are designed to: (1) retain a forested canopy across at least 50 percent of the prescription area, (2) maintain or enhance hard and soft mast production, (3) provide a dispersed system of permanent and transitory openings, and (4) limit motorized access across the prescription area and control access during critical nesting and brood-rearing seasons.

The desired condition for the MP is a natural forested appearance, where a mid- to late-successional forest greater than 40 years of age dominates the landscape with a continuous forested canopy greater than 50 percent of the prescription area. The area is interspersed with both forest communities greater than 100 years of age and herbaceous openings providing both wildlife habitat diversity and visual diversity. The overstory is relatively closed, multi-layered, and moderately to densely stocked. The midstory is also multi-layered composed of a diversity of shrubs, vines, grape arbors, and saplings.

MP 8.B emphasizes providing optimal to suitable habitat for a variety of upland game species and plants and animals associated with early successional forest habitats. Management activities are designed to: (1) sustain a distribution of early successional habitat conditions interspersed throughout a forested landscape, (2) maintain a habitat structure that provides both horizontal and vertical diversity, (3) optimize hard and soft mast production, and (4) control access to protect habitat when necessary.

The desired condition for this prescription is a mix of forest age classes in a predominantly forested landscape. Communities are structurally diverse with canopy gaps occurring from both natural and human-initiated events.

MP 8.C emphasizes providing optimal habitat for black bears and other wide-ranging area sensitive species. Management activities are designed to: 1) provide a secluded and diverse habitat; 2) ensure adequate den sites, and 3) maintain hard and soft mast production.

The desired condition in MP 8.C is a mid- to late-successional forest greater than 40 years of age dominating the landscape with a continuous forested canopy over at least 65 percent of the prescription area. The area ideally is interspersed with both forest communities greater than 125 years of age and herbaceous openings providing both wildlife habitat diversity and vegetation diversity.

Goals, objectives, and standards were developed for the Forest and each MP to identify management activities that would lead an area toward its DFC. Thus comparison of these goals, objectives, and standards with the existing conditions identifies those areas where efforts should be focused and management activities should take place.

The Forest uses rapid assessments (RA) at the watershed scale to identify opportunities that are ripe for decision. As part of the RA for the Upper & Middle Citico watersheds (CNF 2008a) 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 increase vegetative diversity. The assessment also identified a need for an improved trail infrastructure to implement both the RLRMP and the Forest's strategic plan for trails, while reducing sediment input to Citico Creek.

The need for vegetation management activities to alter the successional stages is displayed in Table 1, 2, and 3. These tables display the differences between the DFC and the existing condition of the analysis area in relation to the objectives of 8.A, 8.B, and 8.C. The difference between the desired and existing conditions provides opportunities for management activities that can lead these areas toward the DFC.

Table 1. Comparison of Objective 8.A 1.01 by Condition

Objectives/Standard	Desired	Existing	Proposed Action
Maintain a minimum of 50% of forested acres in mid to late successional forest including old growth	2,497+ ac	4,037 ac (81%)	3,883 ac (78%)
Maintain a minimum of 20% of forested acres in late successional forest including old growth	999+ ac	2,549 ac (51%)	2,549 ac (51%)
Maintain 4% to 10% of forested acres in early successional forest	200-499 ac	143 ac (3%)	297 ac (6%) .

Table 2. Comparison of Objective 8.B-1.01 by Condition

Objectives/Standard	Desired	Existing	Proposed Action
Maintain a minimum of 20% of forested acres in mid to late successional forest including old growth	361+ ac	1,339 ac (74%)	1,268 ac (70%)
Maintain a minimum of 10% of forested acres in late successional forest including old growth	181+ ac	831 ac (46%)	831 ac (46%)
Maintain 10% to 17% of forested acres in early successional forest	181-307 ac	171 ac (9%)	243 ac (13%)

Table 3. Comparison of Objective 8.C-1.01 by Condition

Objectives/Standard	Desired	Existing	Proposed Action
Maintain a minimum of 65% of forested acres in mid to late successional forest including old growth	2,814+ ac	3,930 ac (91%)	3,885 ac (90%)
Maintain a minimum of 20% of forested acres in late successional forest including old growth	866+ ac	2,368 ac (55%)	2,349 ac (54%)
Maintain 4% to 8% of forested acres in early successional forest	173-346 ac	52 ac (1%)	97 ac (2%)

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; Citico Creek is only one of four recreation zones across the forest where the development of a horse trail complex is recommended (CNF 2008a). There is a need to develop a trail network suitable for equestrian use. The purpose of this part of the proposed action is to implement the Forest's trails strategy by developing additional, interconnecting trails that provide at least 12 miles of trail for daily rides.

Proposed Action

The Tellico Ranger District proposes the following actions to achieve the purpose and need (See Appendix A for maps).

Silvicultural Treatments – Proposed Activities

1) Maintain or restore natural oak and oak-pine communities and create early successional habitat through silvicultural treatments on approximately 35 acres of existing forested stands. These are mostly upland sites that would support "dry to mesic oak forest" or "dry and dry mesic oak-pine forests". Regeneration sources would be existing seedlings, coppice or stump sprouts, and supplemental planting of oaks. Activities would occur in the stands listed in Table 4.

Table 4. Oak and oak-pine maintenance/restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
14/23	25	Shelterwood w/reserves	Slashdown site preparation, plant white oak on 30' x 30' spacing, 2nd year chemical release of oak seedlings.
31/6	10	Shelterwood w/reserves	Natural regeneration

2) Maintain or restore shortleaf pine, pitch pine and associated pine-oak communities and create early successional habitat through silvicultural treatments on approximately 233 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. These stands currently support a high component of Virginia pine, white pine or both of these species. Opportunities exist to increase table mountain pine in some of these stands. Site preparation, planting of pitch or shortleaf pine, and a second year chemical release using herbicide (triclopyr) would ensure the survival and establishment of desired oak and pine. Activities would occur in the stands listed in Table 5.

Table 5. Pine maintenance/restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
15/08	40	Seedtree w/reserves	Slashdown and burn site preparation, plant shortleaf pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
15/27	18	Seedtree w/reserves	Slashdown and burn site preparation, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/19	40	Seedtree w/reserves	Slashdown and burn site preparation, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/21	22	Seedtree w/reserves	Slashdown and burn site preparation, plant shortleaf pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/23	19	Seedtree w/reserves	Slashdown and burn site preparation, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/26	24	Clearcut w/reserves	Slashdown and burn site preparation, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
24/31	12	Clearcut w/reserves	Slashdown and burn site preparation, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
25/36	5	Clearcut w/reserves	Slashdown and burn site preparation, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
32/27	36	Seedtree w/reserves	Slashdown and burn site preparation, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
32/28	17	Seedtree w/reserves	Slashdown and burn site preparation, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.

3) Improve forest health, species composition and promote advanced oak regeneration using intermediate stand treatments on approximately 123 acres. These upland stands are primarily white pine. Activities would occur in the stands listed in Table 6.

Table 6. White pine removal

Comp/Stand	Acres	Type of Harvest	Reforestation
15/13	34	Thinning	None
15/14	34	Thinning	None
15/15	40	Thinning	None
31/18	15	White pine removal	None

The activities described above would contribute to meeting the following RLRMP objectives: Objective 17.01, Objective 17.02, Objective 17.03, Objective 17.05, Objective 18.02, Objective 19.01, Objective 19.02, Objective 8.A.1-1.01, Objective 8.B-1.01, and Objective 8.C-1.01

Additional Wildlife Habitat Improvements – Proposed Activities

1) Create approximately 621 acres of open pine-oak woodlands on sites that would naturally support these communities. Treatments associated with creating woodland conditions may include prescribed burning on a rotation suitable to reduce woody vegetation in the understory and encourage establishment of desired herbaceous vegetation; herbicide (triclopyr and/or glyphosate) application to reduce sprouting of woody vegetation; and cutting of understory and midstory vegetation with chainsaws or other hand tools to expose the forest floor to additional sunlight. Activities would occur on the stands listed in Table 7. Streams, roads, trails, handline, and dozer line would be used as fire line.

The stands vary considerably from xeric pine and oak to more mesic coves. Treatment would only occur in more xeric areas appropriate for this goal. Activities would occur on the following stands:

Table 7. Woodland Creation

Comp/Stand	Acres	Treatment
Gold Cabin Branch		
15/18	19	Thin, burn, herbicide
15/19	10	Thin, burn, herbicide
15/20	27	Thin, burn, herbicide
15/21	18	Thin, burn, herbicide
15/23	24	Thin, burn, herbicide
15/39	20	Thin, burn, herbicide
23/4	15	Thin, burn, herbicide
23/10	91	Thin, burn, herbicide
Total Gold Cabin	224	
Footes Creek		
31/8	14	Thin, burn, herbicide
31/15	22	Thin, burn, herbicide
Total Footes Creek	36	
Bivens Branch		
16/8	31	Thin, burn, herbicide
16/12	17	Thin, burn, herbicide
405/9	76	Thin, burn, herbicide
406/7	89	Thin, burn, herbicide
406/3	13	Thin, burn, herbicide
406/2	52	Thin, burn, herbicide
406/12	39	Thin, burn, herbicide
406/6	44	Thin, burn, herbicide
Total Bivens Branch	361	

2) Maintain approximately 66.5 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 openings are listed in Table 8 and linear openings in Table 9.

Table 8. Spot wildlife openings for maintenance and daylighting

Opening number	Acres	Opening number	Acres
13-1	0.5	31-3	0.5
13-2	2.0	32-2	2.5
13-3	1.5	32-3	1.5
14-1	3.5	40-1	1.5
14-2	2.0	40-2	2.0
14-3	2.5	40-3	2.5
14-4	2.5	42-1	2.5
15-1	3.5	42-2	1.0
24-1	1.5	51-1	1.0
25-1	1.0	403-1	0.5
31-1	0.5	403-2	1.0
31-2	0.5		

Table 9. Linear wildlife openings for maintenance and daylighting

NFSR	Acres	Miles	NFSR	Acres	Miles
40321	3.0	1.5	5022B	3.0	1.5
404201	2.0	1.0	2604	6.0	3.0
40401	1.0	0.5	2051A	3.5	1.75
403101	2.0	1.0	44241	3.0	1.5
5022	3.0	1.5	44242	2.0	1.0

3) Seed 258 acres of timber harvest that are site preparation burned with a non-invasive grass seed mixture of native and non-persistent non-native species following burn.

4) Install ephemeral pools in temporary roads and gated roads in appropriate areas (approximately 10-30 pools up to 0.25 acre each).

5) Daylight by removing trees up to 25 feet from either side of National Forest System Road (NFSR) 36 Tavern Branch (0.75 miles), NFSR 40321 East Miller Ridge (1.25 miles), and NFSR 2604 Gold Cabin Branch (2 miles). 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.

The activities described above would contribute to meeting the following RLRMP objectives: Objective 14.02, Objective 15.02, Objective 17.06, Objective 21.02, Objective 21.03, and Objective 21.04.

Prescribed Burning– Proposed Activities

Prescribe burn to reduce fuel loads in the following units totaling approximately 18,100 acres: T05 Okra Top, T04 Bivens Branch, T07 Blue Mountain, T09 Cow Camp, T08 Jake Best, T06 Bark Camp, T10 Miller Ridge, T11 Flatts Foot Branch, and T15 Flats Mountain. Streams, roads, trails and handline would be used as fire lines. Approximately two miles of ground disturbance is also needed for fire lines. Prescribed burning is not proposed in Citico Creek Wilderness Ignition would occur along ridgelines with fire allowed to back on to lower slopes. Not all units would be burned in the same year. Not all units would be burned in the same year.

The activities described above would contribute to meeting the following RLRMP objectives: Objective 21.01, Objective 21.02, Objective 21.04, and Objective 24.01

Transportation System – Proposed Activities

1) Reconstruct approximately 11.5 miles of existing NFSRs to bring them up to haul standards. Work would primarily consist; of widening curves, placing spot gravel, brushing, minor re-shaping, cleaning and constructing dips and other drainage structures to improve overall drainage, upgrading culverts, and replacing gates. (See Transportation Analysis in project file for details by road).

2) Construct approximately .3 mile of temporary road to access stands. Temporary roads would be closed, stabilized and seeded with wildlife preferred species following completion of the project.

3) Decommission a portion of NFSR 36-1 (3 mi.) and 284F (.3 mi) to reduce sediment runoff. Decommissioning would involve; repairing ruts/erosion, constructing waterbars on grades that drain towards creek crossings, seeding the roadbed in areas where no vegetation exists and blocking the road with an earth berm. NFSR 36-1 would not be decommissioned until the new trails are in place.

4) Rehabilitate sections of unauthorized roads and trails using a combination of biotechnical techniques, rip rap and other materials to reconstruct the channels and banks. Unauthorized roads along tributaries to Little Citico Creek in several areas have diverted the stream from its channel, resulting in continuing erosion and sedimentation. Heavy equipment may be used during rehabilitation.

5) Perform maintenance on NFSRs needed for timber haul.

6) Add existing roads to the system: NFSR 2659A (.1 mile) and 40321 (.3 mile). NFSR 2659A accesses an existing spot wildlife opening and is also included in routine maintenance figure above. NFSR 40321 is an extension of the existing road to access a stand and is also included in the 11.5 miles of reconstruction listed above.

The activities described above would contribute to meeting the following RLRMP goals: Goal 47, Goal 48, Goal 49, and Goal 51.

Trail System – Proposed Activities

1) Design and construct approximately 16 miles of trails, designed for equestrian use, in the Citico Creek area originating from Young Branch Horse Camp. The trails would create several loops within the trail system.

2) Close approximately 2 miles of Trail 165-2 and improve approximately 1,300 feet of Trail 165-3. Trail 165-2 is causing sediment into Little Citico Creek. Closing and stabilizing the trail would reduce sedimentation. Trail 165-3 will be improved to FS standards and provide safer passage for horses. Trail 165-2 will not be closed until other trails are constructed.

3) Construct a parking lot of approximately 4 acres and 1.2 miles of connector trail to access the new trails.

4) Reclassify 2.3 miles of Mill Branch Hiking Trail (Trail 96) as a dual equestrian and hiking trail. Reroute a portion for easier horse use.

5) Stabilize the approaches to Trail 165-1 on Citico Creek to reduce sedimentation.

The activities described above would contribute to meeting the following RLRMP goals: Goal 30, Goal 31, Goal 32, and Goal 33.

Decision Framework

The decision to be made is whether or not to implement all or portions of the proposed action, or another alternative in order to fulfill the purpose and need for the proposal.

Public Involvement

Scoping, to solicit the issues and concerns related to the Proposed Action started on January 12, 2009. Letters (see Project File) were mailed to approximately 92 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 from October 2008 through July 2010.

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, Forest Plan, 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 reasons regarding their categorization may be found in the project file at the Tellico Ranger District.

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:

- The amounts, arrangements, and conditions of habitats are not in the optimal ratio to support native fish and wildlife species within the analysis area.
- White and Virginia pine, fire-intolerant species, are now found reproducing generally throughout the forest having replaced shortleaf, pitch, table mountain pine, and other pine or pine-oak communities on the landscape.
- Habitats that promote early successional wildlife species, including: open woodlands, savannahs, and grasslands; native warm-season grass fields; and young growth (early succession) in the general forest, are below optima.
- There are concerns about adverse impacts to hunting and fishing access as well as general driving access with proposed seasonal closure of roads or decommissioning of roads.
- Some roads should be decommissioned due of their location along streams and sediment contributions to those streams.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This chapter describes and compares the alternatives considered for the Middle Citico project. It includes a description and map of each alternative considered in detail. 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 A

No Action

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

Alternative B

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 Tellico Ranger District proposes the following actions to achieve the purpose and need (See Appendix A for maps).

- Maintain and restore natural oak and oak-pine communities through silvicultural treatments on approximately 35 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Maintain and restore shortleaf pine and shortleaf pine-oak communities through silvicultural treatments on approximately 233 acres of existing forested stands that have been altered from desired conditions due to previous land use.
- Improve forest health, species composition and promote advanced oak regeneration on 123 acres.
- Create approximately 621 acres of open pine and pine-oak woodlands on sites that would naturally support these communities.
- Maintain approximately 67 acres of existing spot and linear wildlife openings.
- Seed approximately 258 acres of harvested areas that are site preparation burned with a non invasive grass seed mixture following burn.
- Create ephemeral pools for amphibians and bats in temporary roads and log landings (approximately 10-30 pools).
- Daylight linear wildlife openings NFSR 36, NFSR 40321, and NFSR 2608 by removing timber up to 25 feet on either side of road.
- Complete prescribed burning on approximately 18,100 acres.
- Reconstruct 11.5 miles of existing NFSRs.
- Construct approximately .3 miles of temporary road.
- Decommission approximately 3.3 miles of NFSR to reduce sediment runoff.
- Perform maintenance on NFSRs needed for timber haul.
- Rehabilitate sections of legacy roads to prevent erosion.
- Add approximately .4 mile of existing road to the system.
- Construct 16 miles of trails designed for equestrian use.

- Construct a 4 acre parking area and 1.2 mile connector trail.
- Close 2 miles of trail, designed for equestrian use, causing sedimentation into Little Citico Creek and improve access to another trail.
- Stabilize a trail crossing at Citico Creek.
- Reclassify Mill Branch Hiking Trail as a dual hiking/equestrian trail.

Alternatives Not Considered in Detail

Alternative C

The original proposal scoped to the public included additional road decommissioning. The proposed action has been modified to address issues from scoping both internally and externally. Because the difference between the publically scoped alternative and the proposed action are relatively small, it was determined that a separate alternative to analyze the effects is unnecessary.

An alternative to rehabilitate Trail 165-2 to allow continued use was considered. Due to the location of the trail adjacent to the stream as well as the topography, this alternative was not considered in detail.

Mitigation 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.

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 measures would be followed:

- Three sites of *Eupatoreum steelei* occur in stands proposed for silvicultural treatments (15/8, 15/15, and 24/26), one site along a road with a proposed "daylighting" treatment, and one site along a proposed trail segment. All five sites have been marked in the field and would be avoided by project activities where feasible.

- One new site of *Lygodium palmatum* was found along the cut-slope of an existing road that has proposed "daylighting" treatments. This site has been marked in the field and can be avoided by designation of a "no-skid zone" during harvest activities.

- Numerous new sites for *Stewartia ovata* were found within stands proposed for timber harvest activities. All sites have been marked in the field and should be avoided where possible through directional felling and designation of no skid zones.

Comparison of Alternatives

This section provides a summary of the effects of implementing each alternative. Information in Table 10 is 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 11 is focused on the effects of the alternatives.

Table 10. Comparison of Alternatives

ACTIVITY	UNITS	ALT. A	ALT. B
VEGETATION			
Seedtree with reserves	Acres	0	192
Shelterwood with reserves	Acres	0	35
Clearcut with reserves	Acres	0	41
White pine removal	Acres	0	123
Site Preparation – slashdown and burning slashdown	 Acres Acres	 0 0	 233 25
Regeneration– Oak planting	Acres	0	25
Pine planting	Acres	0	233
Natural	Acres	0	10
Seedling release-chemical	Acres	0	258
WILDLIFE			
Woodland restoration	Acres	0	621
Maintenance of linear and spot openings	Acres	66.5	66.5
Seeding	Acres	0	258
Creation of ephemeral pools	Number	0	10-30
Daylighting	Acres	0	24
PRESCRIBED BURNING			
Dormant season burning	Acres	0	18,100
TRANSPORTATION			
Road reconstruction	Miles	0	11.5
Temporary road construction	Miles	0	.3
Decommission roads	Miles	0	3.3
Rehabilitation of roads	Miles	0	
Maintenance	Miles		20
System addition	Miles	0	.4
TRAIL SYSTEM			
Trail construction	Miles	0	17.2
Trail closure	Miles	0	2.0
Trail reconstruction	Miles	0	.24
Parking lot construction	Acres	0	4
Trail reclassification	Miles	0	2.3
Stream crossing stabilization	Number	0	1-2

Table 11. Summary of Effects

Resource	Alternative A	Alternative B
Biological Factors		
Mesic Deciduous Forest	No measurable effect	Benefit some species. Temporarily negatively affect individual MIS.
Eastern Hemlock and White Pine Forest	Decrease in hemlock due to HWA	Benefit many species.
Oak and Oak-pine Forest	No measurable effect	Positive effect to many species. Both positive and negative effects to MIS.
Pine and Pine-oak Forest	No measurable effect	Benefit many species. No effect to MIS.
Woodlands, Savannas, and Grasslands	No effect	Short term negative effect to some species. Benefit many species, including viability concern.
Successional Forested Habitats	Early successional habitat would decrease	Benefit many species, including MIS.
Permanent openings and old fields, Rights-of way, Improved pastures	No effect	Benefit many species, including MIS.
Terrestrial Riparian Habitats	Change in species composition due to HWA	No effect
Snags, Dens, and Downed Wood	Increase in this habitat	Minor reduction in available habitat
Aquatic Habitats	Existing sediment sources would continue	No effect
Threatened and Endangered Species	May adversely affect 3 fish species. No effect on other species.	Not likely to adversely affect.
Demand species	Habitat diversity would decrease	Benefit many species including MIS.
Invasive non-native plants and animals	No effect	Controls existing non native populations.
Species Viability	May impact individuals.	May impact individuals.
Forest Health	Increased vulnerability to insect and disease	Improve the health and vigor
Social Factors		
Scenery and Recreation	No increase in recreational opportunities	Increase in recreational opportunities
Heritage Resources	No effect	No effect
Civil Rights	No effect	No effect
Economics	No revenues to benefit local economy	Positive Cost/Benefit Ratio
Physical Factors		
Water	Continued sediment input into Citico Creek	Decreased sediment input into Citico Creek
Soil	No measurable effect	No measurable effect
Climate	No measurable effect	No measurable effect

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 Table 9.

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 (White Oak Flats); prescribed burning and wild fires; recreational uses (i.e. camping, hiking, hunting, fishing, scenic driving, horseback riding, etc.); utility right-of-way (ROW) and road maintenance; corridor dispersed camping improvements; non-native invasive species treatments; illegal OHV use; and impacts from southern pine beetle (SPB) and hemlock wooly adelgid (HWA).

Activities that are currently occurring in the analysis area include: prescribed burning and wildfires; recreational uses; maintenance of roads, existing ROWs, trails and campgrounds; changes in private land use patterns; non-native invasive species treatments; illegal OHV use; and impacts from HWA.

Reasonably foreseeable activities expected in the analysis area include: harvesting; maintenance of roads, existing ROW's, trails and campgrounds; prescribed burning and wildfires; recreational uses; impacts from HWA; changes in private land use patterns; treatments of non-native invasive species; illegal OHV use; and additional acres added to Citico Creek Wilderness.

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 forest planning (USDA 2004b). Use of this framework is designed to ensure comprehensive consideration of effects to the biological environment. Elements in this framework are listed in Table 12, where they are assessed for their relevance to this project. Only those relevant to the project are analyzed further in this document.

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 April 20, 2010. Data for the 27 compartments in the Middle Citico Creek analysis area (9, 10, 11, 13, 14, 15, 16, 17, 22, 23, 24, 25, 31, 32, 33, 40, 41, 42, 51, 402, 403, 404, 405, 406, 428, 429 and 430) 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 17.

Table 12. Elements of the biological environment, derived from RLRMP analysis, and their relevance to Middle Citico Creek.

Biological Element	Discussed Further?	Relevance to this Project
Mesic Deciduous Forest	Yes	Mesic deciduous forests occur on 6492 acres (27%) in the area. Mesic deciduous forest would be impacted by the proposed activities.
Spruce-fir Forest	No	There are no spruce-fir forests in the area.
Eastern Hemlock and White Pine Forest	Yes	Hemlock or white pine forests occur on 2660 acres (11%) in the area, and 264 acres would be impacted by the proposed activities.
Oak and Oak-pine Forest	Yes	Oak and oak-pine forests occur on 5027 acres (21%) in the area. and 149 acres would be impacted by the proposed activities.
Pine and Pine-oak Forest	Yes	Pine and pine-oak forests occur on 12,137 acres (50%) in the area and 652 acres would be impacted by the proposed activities.
Woodlands, Savannas, and Grasslands	Yes	The proposed action includes creation of this type of habitat
Rare Communities		
Wetland Communities	Yes	An occurrence of a Cumberland Forest Acid Seep is reported for Stand 406/7. There are likely some additional small wetlands associated with the many small streams in the project area.
Barrens, Glades, and Associated Woodlands	No	None of this type of habitat occurs in the area.
Carolina Hemlock Forests	No	None of this type of habitat occurs in the area.
Table Mountain Pine Forests	No	There are no known acres of this forest type in the area.
Basic Mesic Forests	No	Occurrence of this forest type in the area is unknown.
Beech Gap Forests	No	None of this type of habitat occurs in the area.
Rock Outcrops and Cliffs (includes forested boulderfields)	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 area.

Table 12. Elements of the biological environment, derived from RLRMP analysis, and their relevance to Middle Citico Creek.

Caves and Mines	No	No caves are known to occur in the area.
Successional 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, Rights – of-way, Improved pastures	Yes	The project proposes to maintain this type of habitat
Forest Interior Birds	No	The affected area is not identified in the RLRMP as an area where edge effect is an issue.
Old Growth	Yes	This type of habitat may occur in the area.
Riparian Habitats	Yes	Riparian habitats occur within or near the proposed affected areas.
Snags, Dens, and Downed Wood	Yes	Snags occur in or near the proposed affected areas.
Aquatic Habitats	Yes	Aquatic habitats occur in the proposed affected areas.
Threatened and Endangered Species	Yes	Potential effects to T and E species will be analyzed.
Demand Species	Yes	Demand species could be impacted by the project.
Migratory Birds	No	Migratory bird issues are included in individual Major Forested Communities sections and therefore are not represented in a separate section.
Invasive Non-native Plants and Animals	Yes	Invasive non-natives are located in the area.
Species Viability	Yes	Species with viability concerns occur in the area.
Forest Health	Yes	Forest health is an issue in the area.

The RLRMP selected management indicator species (MIS) as a tool to help indicate effects of management on some elements of this framework. A subset of these MIS is selected for consideration in this analysis because their populations or habitats may be affected by the project (Table 13)

Table 13. Forest-level Management Indicator Species

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 communities associated with the affected 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.
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 some are 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 some are subject to management actions.

Existing Condition Major Forest Communities

The analysis area encompasses approximately 24,200 acres within the Citico Creek 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 approximately 1000 feet to 3,000 feet above sea level. Dry upland sites occupied by white pine, 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 greenbrier are present. Common herbaceous species include galax, poison ivy, ferns, trillium, and smilax. Approximately 59% of the 27 compartments are greater than 80 years of age. There are currently 366 acres within the 0-10 year age class (base year 2010) of the total forested acres in the 27 compartments.

Perennial water sources are readily accessible from all parts of the compartments. Openland, grassy wildlife openings within the compartments total approximately 14 miles of linear wildlife openings and approximately 38 acres of spot openings.

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 identified on the CNF (Table 14). The RLRMP Final Environmental Impact Statement (FEIS) further groups these 9 forest community types into 5 major forested communities (USDA 2004b) (Table 15).

Table 14. Forest community types, as defined in the 2004 RLRMP, found on the CNF

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-nutall oak-willow oak (62), Black Walnut (82)	1,086

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

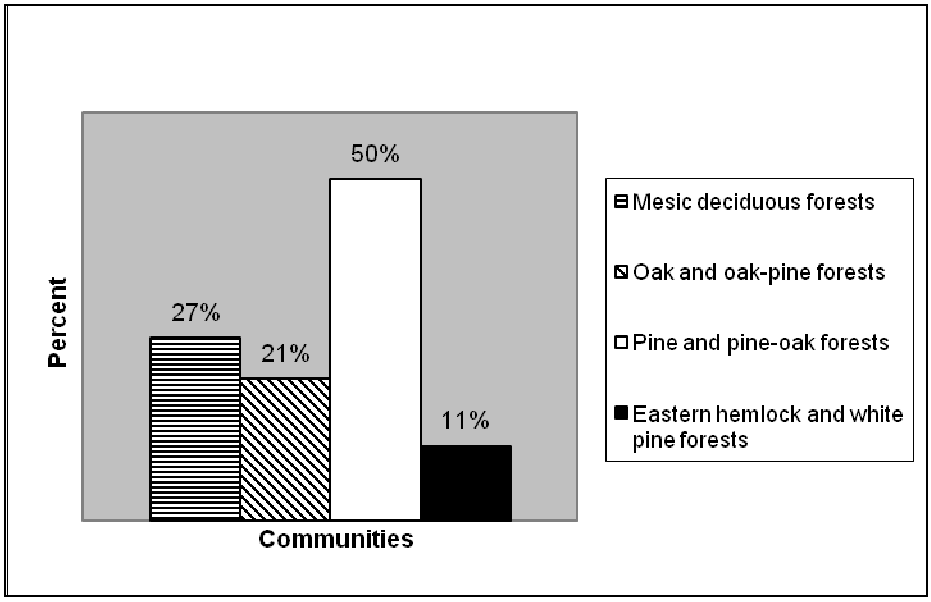
Table 15. Major forested communities, as defined in the 2004 FEIS for the RLRMP and Number of Acres in Citico Creek.

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).	6,492
Spruce-Fir Forest	Fraser fir (6), Red spruce-Fraser fir (7), Red spruce-Northern hardwood (17).	0
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).	2,660
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), Chestnut Oak (52), White oak-Red oak-Hickory (53), White oak (54), Northern red oak (55), Scarlet oak (59), Chestnut oak-Scarlet oak (60).	5,027
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).	12,137

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

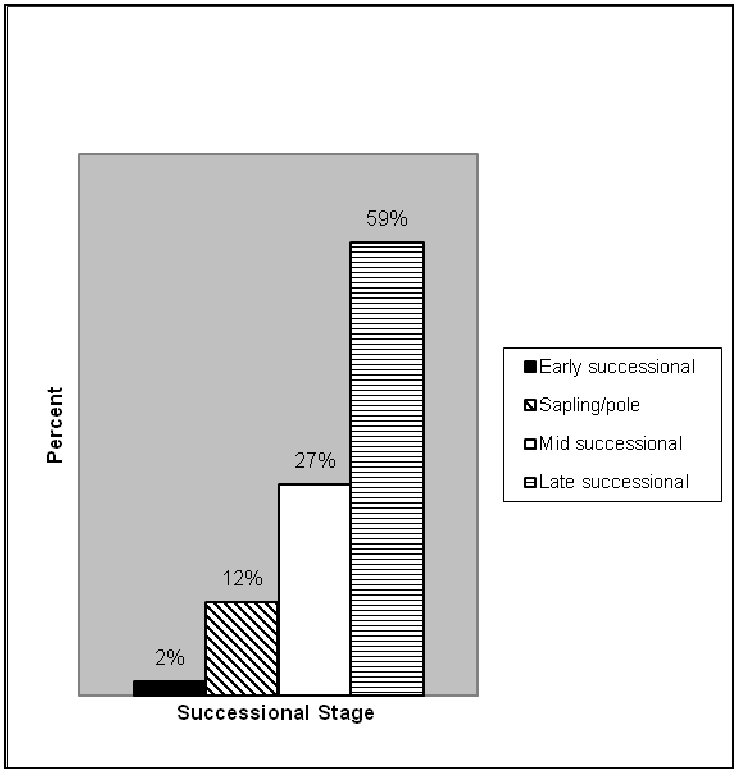
The percentage distribution of major forest communities and corresponding successional stages are presented in Figures 2 and 3. The following chart (Figure 2) displays the major community groups in the area. The percentages of the major forested communities do not equal 100% because some forest types can be a component of more then one community.

Figure 2. Middle Citico Creek Major Forested Communities



Pine and pine-oak forests comprise the majority of the landscape at 50%. Mesic deciduous forests are the next most plentiful, while oak and oak-pine forests and eastern hemlock and white pine forests are the least abundant. Community descriptions can be found in the RLRMP FEIS (USDA 2004b) beginning on page 97.

Figure 3. Middle Citico Creek Successional Stages Existing Condition



Data for the analysis area and surrounding landscape (approximately 44,055 acres including compartments 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 31, 32, 33, 34, 40, 41, 42, 43, 48, 49, 50, 51, 52, 62, 402, 403, 404, 405, 406, 407, 409, 412, 415, 424, 428, 429, 430 and 435) has been analyzed for cumulative effects. (Map of the cumulative effects area is located in project file).

Forage availability (herbaceous material, browse, and soft mast) is low to moderate throughout most of the forest in the area. Snag density appears to be average to high. This is a result of several factors including the recent SPB and HWA outbreaks, stand age and condition, species composition, and further susceptibility to insect, disease, and storm damage. Snag densities are expected to increase as existing stands mature and pines continue to die. Cover in the form of shrubby habitat is low to moderate. Many of the streams and hollows in the area have a good deal of downed trees, primarily as a result of past storms and insect outbreaks.

In the stands proposed for harvest, the dominant overstory component is conifer and mixed conifer-hardwood. The midstory and herbaceous layers vary within forest types and communities.

The primary wildlife management concern within the Middle Citico Creek compartments is the lack of habitat diversity. Proposed actions are aimed at restoring communities based on their ecological potential. From a wildlife standpoint, proposed actions are designed to diversify vegetation by increasing the amount of 0-10 year old stands in order to increase browse and cover, creating open woodlands for foraging and nesting habitat, promoting hard mast production by planting oak as well as planting pine on a wide spacing within harvested stands thereby

allowing reproduction of oaks, controlling non-native invasive plant species, and increasing upland water sources.

The following sections describe the affected environment and effects by alternative for each biological element listed above in Table 12.

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 Middle Citico Creek analysis area, mesic deciduous forests are the 2nd most abundant forest community type comprising 27% (6,492 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

Alternative A (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.

White pine occurs on several inappropriate sites in the Middle Citico Creek analysis area. Silvicultural techniques can be used as a tool to remove species not occurring on appropriate sites and reduce/remove invasive and non-native species. Allowing these species to persist negatively impacts forest health, tree vigor, wildlife browse, and reduces quality habitat available for 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 A would have no effect on populations of this management indicator.

Alternative B (Proposed Action)

No timber harvest or woodland creation is proposed for this habitat type. Prescribed burning is proposed for several units across the analysis area and some burning may occur in mesic deciduous forests. However, the likelihood of these areas actually carrying fire in minimal. The proposed application of prescribed fire in the analysis area would theoretically benefit mesic deciduous 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 improving wildlife habitat for many species by improving forage and browse quality.

Other actions proposed in Alternative B, including maintenance of wildlife openings; creation of ephemeral pools; road construction, reconstruction, and maintenance; and trail construction would not 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 plan implementation, long term stability or increases in mature mesic forest is expected (USDA 2004a).

Prescribed burning is generally beneficial for mesic deciduous 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.

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 analysis 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 analysis 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 analysis 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 hemlock wooly adelgid (*Adelges tsugae*) 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 would 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 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 Eastern Hemlock and White Pine forest

Eastern hemlock and white pine forests are broadly defined to include those forested communities that are either dominated or co-dominated by eastern hemlock (*Tsuga canadensis*) or eastern white pine (*Pinus strobus*) in the canopy. For the purposes of this assessment, forests with a significant component of eastern hemlock are classified as hemlock forests, even where white pine may be dominant (CISC types 4, 5, 8). White pine forests include all other forests where white pine is dominant (CISC types 3, 9, 10). This division puts priority on the presence of hemlock as a key habitat component.

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.

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, including 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 (USDA 2004a). There is some evidence that hemlock-white pine forests provide necessary habitat components for the long-term conservation of red crossbills (USDA 2004a).

Eastern hemlock forests may also be important refugia for species typically adapted to higher elevations. Red-breasted nuthatches, winter wrens, and golden-crowned kinglets are found in late successional hemlock forests down to elevations of 2,000 feet and 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 (USDA 2004a).

The current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the HWA 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 (SAMAB 1996).

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. There are currently approximately 45,125 acres of white pine forest types on the CNF, 6,664 acres of which originated as plantations. This assessment area includes 2,660 acres of hemlock or white pine forests.

Two key habitat variables are selected as management indicators to monitor the condition of eastern hemlock and white pine forests. The number of acres of hemlock forests infested with HWA and the number of acres of white pine plantations restored to diverse native communities will be tracked annually.

Direct and Indirect Effects Eastern Hemlock and White Pine Forest

The action alternative proposes a maximum of 234 acres of white pine forests be treated by timber harvest. Table 16 shows the number of acres of white pine forest that would be affected by timber harvest under each alternative by treatment type.

Table 16. Acres of White Pine Forest Treated by Treatment and Alternative

Treatment	Alt. A	Alt. B
Seedtree or shelterwood with reserves	0 acres	111 acres
Thinning	0 acres	108 acres
White pine removal	0 acres	15 acres
Total	**0 acres**	**234 acres**

Alternative A (No Action)

Without treatment in white pine forests, white pine would increase and continue to become established in forests where it is not historically naturally occurring. Oaks and other native species would decrease leading to a reduction in mast and other wildlife habitat components. Non-native invasive species would also continue to increase due to a lack of management. Native plants would be displaced and suitable habitat for wildlife would decrease.

The understory in white pine stands is notably lacking in herbaceous cover. Without removal of white pine in off site areas, this condition would continue and become more prevalent as white pine invades other stands in the forest.

Alternative B (Proposed Action)

Under this alternative, 234 acres would be harvested to begin restoration of diverse natural communities. The eventual forested stands would approximate desired future conditions

favoring a mixed stand of tree species. This would increase the diversity of the forest and eventually favor more mast producing species.

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. The goal is to restore natural communities which have been displaced by off-site tree species including white pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat. Herbicide use would reduce the number of non-native invasive species leading to an increase in native plants and wildlife habitat.

The other actions in Alternative B, including herbicide use, maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction, trail construction and other activities would not appreciably affect the community.

Cumulative Effects Eastern Hemlock and White Pine Forest

All Alternatives

Prescribed burning near any of the affected areas would reduce white pine in the understory. White pine is susceptible to burning. Without burning and other treatments to reduce the amount of white pine, it would continue to increase across the analysis area. Noxious weed species would also increase without treatments for control. Non-native invasive species crowd out native species, decreasing habitat for native wildlife.

Other timber harvests that have taken place are so minimal as to have almost no effect. Despite protection and restoration objectives given in the RLRMP, the current amount and distribution of mature eastern hemlock forests is threatened by the recent emergence of the HWA in the southern Appalachians. The fact that this community type is naturally limited in distribution, coupled with the impending threats from the HWA that will impact the species regardless of land ownership, leaves the long-term maintenance of historical distribution and abundance of this community type in question.

Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 17) 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. 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*) (USDA 2004b). The predominant forest type included in the analysis area in this community is white oak-red oak-hickory. The dry to mesic oak-pine forests considered here are oak-dominated forests containing a significant pine component. Predominant pine species include white pine (*Pinus strobus*), shortleaf pine (*P. 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 (USDA 2004b). Oak and oak-pine forests are common throughout the South, comprising over half of the timberland of the region as a whole (USDA 2004b). Oak-hickory forests are the dominant forest type in the Southern Appalachian Ecoregion.

Oak forests are abundant on the CNF, comprising 36 percent of the CNF 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.

Several management indicators have been identified for assessing effects to oak and oak-pine forest communities. These indicators include both MIS and key habitat variables. Because of their wide distribution across moisture gradients, mid- and late-successional oak and oak-pine forests support a wide variety of species. Drier oak forests support a slightly different mix of species due to their more open condition. To represent this upland oak community, the scarlet tanager is selected as an MIS. This species is most abundant in upland mature deciduous forest (Hamel 1992).

Scarlet Tanager (MIS)

The breeding range of scarlet tanager (*Piranga olivacea)* 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 2004). 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). 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 scanty 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 woods (according to some sources, prefers pole stands).

Direct and Indirect Effects Oak and Oak-pine Forest

Alternative A (No Action)

There would be no direct effects of the No Action Alternative. However, there would be indirect effects by no action. Prescribed fire would not be used. Lack of treatment with burning and timber removal would mean oak trees preferred by nesting scarlet tanagers would age and fall from the canopy, and would be often replaced by white pine or maple. This would lead to a reduction in scarlet tanager habitat. No new oak-pine habitat would be created.

Alternative B (Proposed Action)

The action alternative proposes a maximum of 148 acres of oak and oak-pine forests be treated by timber harvest. Table 17 shows the number of acres of white pine forest that would be affected by timber harvest under each alternative by treatment type.

Table 17. Acres of Oak and Oak-Pine Forest Treated by Treatment and Alternative

Treatment	Alt. A	Alt. B
Seedtree with reserves	0 acres	17 acres
Woodland creation	0 acres	131 acres
Total	**0 acres**	**148 acres**

Under this alternative, approximately 148 acres would be treated to restore natural community assemblages. Burning and other treatments would benefit natural systems. The goal of the timber harvest and other treatments is to restore natural communities which have been displaced by off-site tree species including white pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat.

These treatments would have both negative and positive impacts to scarlet tanager. Removal of the overstory would reduce nesting sites in those stands. However, the stands proposed for treatments are currently not preferred nesting habitat. In addition, the harvest would diversify the understory. Suitable habitat would increase as the stands grow. There would also be ample habitat remaining in the surrounding forest. Conditions in other areas would remain relatively stable as the forest ages with the possible exception of natural storm events or wildfire.

Herbicide use would promote desired species growth, contributing to an increase in habitat for wildlife. 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.

The other actions in Alternative B, including herbicide use, maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities would not appreciably affect the community with the exception of planting oak which would benefit the community and MIS long term.

Cumulative Effects Oak and Oak-pine Forest

Alternative A (No Action)

Insects and diseases such as gypsy moth 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 Forest's northeastern counties, and spread of the infestation is expected to expand throughout the Forest 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 activity such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases.

Past prescribed burns may have reduced the understory temporarily, thus affecting foraging habitat for the MIS. However, with the understory sprouting that typically occurs after a prescribed burn, the area would again provide better habitat to tanagers within a year or two.

There would be no cumulative effect to scarlet tanagers 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 scarlet tanager when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from HWA apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 17) would have little effect.

Cumulatively, Alternative A would not have an effect to scarlet tanager.

Alternative B (Proposed Action)

Insects and diseases such as gypsy moth 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 Forest's northeastern counties, and spread of the infestation is expected to expand throughout the Forest 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 activity such as thinning and burning that encourage oak reproduction to offset the impacts of these insects and diseases. One of the management objectives of this project is to enhance oak. The action alternative would revert some acres to early successional habitat conditions, which may have some long-term forest health benefits through diversification of age-class distributions.

Prescribed burning in or near any of the affected areas would remove understory in some areas, making the area temporarily less attractive to scarlet tanagers. However, with the understory sprouting that typically occurs after a prescribed burn, the area would again provide better habitat to tanagers within a year or two. 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 scarlet tanager when sunlight from the increased canopy openings caused a flush of new and dense undergrowth.

The death of hemlock from HWA apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 17) would have little effect.

Cumulatively Alternative B would benefit scarlet tanagers in some areas and have no effect in other areas.

Existing Condition Pine and Pine-oak forest

Pine dominated forests covered in this section include all "Southern Yellow Pine"

(USDA 2004a) 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 (NatureServe 2002). 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.

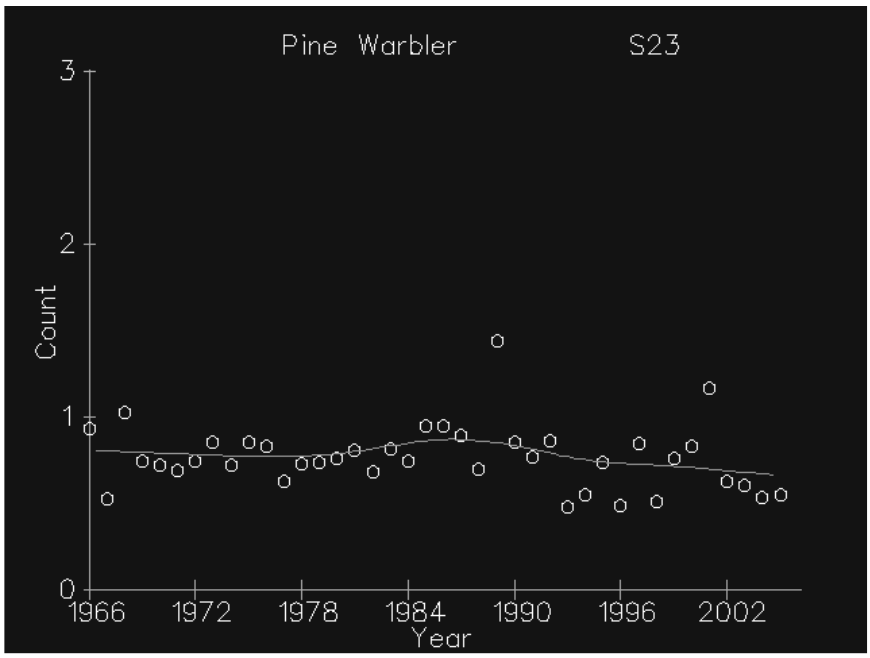
The assessment area includes 50% (12,137 acres) pine and pine-oak communities.

Pine Warbler (MIS)

The pine warbler (*Dendroica pinus*) is a short-distance migrant and summer resident that occurs primarily at elevations below 3500 feet. It is apparently more abundant on the southern ranger 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) (Sauer et al. 2005).

Figure 4. Breeding Bird Survey trend data for Pine Warbler, Blue Ridge Mountain region.



Direct and Indirect Effects Pine and Pine-oak Forests

Table 18 shows the number of acres of pine and pine-oak forests that would be affected by timber harvest under each alternative by treatment type.

Table 18. Acres of Pine and Pine-Oak Forest Treated by Treatment and Alternative

Treatment	Alt. A	Alt. B
Seedtree with reserves	0 acres	99 acres
Clearcut with reserves	0 acres	41 acres
Woodland creation	0 acres	488 acres
Total	**0 acres**	**628 acres**

Alternative A (No Action)

There would be no direct effects of the No Action Alternative. However, there would be indirect effects by no action. Prescribed fire and herbicide would not be used. Lack of treatment with burning and timber removal would mean shade tolerant species, likely white pine or maple, would secede into pine and pine-oak communities reducing habitat of species which prefer those habitat types. This would lead to a reduction in pine warbler habitat

Alternative B (Proposed Action)

Under Alternative B, 628 acres of pine and pine-oak would be treated by timber harvest. The timber harvest and other treatments would promote and maintain these communities. The maintenance of naturally occurring pine and pine-oak would benefit species dependent on that habitat type, including the pine warbler. Furthermore, the amount of shade tolerant species that would replace these communities without treatment would be reduced.

Creation of early successional habitat within this forest type is intended to provide optimal habitat conditions for species that depend on both late and early successional habitats including black bear, white-tailed deer, eastern wild turkey, ruffed grouse, and a variety of non game species. Shrubby and grassy habitats interspersed among the remaining mid to late successional habitats within the activity area provide soft mast and other forage, cover, and bugging areas important to those species. The importance of this habitat is further discussed in the section of this document pertaining to “Successional Habitats”.

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. Burning and other treatments to open these stands would benefit natural systems. The goal is to restore natural communities which have been displaced by off-site tree species including Virginia pine and other vegetation. These would lead to the diversification of the forest as a whole which would benefit many animal species by creating more forage, nesting, and brood habitat. Herbicide use in the utility corridor would prevent regrowth of pine and oak creating a permanent early successional stage. Herbicide use in cut stands would lead to establishment of desired pine and oak species. The other actions in Alternative B, including maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities would not appreciably affect the community.

Cumulative Effects Pine and Pine-oak Forests

Alternative A (No Action)

Prescribed burning in or near any of the affected areas would benefit this community by suppressing shade tolerant species. Pine and pine-oak communities would be favored.

Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the community and MIS in some areas where pine was either planted or regenerated naturally. In other areas where red maple and other species are prolific, the community did not respond favorably.

The death of hemlock from HWA apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 17) would have little effect.

Cumulatively Alternative A would benefit the community and MIS in some areas and have no effect in other areas.

Alternative B (Proposed Action)

Prescribed burning in or near any of the affected areas would benefit this community by suppressing shade tolerant species. Pine and pine-oak communities would be favored.

Other timber harvests that have taken place are so minimal as to have almost no effect. The SPB outbreak likely benefited the community and MIS in some areas where pine was either planted or regenerated naturally. In other areas where red maple and other species are prolific, the community did not respond favorably.

The death of hemlock from HWA apparently would not affect this community or MIS to any extent, but its effects are not clear. Any development on private land would potentially decrease the availability of this habitat. Other past, present and reasonably foreseeable activities (see page 17) would have little effect.

Cumulatively Alternative B would benefit the community and MIS in some areas and have no effect in other areas.

Existing Condition Woodlands, Savannas, and Grasslands

Complexes of woodlands, savannas, and grasslands were once a frequent occurrence across portions of the southeastern landscape, primarily in the Piedmont and Coastal Plain provinces. Smaller occurrences likely occurred in the southern Appalachians on xeric ridge-tops and south-facing slopes where they were maintained by frequent fire (USDA 2004). Woodlands are open stands of trees, generally forming 25 to 60 percent canopy closure and may be of pine, hardwood (typically oak), or mixed composition. Savannas are usually defined as having lower tree densities than woodlands; grasslands are mostly devoid of trees. All of these conditions typically occurred in mixed mosaics within a fire-maintained landscape. In all cases, a well-developed grassy or herbaceous understory is present.

Existing remnants of this habitat in both the southern Appalachians and Piedmont are limited primarily to roadsides and powerline rights-of-way due to reductions in fire frequency across most landscapes. One hundred thirty-seven species of viability concern are associated with this

community in the southern Appalachian region. Of these, thirty-five species are of concern on the CNF. Because existing woodland, savanna, and grassland complexes are rare and not consistently tracked, the current acreage in such conditions is not well documented. These communities would likely occur on landforms currently occupied by xeric pine and oak communities. The distribution and condition of xeric pine and oak forests are discussed in other sections of this document.

In an effort to restore some of the ecological role that these communities have historically played, the RLRMP includes objectives for restoring complexes of woodlands, savannas, and grasslands to fire-maintained landscapes. Desired conditions include heterogeneous canopy coverage averaging 25 to 60 percent, and dense grass and herbaceous ground layers. Scattered patches may be devoid of canopy to provide for interspersed savanna and grassland conditions. These would generally occur on drier ridges and slopes. Other more mesic areas of the stands would be left intact. Restoration activities may include thinning of trees (generally to less than 60 sq. ft. of basal area per acre) and prescribed burning. Prescribed fire on relatively short rotations (1 to 3 years) typically would be used to maintain desired conditions, and may involve both dormant and growing season fires.

Direct and Indirect Effects Woodlands, Savannas, and Grasslands

Alternative A (No Action)

There would be no treatment to establish and maintain this community. Forests would continue to age, and non-native invasive species would continue to increase.

Alternative B (Proposed Action)

Restoration and maintenance activities on approximately 621 acres would provide habitat for species associated with these community types, including several species of viability concern. Fire adapted species are expected to increase over time within these areas.

Restoration and maintenance activities, including prescribed burning, may cause some short-term negative effects to individual species, by causing disturbance, mortality, or temporarily setting back plant and animal reproduction or growth. The use of prescribed fire is designed to restore these plant communities to a more natural species assemblage, and the goal is to have a long-term beneficial effect on organisms associated with xeric woodlands. Species associated with this community are relatively adapted to such disturbances, which are necessary to create and maintain optimal habitat conditions. In balance, these actions would result in long-term beneficial effects to associated species including thirty-five species are of concern on the CNF.

These areas would be monitored periodically to determine if the results are as expected. Informal walk-through surveys would be done after treatments to assess effects.

Herbicide use would reduce the number of non-native invasive species leading to an increase in native plants and wildlife habitat. The other actions in Alternative B, including maintenance of wildlife openings, planting pine and oak, creation of ephemeral pools, road construction and reconstruction and other activities would not appreciably affect the community.

Cumulative Effects Woodlands, Savannas, and Grasslands

Alternative A (No Action)

Past prescribed burning likely benefited this community by keeping the canopy open and increasing the grassy component, especially in areas affected by SPB. Future prescribed burning would do the same. Other past and future activities would have little effect. The death of hemlock from hemlock woolly adelgid apparently would not affect this community, but its effects are not clear. Other past, present and reasonably foreseeable activities (see page 17) would likely not affect woodlands, savannas and grasslands. Therefore, there would be no cumulative effects to woodlands, savannas and grasslands.

Alternative B (Proposed Action)

Past prescribed burning likely benefited this community by keeping the canopy open and increasing the grassy component, especially in areas affected by SPB. Utility rights of way may increase the amount and benefits of this community if maintained in a grassy state. The death of hemlock from hemlock woolly adelgid apparently would not affect this community, but its effects are not clear. Other past, present and reasonably foreseeable activities (see page 17) would likely not affect woodlands, savannas and grasslands.

Historically present on xeric sites due to presence of fire, these habitats are much reduced today. Restoration would improve their distribution, but not likely to historical levels under any alternative. Restoration and management activities on National Forests would play a critical role in the conservation of this community within the landscapes containing NFS land. Natural woodland, savanna, and grassland habitats are currently rare, occurring on private ownerships primarily along mowed roadside and powerline rights-of-ways. It is not expected that private landowners will restore or manage to maintain significant amounts of woodland, savanna, and grassland complexes; therefore, they would remain limited in acreage without national forest restoration efforts.

Existing Condition Wetland Communities

Most large wetland complexes on the Forest have been mapped and are designated in the RLRMP as rare communities. Smaller occurrences that meet the rare community definitions provided in the RLRMP will be managed under the rare community prescription as they are found. An occurrence of a Cumberland Forest Acid Seep wetland is reported for Stand 406/7. This community type is listed as rare community in the RLRMP and thus is subject to the standards of MP 9.F. There are likely some additional small wetlands associated with the many small streams in the analysis area, though these are likely encompassed within the riparian corridor and thus afforded protection through the Riparian (11) MP.

Direct and Indirect Effects Wetland Communities

Alternative A (No Action)

Under this alternative no project activities would be implemented, thus there would be no direct or indirect effects to wetland communities under this alternative.

Alternative B (Proposed Action)

MP 9.F states that "management actions that may adversely alter the hydrologic conditions of wetland rare communities are prohibited." The treatment proposed for stand 406/7 is woodland creation and would be limited to portions of the stand that support xeric communities suitable for achieving this objective. The occurrence of a Cumberland Forest Acid Seep wetland would not be affected by these treatments. Likewise, proposed dormant season fuel reduction burns would not affect this community. No effects to this rare community are expected.

Cumulative Effects Wetland Communities

All Alternatives

The RLRMP recognizes the value of rare communities on the landscape and provides for their protection. It is estimated that more than 50% of the nation's wetlands have been destroyed in the past 200 years (Ernst and Brown 1988). Because wetlands are so vulnerable to destruction on private land, it is critical to maintain these communities where they occur on NFS land. Because the CNF places priority on protection and maintenance of rare communities regardless of alternative, cumulative effects on NFS lands are expected to be positive.

Existing Condition Successional Habitats

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 (USDA 2004a). 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.

This section deals only with successional forest conditions. 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. Mid- and late-successional/old growth conditions can be found under individual forest community sections.

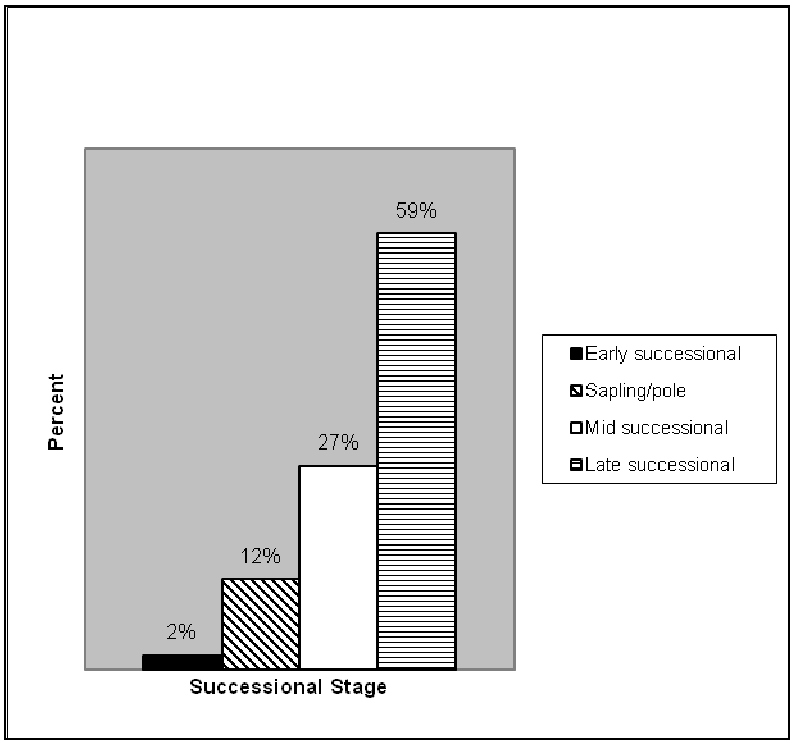
Early-successional forests are important because they are highly productive in terms of forage, diversity of food sources, insect production, nesting and escape cover, and soft mast. Early-successional forests have the shortest lifespan (10 years) of any of the forest successional stages, and are typically in short supply and declining on national forests in the southern Appalachians, and in the eastern U.S. (USDA 2004a). Early-successional forests are also not distributed regularly or randomly across the landscape. These habitats are essential or beneficial for some birds (ruffed grouse, chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, blue-winged warbler); beneficial to deer, turkey, and 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 2004a).

Based on R8 FSVeg age class distribution dated 20 April 2010, approximately 59% of the acreage in the 27 compartment assessment area is greater then 80 years of age at this time. There

are currently 455 acres (2%) within the 0-10 year age class (base year 2010) of the total forested acres.

The percentage distribution of successional stages is presented in Figure 5.

Figure 5. Middle Citico Creek Existing Successional Stages



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 2004b). 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 United States (Trend -2.08, P value 0.0000; Sauer et al. 2005).

Direct and Indirect Effects Successional Habitats

Alternative A (No Action)

No additional early successional habitat would be created with this alternative. Forests would continue to age, affected by an increase in shade tolerant species that don't provide habitat for species that use these communities. There are currently 455 acres of existing forest in the 0-10 year age class, (2% of the analysis area). These areas would continue to grow and age, making

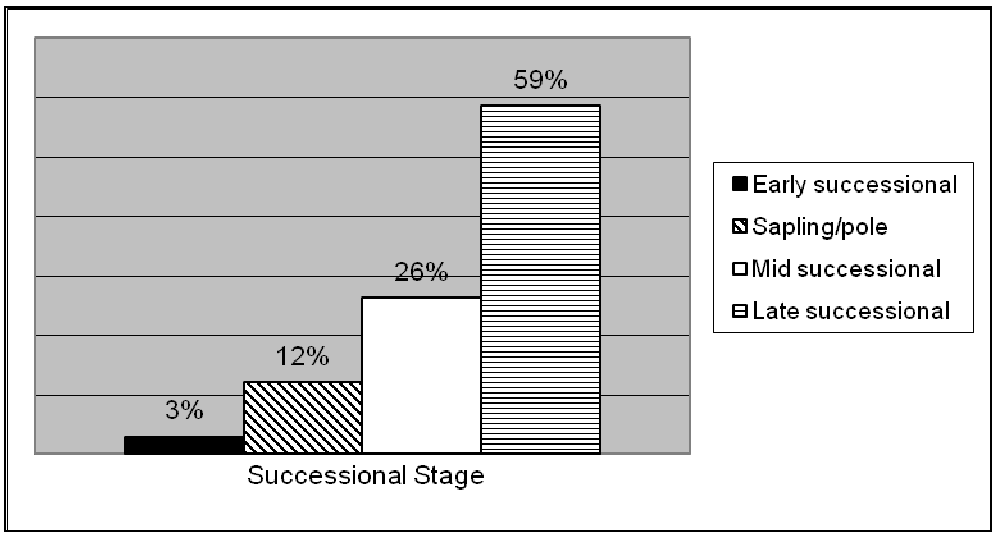
them less suitable habitat for prairie warbler and other species dependent upon early successional communities.

This alternative would indirectly negatively affect prairie warbler by reducing habitat. No early successional habitat would be created with the possible exception of natural storm events, insect outbreaks or wildfire.

Alternative B (Proposed Action)

Under this alternative, 268 acres (1% of the area) would be treated to create early successional habitat. Creation of early successional habitat is intended to provide optimal habitat conditions for species that depend on early successional habitats including chestnut-sided warbler, golden-winged warbler, prairie warbler, yellow-breasted chat, and blue-winged warbler. The percentage distribution of successional stages if Alternative B is implemented is presented in Figure 6.

Figure 6. Middle Citico Creek Successional Stages Alternative B



The proposed action would harvest 268 acres of forest bringing the early successional age class to 3%. None of the other proposed activities would affect prairie warbler because they don't affect its habitat. Alternative B would create 268 acres or 1% more prairie warbler habitat.

Alternative B would benefit prairie warbler by creating more nesting habitat.

Cumulative Effects Successional Habitats

All Alternatives

Any activity which would open the understory and create patchy openings would benefit this community and MIS. This includes prescribed burning, timber harvest, utility ROW herbicide, and SPB affected areas. Recreation would not affect these types of habitats. Therefore, there would be beneficial cumulative effects to prairie warbler. The development of private land may have a detrimental affect if the land is converted to a use other than forested land.

Existing Condition Permanent openings and old fields, Rights-of-way, Improved pastures

Habitats considered here include permanent openings and old fields, utility ROW, and improved pastures. Other early successional habitats such as early successional forests are discussed elsewhere in this document.

Permanent Openings and Old Fields

Permanent grass/forb and seedling/sapling/shrub habitats are important elements of early successional habitat. Permanent openings typically are maintained for wildlife habitat on an annual or semi-annual basis with the use of cultivation, mowing, or other vegetation management treatments. These openings may contain native grasses and forbs, but many are planted to non-native agricultural species such as clover, orchard grass, winter wheat, annual rye, or other small grains. Old fields are sites that are no longer maintained and or succeeding to forest or are maintained on a less frequent basis (5-10 year intervals, usually with burning and mowing). They are largely influenced by past cultural activities and may be dense sod or a rapidly changing field of annual and perennial herbs, grasses, woody shrubs and tree seedlings.

Permanent openings are used by a variety of wildlife, both game and non-game species. The benefits of permanent openings to white-tailed deer are well documented. Permanent openings, especially those containing grass-clover mixtures, are used most intensively in early spring, but also are 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.

There also are numerous wildlife benefits from openings maintained in native species. Native warm season grasses provide nesting, brood-rearing, and roosting habitat for northern bobwhite and other grassland species of wildlife. Native species are well adapted to local environments and generally require less intensive maintenance following establishment.

Old fields provide food and cover for a variety of wildlife species. A number of disturbance-dependent birds, such as northern bobwhite, grasshopper sparrow, golden-winged warbler, and blue-winged warbler are associated with old field habitat. Recently abandoned fields are important for rabbits and many small mammals. Woodcock use old fields as courtship, feeding, and roosting sites. Although managed less intensively than other types of permanent openings, some degree of periodic management is necessary to maintain these habitats.

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.

The openland, grassy wildlife openings in the assessment area are approximately 14 miles of linear wildlife openings and 38 acres of spot openings.

Rights-of-Way and Improved Pastures

Although pastureland acreage has declined over the last 50 years, pastures still comprise approximately seven percent of the southeastern United States. For the Southern Appalachian Assessment (SAA) Area, pastures comprise approximately 17 percent of the area, 99 percent of which is on private land. There are no comparable estimates for ROWs.

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 2.5 miles of utility corridor in the analysis area.

The conversion of fescue pastures to native warm season grasses improves habitat conditions for northern bobwhite and numerous grassland species. Featured sites are primarily old farms that were in cultivation when acquired by the Forest Service. Native warm season grass plantings have been established at Doc Rogers fields, several tracts along the French Broad River, and along a powerline ROW between the Ocoee and Hiwassee Rivers. Emphasized species include bluestems, Indian grass, switchgrass and native legumes. An experimental native cool season grass planting (Virginia wild rye) has been established along the Nolichucky River. These plantings total approximately 215 acres and were established with funds provided by the Forest Service, TWRA, TVA and several sportmen's organizations including Quail Unlimited.

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

Alternative A (No Action)

This alternative would not affect the current wildlife openings in the analysis area. It would allow 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 B (Proposed Action)

The proposed action would include approximately 38 acres of spot wildlife opening maintenance. 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, Rights-of way, Improved pastures

Alternative A (No Action)

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. Other past, present and reasonably foreseeable activities (see page 17) would have little effect.

Alternative B (Proposed Action)

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.

Additional wildlife openings in the cumulative effects analysis area include about 2 acres of spot openings and about 5.5 miles of linear openings. There would be no net loss or gain or other effect from road maintenance on openings. If road maintenance occurs on a linear opening 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.

Though there are some grassy openings on private land, they are not abundant or widespread within the cumulative effects analysis area. Their usefulness as habitat is also questionable depending on the vegetative species present and the type of management.

Other past, present and reasonably foreseeable activities (see page 17) 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.

Terrestrial riparian habitats within the planning area are typical for the physiographic region, occurring as narrow bands along numerous small streams that flow into Citico Creek, which is the largest of the streams in the area. Most of these tributary streams are in incised landforms with relatively small floodplains and functional riparian areas that rapidly transition to steep, upland slopes. With the exception of the larger Citico Creek, Jake Best Creek is one of the few drainages in the analysis area that has some areas of wider riparian communities. While there are some open areas supporting wetland forbs and grasses, the majority of riparian habitats in this area are dominated by thickets of Rhododendron (*Rhododendron maximum*) which exclude most other vegetation. Riparian habitat in several of the larger drainages is impacted by existing roads that parallel the creek for fairly long segments. Examples are Tavern Branch, Jake Best Creek, Doublecamp Creek, and the main stem of Citico Creek. Illegal ATV use has been documented along old roads and designated horse trails along Little Citico Creek (K. Jones, Pers. Com., 2009). Major drainages from north to south in the analysis area include Little Citico Creek, Salt Spring Branch, Bear Branch, Bivens Branch, Jake Best Creek, Tavern Branch, Gold Cabin Branch, Burnt Station Branch, Flats Creek, Footes Creek, Gladys Branch, and Doublecamp Creek.

Acadian Flycatcher (MIS)

The Acadian flycatcher (*Empidonax virescens)* was selected as a management indicator species in the RLRMP to help indicate management effects within mature riparian forest communities. The breeding range of the Acadian flycatcher includes southeastern South Dakota east across southern Great Lakes region to southern New England, south to southern Texas, the Gulf Coast, and central Florida, west to central Kansas; in Canada, restricted to southwestern Ontario (NatureServe 2002). The highest nesting densities are 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 A (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 B (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. A short description of potential effects for each category of proposed activities follows.

Silvicultural Treatments – All stands proposed for silvicultural treatments (including wildlife habitat improvements) include prescribed riparian buffers. There may be some slight edge

effects (increased light, increase in seed source of early seral species) to riparian habitats that are adjacent to treated stands, however no change to terrestrial riparian habitats are expected as a result of implementing proposed activities.

Prescribed Burns – Proposed Rx burns would occur during the dormant season when effects to vegetation are minimized. Based upon the prescription, fire would be set along ridgelines and allowed to back onto lower slopes minimizing any effect to mesic sites. It is expected that these fires would not carry into riparian areas or other moist environments. Based upon this, no effects to terrestrial riparian habitats are expected.

Transportation System Improvements – All proposed activities would be implemented outside of riparian areas and thus would have no effect on terrestrial riparian habitats.

Construction of Trails and Parking Area – Approximately 16 miles of new trail construction is proposed, most of which occurs along ridgelines linking existing trails and roads to form loops. A segment of proposed trail between Farr Gap and Bald Hill Lead parallels an upper tributary of Milligan Creek for approximately 0.5 mile and then continues west and parallels a portion of an upper tributary to Little Citico Creek for approximately 0.3 mile. Along these sections, the proposed trail follows old road beds and stays greater than 50' from the creek (K. Jones, Pers. Com., 2009). No changes to the canopy of the riparian forest should occur with trail construction but small effects to the understory species may occur. Effects may include small changes in species composition as disturbance loving species would likely colonize the trail edges. Modification of terrestrial riparian habitat should be slight as the trail represents a simple linear feature within the larger riparian corridor.

The proposed site for the construction of the new parking area lies within the historic floodplain of Citico Creek but has been functionally isolated from the primary riparian area by the current alignment of Citico Creek Road. Construction of this parking area would remove approximately 4 acres of riparian forest vegetation.

The above activities would have little to no effects on Acadian flycatchers. The only modifications of riparian forest are at the proposed parking area site, and this site represents only 4 acres.

Cumulative Effects Terrestrial Riparian Habitats

Alternative A (No Action)

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

Alternative B (Proposed Action)

Terrestrial riparian habitats have been heavily impacted on the Forest by past events. It is rare to find a major drainage that does not have some historic evidence of timber management, most notably old roads that often run up both sides of a creek. Unapproved activities such as illegal ATV use on trail systems also occur, impacting this resource over time. A list of past, present and reasonably foreseeable activities have been listed for the Middle Citico Area (see page 17) though most of these would have little to no effect on terrestrial riparian habitats as all present and future activities on NFS lands would be in compliance with the RLRMP and thus not be

likely to negatively impact these habitats. With the completion of the proposed equestrian designed trails, small trail segments would now be joined to form loop systems which would naturally attract greater use over time, bringing more use into the riparian corridor. Considering all these factors, with current protective management prescriptions terrestrial riparian habitats are still progressing towards the DFC described in the RLRMP as riparian forests age and provide more downed wood and forest structure.

Existing Condition Snags, Dens, and Downed Wood

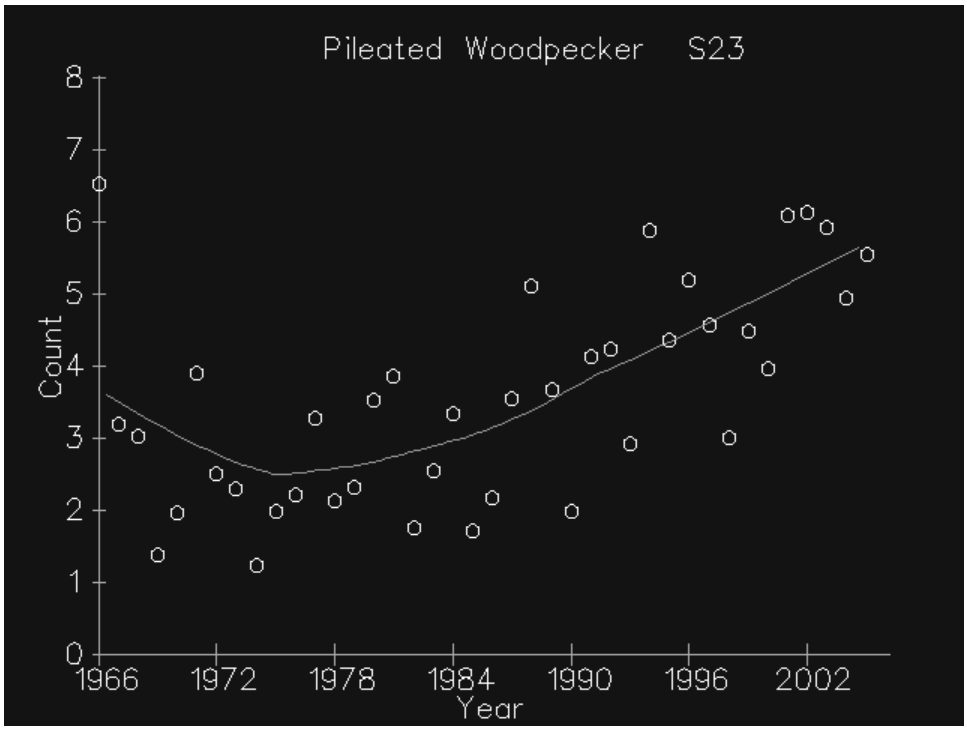
Large woody debris (including branches, large logs, stumps, and root wads) is an important habitat component both to streams and terrestrial areas. It is important both structurally and as a source of energy. Large snags provide birds with nesting and feeding sites, singing perches, and as lookout posts for predators and prey (USDA 2004a). Bats roost and produce maternity colonies under exfoliating bark. Amphibians, reptiles, small mammals, and invertebrates utilize woody debris as cover. Animals use snags, logs, and stumps as denning sites. Downed wood and logs are used for drumming by grouse to attract mates. 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. 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 2004a).

Snag availability is currently not considered a limiting factor on the CNF. Snag availability is influenced by a variety of factors including tree species, age, slope, aspect, and health allowing for lots of variability within the landscape. It is estimated that there are about 7 to 8 snags per acre across the forest and the recent SPB outbreak has resulted in a sharp increase in snag availability over the past several years. Unless another disease outbreak occurs, a gradual decline toward pre-SPB outbreak levels should be expected over the next several years as these trees decay and fall to the ground. Snag availability is expected to exhibit a gradually increasing long-term trend as the average age of the forest continues to increase. With the provisions included under all alternatives in the RLRMP, existing snags, downed wood, and den trees would be well maintained on NFS land.

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 (Nicholson 1997). It can be found throughout the elevational range of the Unaka Mountains but is less common at higher elevations and spruce-fir forests. 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 counts show an increase in pileated numbers (Nicholson 1997). See the CNF FY04 Monitoring and Evaluation Report for details of habitat requirements, Cherokee point count data information, and RLRMP Standards and Objectives forest wide (USDA 2005). Figure 7 shows Breeding Bird Survey population trends for Blue Ridge Mountains. The overall regional population trend (Blue Ridge Mountains) for 1966-2005 is a steady increase (Sauer et al. 2005).

Figure 7. Population trends for pileated woodpecker in the Blue Ridge, 1966-2005.



Direct and Indirect Effects Snags, Dens and Downed Wood

Alternative A (No Action)

This alternative would lead to an increase in snags, dens, and downed wood. The forest would continue to age, causing an increase in the age and decadence of trees and thus snags. No management activities would take place. There would be no effect in the short term, but a long term increase in pileated woodpecker habitat**.**

Alternative B (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 and HWA 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 268 acres (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 HWA 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 17) would have little effect.

Existing Condition Aquatic Habitats

Streams in the Middle Citico Creek Analysis Area drain to Citico Creek or to the Little Tennessee River. This area is within the Blue Ridge Province and within the Little Tennessee River Watershed. Based on the FEIS for the RLRMP (USDA, 2004b) the Little Tennessee River Watershed is in the best condition of all 24 watersheds. Sediment, temperature, and altered stream flow all rated excellent while point source pollution has an acceptable rating of average. None of these water quality factors pose a risk to aquatic habitats (USDA, 2004b).

The Middle Citico Creek analysis area contains approximately 400 miles of ephemeral, intermittent and perennial streams (Table 19).

Table 19. Forest Service aquatic habitats in the Middle Citico Creek Analysis Area

Aquatic Habitats	Miles in Assessment area
Ephemeral Streams	248 miles
Intermittent Streams	83 miles
Perennial Streams	69 miles
Fish Supporting Waters	
Coldwater	14 miles
Coolwater	19 miles

Approximately 33 miles of Forest Service managed streams are capable of supporting fish and are displayed in Table 20 along with their physical characteristics. Fourteen of twenty-two reaches have been surveyed for fish. Of the unsurveyed reaches only Citico Creek reach #2 might have fish species not yet identified in this analysis area (based on physical stream characteristics). None of the other unsurveyed streams are likely to support any different or rare fish species.

Table 20. Streams in the Middle Citico Creek Analysis Area

Stream Name	Reach	Miles	Low Elev	% Grad	Order	Date last Surveyed	No. of Fish Species
Bear Branch	1	0.7	900	4.6	4	9/10/2003	5
Bivens Branch	1	1.1	1040	12	4	10/28/1982	2
Citico Creek	2	2.35	910	0.40	6	Never	--

Table 20. Streams in the Middle Citico Creek Analysis Area

Stream Name	Reach	Miles	Low Elev	% Grad	Order	Date last Surveyed	No. of Fish Species
Citico Creek	3	5.8	960	1.45	6	7/22/1996	20
Citico Creek	4	2.51	1400	2.68	6	7/9/1998	19
Citico Creek, Little	1	2.11	920	1.6	5	9/11/2003	6
Citico Creek, Little	2	0.88	1100	4.3	4	Never	--
Citico Creek, Little, Unnamed Trib	1	0.8	1100	4.0	4	Never	--
Doublecamp Creek	1	2.43	1390	3.7	5	8/9/2005	8
Doublecamp Creek, Left Fork	1	0.5	2300	6.7	3	Never	--
Flats Creek	1	3.25	1260	2.9	4	11/2/1981	11
Flint Creek	1	0.84	1920	4	4	7/16/1992	6
Footes Creek	1	1.71	1320	6.4	4	11/2/1981	1
Gold Cabin Branch	1	0.55	1100	18	4	6/25/1992	1
Jakes Creek	1	1.26	750	4.50	5	9/11/2003	20
Jakes Creek	2	1.05	1050	3.1	4	Never	--
Jakes Creek	3	0.2	1320	1.9	4	Never	--
Jakes Best Creek	1	1.24	1040	7.6	5	9/9/2003	15
Jakes Best Creek	2	1.55	1540	4.2	4	9/9/2003	4
Milligan Creek	3	0.8	1300	11.3	4	Never	--
Salt Springs Branch	1	1.1	950	4.7	4	Never	--
Tavern Branch	1	0.64	1050	5.6	4	8/16/2005	5

Fish (USDA 2009) and aquatic habitat surveys were conducted on 7 stream reaches between 1999 and 2009 on streams in the Middle Citico Creek Analysis Area. Aquatic habitat conditions indicated that sediment ratings were acceptable in 3 of the reaches. Unacceptable sediment levels have more than 20% of the substrate dominated by fine sediment (silt or sand). The stream reaches with excess sedimentation were: Bear Branch, Little Citico Creek #1, Jake Best Branch #2, and Tavern Branch. A site visit to the Little Citico Creek watershed to appraise the effects of the proposed trails designed for equestrian use; revealed sediment runoff from illegal OHV use, unstable decommissioned roads, and the existing horse trail (165-2) along Little Citico Creek.

Direct and Indirect Effects Aquatic Habitats

Alternative A (No Action)

Alternative A would not involve any ground disturbance or use of herbicides. No new adverse effects would occur to aquatic habitats as a result of selecting this alternative. Existing sediment sources would not be remediated and would continue to contribute sediment to Little Citico Creek and then to Citico Creek.

Alternative B (Proposed Action)

Alternative B would employ streamside filter zones between most ground disturbing activities (roads and trails) and streams as prescribed by Forest Wide (FW) standards FW-3, FW-6 and FW-7. These standards minimize the movement of sediment into streams to an acceptable level. Where these standards cannot be met (horse trails), the trail beds will be out-sloped to minimize sediment runoff. Management activities (including construction or reconstruction of non-motorized trails) within defined riparian corridors are "...allowed to improve existing trail configuration..." (Riparian Prescription Standards-RX11-15). Riparian functions and values must be maintained. Decommissioned roads that are causing severe erosion would be stabilized. This activity may cause short term sediment production but would have long term beneficial effects.

Herbicides would be used during timber stand improvement, site preparation activities, along road ROWs, and to treat invasive species. Forest Wide standards FW-14, FW-15, and FW-16; (USDA 2004a) would be followed during implementation.

Full implementation of Alternative B with consideration of these standards would result in a decrease in sediment reaching the aquatic habitats (USDA 2004b).

Cumulative Effects Aquatic Habitats

Alternative A (No Action)

Alternative A does not propose any new ground disturbance. Erosion is contributing sediment to streams from activities that occurred in the past or are presently occurring in the area. Management activities that would reduce sedimentation to streams (closure of illegal OHV trails; erosion control measures on decommissioned road beds; and closure and rerouting of poorly situated horse trails) would not occur. Adverse effects to aquatic habitats would continue.

Management activities, on NFS lands, that are reasonably foreseeable and under the control of the Forest Service would be implemented under the standards for protecting streams listed in the RLRMP (USDA 2004a). Implemented in conjunction with Alternative A, they would not increase the adverse cumulative effect on the aquatic habitats now occurring. Reasonably foreseeable activities that occur on private lands or are not controlled by the Forest Service could have negative impacts on the aquatic systems.

Alternative B (Proposed Action)

Alternative B includes seed tree, shelterwood, and white pine removal treatments; woodlands creation; non-native plant control; maintenance of wildlife openings; wetland enhancement; seeding of prescribed burn areas; ephemeral pool construction; fuel reduction burns; maintenance and reconstruction of system roads including decommissioning of NFSR 36-1 and 284F to reduce sedimentation; construct 16 miles of trails designed for equestrian use and a parking area with a connector trail; and closure/stabilization of legacy roads, eroding decommissioned roads, and poorly situated horse trails. Each of these activities must follow the standards for protecting streams listed in the RLRMP (USDA 2004a). Following these standards would result in minimum amounts of sediment reaching streams and rapid re-vegetation of exposed soils. Overall these activities may reduce the amount of sediment going into streams.

Other activities in the area (see page 17) may be contributing sediment to streams. Past and present activities implemented in conjunction with Alternative B would not have an adverse cumulative effect on the aquatic habitats; in fact, sedimentation rates would decrease. Activities, on NFS lands, that are reasonably foreseeable would be implemented under the standards for protecting streams listed in the RLRMP (USDA 2004a). Implemented in conjunction with Alternative B, they would not have an adverse cumulative effect on the aquatic habitats. 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

Effects to federally-listed threatened and endangered species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. Five federally listed species (three aquatic, one mammal and one plant) were analyzed in detail and the results are summarized here.

Three aquatic T&E species (smoky madtom, yellowfin madtom and Citico darter) occur in the analysis area or immediately downstream of it; critical habitat is designated for the smoky madtom within the analysis area. The 2007 Monitoring and Evaluation report describes the populations for all three of these species as stable or trending upward (CNF 2008).

Table 21. Aquatic T&E Species

	T&E on Forest	T&E in Analysis Area
Fish	8	3
Mussels	12	0

These three federally listed fish are monitored every year with multiple surveys conducted by Conservation Fisheries, Inc. The results of their surveys are documented in the annual Monitoring and Evaluation Report which is available on the CNF webpage (http://www.fs.fed.us/r8/cherokee/). Current population trends for all three species are stable to improving.

The smoky madtom, yellowfin madtom and Citico darter are very sensitive to sedimentation because of spawning, escape cover, and foraging needs. Males of all three species excavate nest cavities under flat rocks where they guard their eggs and young. Madtoms and darters use the interstitial spaces between rocks for escape cover. All three forage on insects; aquatic insects require a clean substrate to thrive.

Direct, Indirect and Cumulative Effects Threatened and Endangered Species

Smoky madtom, yellowfin madtom and Citico darter

Alternative A would not involve any ground disturbance or use of herbicides. No new adverse effects would occur to aquatic habitats as a result of selecting this alternative. Existing sediment sources would not be remediated and would continue to contribute sediment to Little Citico Creek and then to Citico Creek.

Alternative B would close and stabilize trails contributing to sedimentation into Citico Creek. This alternative would also employ streamside filter zones between most ground disturbing activities (roads and trails) and streams as prescribed by Forest Wide standards FW-3, FW-6 and

FW-7. These standards minimize the movement of sediment into streams to an acceptable level. Where these standards cannot be met (horse trails), the trail beds will be out-sloped to minimize sediment runoff. Management activities (including construction or reconstruction of non-motorized trails) within defined riparian corridors are "...allowed to improve existing trail configuration..." (Riparian Prescription standards-RX11-15). Riparian functions and values must be maintained. Decommissioned roads that are causing severe erosion would be stabilized. This activity may cause short term sediment production but would have long term beneficial effects.

Herbicides would be used during timber stand improvement, site preparation activities, along road ROWs, and to treat invasive species. Forest Wide standards FW-14, FW-15, and FW-16; (USDA 2004a) would be followed during implementation.

Full implementation of Alternative B with consideration of these standards would result in a decrease in sediment reaching the aquatic habitats (USDA 2004b). The USDI Fish and Wildlife Service (USFWS) concurs with this finding (Jennings 2010).

Indiana Bat

No Indiana bats have been found within the analysis area. Habitat is available. With Alternative A, no activities would take place in habitat for the Indiana bat (Myotis sodalis); therefore, there would be no affect to Indiana bat. The proposed action is consistent with the RLRMP (USDA 2004a). The RLRMP established standards aimed at protecting Indiana bat including provisions for snag retention (FW-34) and prescribed burning (FW-36). Ephemeral pools are being created in part for the benefit of Indiana bats. 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 (Jennings 2010).

Small Whorled Pogonia

Under Alternative A no project activities would occur, thus there would be no effects to this species. All areas of proposed ground disturbance, including proposed control lines for prescribed burns were surveyed (Copperhead Environmental Consulting, Inc 2008) in order to analyze the potential effects of Alternative B. This species was not found within the analysis area. The large burn blocks would be burned during the dormant season when above ground stems of most herbaceous plants are absent, thus dormant season burning would have no effects to small whorled pogonia. The USFWS concurs with this finding (Jennings 2010).

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 at two locations within one Middle Citico stand (406/7) and also at one site along a proposed trail route at an upper tributary to Jakes Creek. Only a few plants were noted at each site.

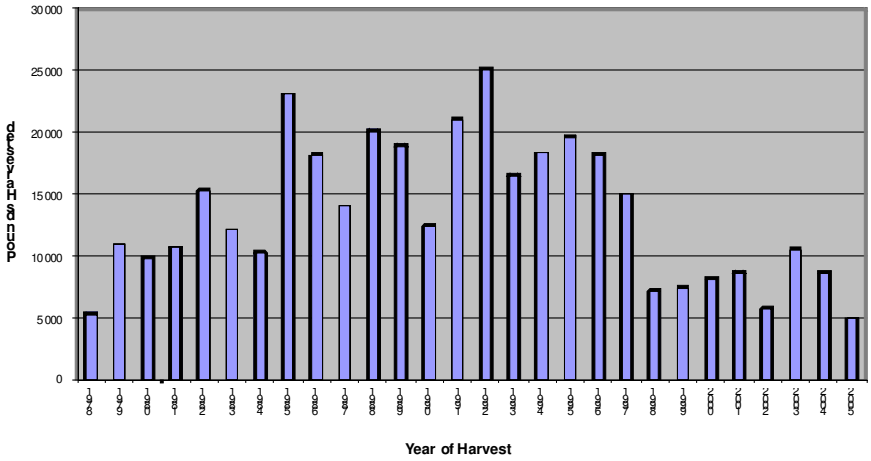
Previously known locations of this species fall under the forest wide prescription allocations shown in Table 22.

Table 22. Prescription allocations of previously known locations of ginseng.

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

Within the State of Tennessee, 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 23). Permits were sold to individuals at a rate of $20 per pound (green weight) from 1999-2005 and then was increased to $30 per pound in 2006.

Table 23. Ginseng Harvest Data Summary for CNF Lands, 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	$1,920
2003	69	69	$1,380
2004	102	102	$2,040
2005	32	32	$640
2006	16	16	$480
2007	26	26	$780
2008	?	56	$1,560

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 A (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. The analysis area is within Prescriptions 8.A.1, 8.B and 8.C as well as other prescriptions. The RLRMP, pages 134 to 142 describe the DFC and standards for management activities/practices that will lead to the DFC of the area.

RLRMP guidelines require that 4-10% of each compartment in Prescription 8.A.1 be comprised of 0-10 year age class. Currently, 3% of lands in Prescription 8.A.1 are in the 0-10 year age class. RLRMP guidelines require that 10% to 17% of forested acres in Prescription 8.B be comprised of early successional forest. Currently, 9% of lands in Prescription 8.A.1 are in the 0-10 year age class. RLRMP guidelines require that 4% to 8% of forested acres in Prescription 8.C be comprised of early successional forest. Currently, 1% of lands in Prescription 8.C 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.

No other wildlife habitat improvements would take place under Alternative A.

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 A would have no effect on the viability of ginseng.

Alternative B (Proposed Action)

The timber harvest in Alternative B increases the percentage of acreage in the 0-10 year age class from 2% to 3% in 2010 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. The utility corridor would also be maintained in a grassy and shrubby state. 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 B, including road construction and reconstruction and other activities would not appreciably affect the MIS or the community.

Alternative B would regenerate 268 acres of forest. Over 14,000 acres (59%) of late successional forest age 81 and over 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 prescription 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 USFWS 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 treatment proposed for stand 406/7 where two sites of ginseng were found is woodland creation and would be limited to portions of the stand that support xeric communities suitable for achieving this objective. Both occurrences of ginseng are within small drainages and would not be affected by these treatments. Likewise, proposed dormant season fuel reduction burns would not affect riparian or rich cove habitats and thus would have no effect on ginseng. The single site along the proposed trail route has been marked in the field and would be avoided during trail construction. Based upon the above information, the implementation of Alternative B would have no effect on ginseng.

Cumulative Effects Demand Species

Alternative A (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 HWA 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 17) 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 new locations found for this species within the Middle Citico Creek analysis area occur within areas that would be protected from impacts. The biggest threat to this species survival comes from commercial harvest. The CNF issues permits for harvest in accordance with findings from the USFWS Division of Scientific Authority. Based upon this, ginseng would continue to have viable populations on the CNF. No negative cumulative effects are expected.

Alternative B (Proposed Action)

Examination of this cluster of compartments within the context of the surrounding landscape reveals that less than 2% of the over 44,000 acre cumulative effects analysis area (see map in project file) would be considered early successional habitat after cutting in Alternative B. 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. Much of the cumulative effects area is within wilderness, where no timber harvest would likely ever occur. While some private land occurs adjacent to the analysis area, much of this is forested. Some timber harvest may occur, but these would not affect black bear to any degree. If adjacent private land is developed into non-forested land, however, that would affect bear by completely removing quality habitat as well as increasing human interactions. 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.

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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 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 Middle Citico 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*), autumn olive (*Eleagnus umbellata*), and sericea lespedeza (*Lespedeza cuneata*) are a particular problem along linear wildlife openings, spot 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. Infestations specifically noted within the botanical reports for this area include, Nepal grass, sericea lespedeza, and autumn olive in "artificial openings" in stand 14/23; A small field and jeep trail infested with sericea lespedeza and autumn olive in stand 15/14; A wildlife opening with an infestation of autumn olive within stand 23/10; Chinese yam (*dioscorea oppositifolia*) within stand 25/36; Infestations of Johnson grass (*Sorghum halepense*) and autumn olive in wildlife openings within stands 31/8 and 31/15; Infestation of sericea lespedeza and Johnson grass in opening in stand 32/28; Infestations of Johnson grass (*Sorghum halepense*), sericea lespedeza, and autumn olive in wildlife openings along proposed trail routes; and infestations of

crown vetch (*Coronilla varia*), sericea lespedeza, Johnson grass, and Nepal grass along segments of roads slated for transportation improvements.

Contract clause BT6.35 would be included in any contracts that would result from the Middle Citico 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":

(i) 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.

(ii) 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).

(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.

(iv) 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 A (No Action)

Under this alternative no project activities would be implemented. Existing populations of non-native invasive plants would continue to spread though normal processes within the analysis area further affecting wildlife forage and native and desired non-native plants.

Alternative B (Proposed Action)

Alternative B would implement the proposed action. All ground disturbing activities create favorable conditions for the spread and establishment of weeds. Ground disturbing activities within this proposed action include road maintenance, temporary road construction, trail construction, fire-line construction, and all disturbances associated with tree harvest including skid trails and log landings. The primary species noted in the analysis area are species that are widespread and common across the forest. 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. No specific treatments for non-native invasive species were proposed as a part of this project. 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 (USDA 2008) it would be treated accordingly.

Cumulative Effects Non-native Invasive Plants and Animals

Alternative A (No Action)

Past, present and reasonably foreseeable activities are listed on page 17. 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 (USDA 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 B (Proposed Action)

This alternative would implement the proposed activities and all associated ground disturbance. Invasive plants occur throughout the analysis area along roads, trails, and other disturbed sites and they rapidly colonize newly disturbed habitats when seed sources are nearby. Contract clause BT6.35 would be included in any contracts that would result from the Middle Citico Creek Environmental Assessment. This clause 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. The CNF is currently treating non-native invasive species on high priority acres through an environmental assessment that was completed in June of 2008 (USDA 2008). The action is intended to slow the spread of these species on the landscape. Despite best efforts, weed species continue to spread. Dispersal

mechanisms are wide and varied and only some are within the control of land managers. It is hoped that the mitigating efforts described above would 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 planning area. Threatened and endangered species are discussed above under a separate heading.

The Middle Citico project proposes several types of activities including timber harvest, prescribed burning, transportation improvements, and trail construction that could have effects on viability concern 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.

Additional species, not found during surveys, may be included in the analysis or biological evaluation because suitable habitat is available within the burn blocks. Species of viability concern are addressed in Appendix C of this document.

Effects to Regional Forester Sensitive Species are analyzed in detail in the Biological Evaluation (Appendix B) for this project. These species are those for which there is concern for viability of their populations across their range.

Species known from the area or found during surveys include *Paravitrea placentula* (glossy supercoil), *Etheostoma vulneratum* (wounded darter), *Megaceros aenigmaticus* (a hornwort) and *Lophocolea appalachiana* (a liverwort). One occurrence of *Paravitrea placentula* was found on a portion of one of the new trails designed for equestrian use. The fish occur in Citico Creek. The bryophytes were found within stands proposed for vegetative treatments. Some species were not found during surveys but habitat is available within the burn areas. Thus they were given a review code of 4a and are analyzed. *Cheumatopsyche helma*, *Gomphus consanguis*, *Gomphus viridifrons*, *Macromia margarita*, *Ophiogomphus alleghaniensis*, and *Ophiogomphus incurvatus* are possible in or near the analysis area. These are riparian insects and would be protected by the riparian mitigation; thus there would be no effects to them. Those species are not further evaluated here.

Table 24 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 24. Species Evaluated in the Biological Evaluation and Determinations of Effect

Scientific Name	Determination of Effect-Alternative A	Determination of Effect-Alternative B
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.
Etheostoma vulneratum	Alternative A may impact individuals, but not likely to cause a trend to federal listing or a loss of viability.	May impact individuals, but not likely to cause a trend to federal listing or a loss of viability. Negative effects short term.
Phoxinus tennesseensis	Alternative A may impact	May impact individuals, but not

Table 24. Species Evaluated in the Biological Evaluation and Determinations of Effect

	individuals, but not likely to cause a trend to federal listing or a loss of viability.	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 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	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.
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.
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.
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.
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 sharpie	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.
Lophocolea appalachiana	No effect: No activities would occur; no habitat would be affected.	No effect with adherence to riparian standards.
Megaceros aenigmaticus	No effect: No activities would occur; no habitat would be affected.	No effect with adherence to riparian standards.
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.
Delphinium exaltatum	No effect: No activities would	May impact individuals but not

Table 24. Species Evaluated in the Biological Evaluation and Determinations of Effect

	occur; no habitat would be affected.	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. Negative impacts are short-term. Long-term probably beneficial.
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.
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. Negative impacts are short-term. Long-term probably beneficial.
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.

The implementation of the proposed activities may affect individuals of sensitive species, however, this would not likely lead to a loss in range wide viability or trend toward federal listing.

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 Forest Wide Standard 28 (FW-28). Appendices E and F to the FEIS for the RLRMP (USDA 2004c) lists species of viability

concern known to occur on the Forest. Appendix C of this document describes the existing condition and effects by alternative for each species of viability concern that was found in the area.

Summary of Alternatives

The following table (Table 25) provides a comparison of the alternatives with regard to Biological Elements.

Table 25. Summary of Alternatives for Biological Elements

Biological Element	Alternative A	Alternative B
Mesic Deciduous Forest	No measurable effect	Benefit some species. Temporarily negatively affect individual MIS.
Eastern Hemlock and White Pine Forest	Decrease in hemlock due to HWA	Benefit many species.
Oak and Oak-pine Forest	No measurable effect	Positive effect to many species. Both positive and negative effects to MIS.
Pine and pine-oak forest	No measurable effect	Benefit many species. No effect to MIS.
Woodlands, Savannas, and Grasslands	No effect	Short term negative effect to some species. Benefit many species, including viability concern.
Successional habitats	Early successional habitat would decrease	Benefit many species, including MIS.
Permanent openings and old fields, rights-of-way, improved pastures	No effect	Benefit many species, including MIS.
Riparian habitats	Change in species composition due to HWA	No effect
Snags, dens and downed wood	Increase in this habitat	Minor reduction in available habitat
Aquatic habitats	Existing sediment sources would continue	No effect
Threatened and Endangered Species	May adversely affect 3 fish species. No effect on other species.	Not likely to adversely affect.
Demand species	Habitat diversity would decrease	Benefit many species including MIS.
Invasive non-native plants and animals	No effect	Controls existing non native populations.
Species Viability	May impact individuals.	May impact individuals.
Forest health	Increased vulnerability to insect and disease	Improve the health and vigor

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 escape its range west and south each year. By the 1980's, gypsy moth was established throughout the northeast. Today the area considered generally 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. Infestation by the HWA has been detected on the north end of the CNF. There are also well-established populations in North Carolina and the Great Smoky Mountains National Park adjacent too much of the CNF. Recently, the adelgid has been found in several locations on the Ocoee/Hiwassee Ranger District. 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, snow or ice loading with or without wind, is similar. These stresses 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 there at the time of precipitation. However, even here, pre-storm management to minimize damage is not possible because of the natural randomness of weather patterns.

Direct and Indirect Effects Forest Health

Alternative A (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.

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.

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 the analysis area: Citico Creek, Indian Boundary, and Double Camp Creek. Treatment in these areas is ongoing and will involve biological and chemical control methods. These sites were chosen for treatment as part of a landscape level effort to maintain the presence and genetic diversity of hemlock.

These sites were chosen for treatment as part of a landscape level effort to maintain the presence and genetic diversity of hemlock. The treatment site was chosen in coordination with other treatment sites on the landscape so that pollen may be transferred between sites.

There are 39 units (443 acres) of SPB killed pine in the analysis area that are scheduled for restoration under previous decisions (USDA 2005). These units range in size from about 2 to 60 acres. This treatment consists of site preparation followed by planting shortleaf or pitch 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.

Alternative B (Proposed Action)

The forested age class distribution for Middle Citico 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 prescription areas whose age class distribution would be affected are 8.A.1, 8.B and 8.C. Approximately 268 acres of early successional habitat would be created with this alternative; the acres of mid and late successional habitat would decrease correspondingly. Existing early successional habitat is the result of previous even aged regeneration and SPB outbreak mentioned earlier in this section. The base year for the age class distributions is 2010. The percentages may not total 100 due to rounding.

Table 26 indicates the age class distribution for the 8.A.1 prescription area in Middle Citico Creek analysis area before and after the proposed harvest activities would occur. Approximately 153 acres in 8.A.1 would be regenerated with this alternative. The 8.A.1 portion of the analysis area is approximately 4,993 forested acres.

Table 26. Age Class Distribution for the Middle Citico Creek 8.A.1 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 A	3%	10%	2%	4%	0%	0%	1%	28%	44%	6%	1%	100%
Alt B	6%	10%	2%	4%	0%	0%	1%	26%	44%	6%	1%	100%

Table 27 indicates the age class distribution for the 8.B prescription area in Middle Citico Creek analysis area before and after the proposed harvest activities would occur. Approximately 71 acres in 8.B would be regenerated with this alternative. The 8.B portion of the analysis area is approximately 1,805 forested acres.

Table 27. Age Class Distribution for the Middle Citico 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 A	9%	2%	10%	4%	5%	0%	0%	23%	38%	2%	5%	100%
Alt B	13%	2%	10%	4%	5%	0%	0%	19%	38%	2%	5%	100%

Table 28 indicates the age class distribution for the 8.C prescription area in Middle Citico Creek analysis area before and after the proposed harvest activities would occur. Approximately 44 acres in 8.C would be regenerated with this alternative. The 8.C portion of the analysis area is approximately 4,331 forested acres.

Table 28. Age Class Distribution for the Middle Citico Creek 8.C 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 A	1%	4%	1%	3%	2%	3%	14%	18%	34%	8%	13%	100%
Alt B	2%	4%	1%	3%	1%	3%	14%	18%	33%	8%	13%	100%

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 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 (192 acres, stands 15/08, 15/27, 24/19, 24/21, 24/23, 32/27 and 32/28) This regeneration method would leave 10 to 20 sq ft BA/AC (Basal Area per acre) of well spaced shortleaf and pitch 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 mixed stands of shortleaf, pitch and table mountain pine; mixed with Virginia pine, scarlet oak, black oak, white oak, and other hardwood species.

These stands that are prescribed for seedtree with reserves regeneration (192 acres) would be planted with shortleaf pine or pitch pine. These stands are suitable pine sites that currently have a component of shortleaf, pitch, table mountain, 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, pine species (Virginia, shortleaf, pitch and table mountain), the hickories, sourwood and others. Planting the shortleaf and pitch pine at a low rate per acre ensures the presence of this species as a stand component, along with a diverse mix of naturally occurring regeneration. The choice of which species to plant is based on site quality and the occurrence of these species at this time. Pitch pine is usually found on lower quality sites than shortleaf pine, but the two species are found together as well.

Shelterwood with reserves (35 acres, stands 14/23 and 31/6) 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.

Stand 31/6 prescribed for shelterwood with reserves (10 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.

The regeneration of stand 14/23, (shelterwood with reserves 25 acres) would be supplemented by planting white oak. This stand currently has a small component of white oak. Natural regeneration combined with planting would ensure a viable white oak component in the future stand.

Clearcut with reserves (41 acres, stands 24/26, 24/31 and 25/36) These stands are prescribed for clearcut with reserves regeneration. These stands are composed primarily of Virginia pine and do not contain enough suitable reserve trees to reproduce a fully stocked stand of desirable tree species. As much as 10 BA/AC would be left behind for the residual stand. The reserve trees would be trees of value to wildlife such as den trees and mast producers. These stands would be artificially regenerated by planting shortleaf pine to achieve desirable stocking levels. The future stands would be stocked with a mixture of planted shortleaf pine and naturally occurring hardwoods including upland oak species.

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:

These stands are composed primarily of Virginia pine and do not contain enough suitable reserve trees to reproduce a fully stocked stand of desirable tree species. Virginia pine tends to be shallow rooted and vulnerable to wind throw, which makes other regeneration methods problematic. This is especially true in older stands of Virginia pine.

The use of the clearcutting with reserves method for regenerating shade intolerant species such as yellow pine is discussed in the RLRMP (pg. 395). Site preparation, planting and release would ensure the establishment of shortleaf pine in this stand and contribute to RLRMP Objective 17.03.

Based upon the above considerations, the use of clearcutting 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 (233 acres, stands 15/08, 15/27, 24/19, 24/21, 24/23, 24/26, 24/31, 25/36 32/27 and 32/28) 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 or clearcut with reserves methods. 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 (25 acres, stand 14/23) 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 (258 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 white oak, pitch pine 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 (108 acres, stands 15/13, 15/14 and 15/15) Thinning would leave a residual stand of approximately 50 sq ft BA/AC or greater. The stands proposed for thinning are primarily white pine stands with low understory diversity. 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. Thinning these stands would allow the establishment of hardwood root stock, which would develop into mature trees if the stand is regenerated in the future.

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.

White pine removal (15 acres stands 31/18) 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.

Invasive exotic control Any treatment for invasive exotic weed control for this analysis area will be addressed in a separate forest wide assessment for weed control. The effects resulting from these treatments will also be 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.

Prescribed Burning (18,100 Acres, not more than 5,000 acres in any one year) Dormant season prescribed burning would be done on 18,100 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 B would establish 6% of the forested acres of prescription area 8.A.1 in the 0-10 age class meeting the 8.A.1 objective of 4-10%. Alternative B would establish 13% of the forested acres of prescription area 8.B in the 0-10 age class meeting the 8.B objective of 10-17%. Alternative B would establish 2% of the forested acres of prescription area 8.C in the 0-10 age class contributing towards the 8.C objective of 4-8%.

This alternative provides an amount of managed disturbance that would help improve overall vegetative diversity to the area. Alternative B would regenerate 268 acres of forest land by 2-aged methods in this project entry

Alternative B 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 B. Some stand age related health problems are likely to occur due to the long average stand rotation. In addition, Alternative B would improve soft mast production.

Alternative B 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 prescription areas 8.A.1 (8.A.1-1.01, 8.B (8.B-1.01), and 8.C (8.C.1.01).

Cumulative Effects Forest Health

Alternative A (No Action)

The area considered for vegetative cumulative effects is all of the forested acres in the Middle Citico Creek Watershed. This is an area of 17,629 acres and includes wilderness. This gives a perspective of effects on age class distribution at a larger, landscape level that includes forested land in all prescription areas. See Table 29 for the age class distribution in the previously mentioned compartments, in the various age classes (base year 2010) for all alternatives. The percentages may not total 100 due to rounding.

Table 29. 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	3%	4%	2%	2%	3%	1%	5%	24%	42%	5%	8%	100%
Alt 2	5%	4%	2%	2%	2%	1%	4%	23%	42%	5%	8%	100%

In the short term, Alternative A would have its greatest effect on the 0-10 age class. In the year 2010 only 3 percent of the forested acres are in the 0-10 age class for the lands in the middle Citico Watershed. This limits the amount of soft mast and low cover for wildlife. 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 40 percent of the Middle Citico 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 443 acres of SPB impacted area have been, or are planned for restoration in the Middle Citico Creek watershed under another decision document. Approximately 32 percent of this watershed is pine or pine hardwood forest types 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 1,208 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 A does not respond to the 8.A.1, 8.B and 8.C prescription area objectives for early successional wildlife species. Alternative A does not provide measures to improve forest health and reduce forest susceptibility to disease and pest outbreaks.

Alternative B (Proposed Action)

Alternative B would increase the amount of 0-10 year old habitat from 3 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 (79%) 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 258 acres using the herbicide triclopyr. Noxious weed control, as allowed under other decisions (USDA 2008), may take place on 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 (18,100 ac) would take place over several years with no more than 5,000 acres occurring in any one year. Large dormant season burns may have beneficial effects on oak regeneration and nutrient cycling.

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 B 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. There are fifteen recreation zones delineated across the CNF. Each zone is defined by its unique waterways, landforms, travel routes, surrounding communities, land uses and recreation opportunities. The Middle Citico Creek analysis area encompasses portions of the Citico Creek recreation zone, an area of the national forest defined by Citico Creek, its tributary streams and steep mountainous terrain.

More than 16,000 acres of the Citico Creek recreation zone have been congressionally designated as Wilderness. The area is popular for visitors seeking remote backcountry settings and primitive recreation related activities such as backpacking, day-hiking and trout fishing. Narrow NFSRs including Citico Creek Road (NFSR 35-1), Double Camp-Jake Best Road (NFSR 2659) and other open roads provide limited motorized access to developed and undeveloped recreation sites, trailheads, fishing streams and hunting areas. The combination of non-motorized trails, open gravel roads and gated roads also make this area attractive for equestrian use. The Cherohala Skyway (TN Highway 165) creates the southern boundary of this recreation zone providing sightseers with scenic views of the surrounding mountains.

View of Citico Creek along Citico Creek Road (35-1)

Scenery Resources

The affected environment for scenery resources includes areas of the national forest viewed from noted travelways and viewing platforms like developed recreation sites. 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).

The Middle Citico Creek analysis area includes landscapes inventoried as Scenic Classes 1, 2, 3, and 5. Scenic Classes 1 and 2 represent landscapes that are highly valued for their natural aesthetics including scenery viewed from Citico Creek Road, Double Camp-Jake Best Road and the Cherohala Skyway. Scenic Class 5 represents areas of the national forest with lower concerns for scenic quality. These areas may be seldom seen by visitors or naturally less attractive than other landscapes.

A Scenic Integrity Objective (SIO) is specified by Scenic Class for each Management Prescription in the RLRMP. Assigned SIOs in the Middle Citico Creek analysis area include Very High, 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 recreation settings, travel and access management affects opportunities for visitors to participate in a variety of recreation activities. The Citico Creek recreation zone is managed to provide camping and fishing opportunities along Citico Creek Road (NFSR 35-1) and access for day-hiking, backpacking, fishing, hunting and horseback riding in the remote backcountry.

The Citico Creek recreation zone is one of four recreation zones in the CNF that have been identified for planning and developing an equestrian trail system that would support multiple day-riding opportunities. The existing Little Citico Horse Trail System includes trails, open roads, closed roads and cleared wildlife openings. This network of routes through the national forest could be improved to offer the desired multiple day-riding options. Overnight facilities are currently provided at Young Branch Horse Camp located off Citico Creek Road.

Direct and Indirect Effects on Scenery and Recreation Resources

Alternative A (No Action)

Under the No Action Alternative no proposed actions would be implemented including silvicultural treatments, wildlife habitat improvements, fuel reduction burns, transportation system improvements, recreation trails improvements or any other proposed action.

Scenery Resources

Existing views of the national forest from noted locations would not be altered by proposed management activities. The appearance of the affected landscapes would gradually change over time and the SIOs assigned in the RLRMP would be met.

View along Citico Creek Road – Stand 31/18

As described in the disclosure of effects for "Forest Health," changes to the forest would continue to occur over time due to natural succession, insects, disease, and potential storm damage.

The photo on the left shows the forest as viewed from Citico Creek Road at Compartment 31, Stand 18.

The scenic integrity of this landscape is noticeably decreasing as hemlock tree mortality increases. Mortality is due to infestations of the hemlock woolly adelgid.

The scenic integrity of this stand would gradually increase as rhododendron, pine and hardwoods begin to fill the voids left by the dead and dying hemlock trees.

Large dead, dying and fallen trees within the road right-of-ways would be cleared to maintain access and public safety.

Recreation Resources

Under the No Action Alternative, the opportunities for recreational use of the national forest would remain about the same. The Little Citico Horse Trail System would not be expanded or improved to provide visitors with multiple day-riding opportunities. Access to the trail system would continue to be facilitated at the Little Citico Bridge trailhead and Young Branch Horse Camp. Day use parking at Little Citico Bridge (see photo below) would continue to provide insufficient space for equestrian-trailer parking and maneuverability for ingress and egress. From Young Branch Horse Camp, most trail users would continue to access the trail complex at a designated, unhardened crossing through Citico Creek near the campground (see photo below). The other access option would be riding down a short paved section of the Citico Creek Road and crossing over Little Citico Bridge.

The existing amount of equestrian trails would not offer non-local visitors incentive to haul their horses to the area and spend multiple days. Use of Young Branch Horse Camp would not increase. Looped trail opportunities would continue to be limited by the visitor's personal knowledge and willingness to use the existing network of equestrian trails, cleared wildlife openings, hiking trails, open and closed roads. Horseback riders using open roads would have to remain cautious especially on the Citico Creek Road which receives a higher volume of vehicular use. Some key connector trails would continue to be closed to horses and require

visitors to choose between making their desired trail loops and obeying current regulations. Either choice would diminish their recreation experience.

Left: Parking at Little Citico Bridge *Right: Ford Crossing of Citico Creek*

The Gold Cabin Branch Road (NFSR 2604) would continue to serve as a primary connector trail between the two ends of Double Camp-Jake Best Road. Of the 4.6 mile route, approximately 2 to 3 miles of the 4.6 route would continue to be designated as a National Forest System Road and open for equestrian use. The remaining section would continue to be managed as a cleared wildlife opening.

The 12-mile designed Fodderstack Trail (NFST 95) would continue to provide a 24-mile out-and-back ride from Farr Gap to Beech Gap. Any loop opportunities that incorporate Fodderstack and Pine Ridge Trails would require equestrian use of open roads and unauthorized use of hike-only trails within the Citico Creek Wilderness, primarily the Mill Branch and Rocky Flats Trails. Unauthorized use of these trails would continue without proper design and maintenance for this use. In general, some equestrian use of the area would continue to be unmanaged and not meet visitor expectations.

Cleared wildlife opening off Gold Cabin Branch Road

Unauthorized Off Highway Vehicle (OHV) use would continue on the existing designated horse trails and closed roads due to lack of enforcement and presence of authorized users. Tavern Branch (NFSR 36-1), a road that requires high clearance vehicles, would continue to be open for hunting access between the first of October through the middle of December.

Alternative B (Proposed Action)

Scenic Resources

Areas of the national forest that have been assigned High or Very High SIOs in the RLRMP would not be affected by the removal of vegetation. Scenic views along Citico Creek and Cherohala Skyway would only change as described under the No Action Alternative.

Typical Landscape Character

Scenery viewed along Citico Creek Road in areas away from the creek, and the Double Camp-Jake Best Road would mostly remain as described under the No Action Alternative (see photo above), but some areas would be affected by various proposed silvicultural treatments. Design criteria listed in the project file would be implemented to conserve the valued landscape aesthetics and meet assigned SIOs.

Silvicultural Treatment- Oak and Oak/Pine Restoration

The existing appearance and scenic integrity of the forested stands listed in the tables below would change due to the proposed silvicultural treatments. The majority of the treatment areas would be out of plain view from visitors where a Low Scenic Integrity Objective (SIO) would be met. Horseback riders using affected closed roads would potentially view areas of low scenic integrity. Stands 14/23, 15/08 and 15/27 would potentially be viewed by visitors driving or riding the Double Camp-Jake Best Road. A moderate level of scenic integrity would be maintained.

Comp/ Stand	Acres	SIO	Noted Travelways & Viewing Platforms
14/23	25	Moderate	NFSR 2659 Double Camp-Jake Best Road
31/6	10	Low to Moderate	None
15/08	40	Moderate	NFSR 2659 Double Camp-Jake Best Road, Proposed Designated Horse Trail
15/27	18	Moderate	NFSR 2659 Double Camp-Jake Best Road
24/19	40	Low	None

Comp/ Stand	Acres	SIO	Noted Travelways & Viewing Platforms
24/21	22	Low	None
24/23	19	Low	None
24/26	24	Low	NFSR 2033
24/31	12	Low	None
25/36	5	Low	None
32/27	36	Low	None
32/28	17	Low	NFSR 36

Forest visitors that view these affected areas would notice the decreased canopy cover, cleared openings, and increased sunlight and landscape visibility. Immediately after timber harvest activities, viewers would notice logging debris, stumps, slash, damaged living vegetation and exposed soil due to skidding and landing logs.

These direct effects would noticeably decrease year after year, season after season, as new saplings emerge and leaf litter accumulates within the stands. A higher density of vegetation would be retained within the immediate foreground of stands 14/23, 15/08 and 15/27 along the Double Camp-Jake Best Road. Trees and shrubs would only be retained as needed to maintain a Moderate level of scenic integrity. The retained vegetation would highlight a few larger diameter trees along the roadway and natural appearing clumps of trees in contrast to the evenly spaced reserve trees in the rest of the affected stand.

In silvicultural terms, this roadside buffer would equate to 25-foot width of vegetation with minimum basal area of 35 square feet/acre. An additional 25-foot of width would be treated to transition down to the prescribed basal area. This retention of vegetation would partially screen the visual impacts due to logging activities and manual site preparation such as slash, stumps, and exposed soil (see photos below).

Left: Stand 15/8 would appear open. *Right: Example of existing cleared opening.*

Silvicultural Treatment- Pine Removal

The existing appearance and scenic integrity of the forested stands listed in the table below would change due to the proposed silvicultural treatments. These treatments would target the removal of white pine trees resulting in a natural pattern of small created openings and gaps within the affected stands.

Comp/Stand	Acres	SIOs	Noted Travelways or viewing platforms
15/13	34	Moderate	NFSR 2659 Double Camp-Jake Best Road, Proposed Designated Horse Trail
15/14	34	Moderate	NFSR 2659 Double Camp-Jake Best Road
15/15	40	Moderate	NFSR 2659 Double Camp-Jake Best Road, Proposed Designated Horse Trail
31/18	15	High	NFSR 35-1 Citico Creek Road

Observant visitors would notice the increase in sunlight and visual impacts from logging activities such as slash, stumps, and exposed soil. Overtime, evidence of logging activities would not be noticeable as existing and new hardwood trees fill the gaps and leaf litter accumulates. Riparian buffers in stand 31/18 would screen activities from view along the Citico Creek Road as viewed in the picture above captioned, "*View along Citico Creek Road – Stand 31/18*"

The photos below represent the existing condition of stands 15/13, 15/14, 15/15 at Gold Cabin Branch Road. Dispersed white pine throughout these stands would be removed creating openings within the stands. Additionally, up to 25-feet of vegetation would be cleared along the gated Gold Cabin Branch Road to enhance wildlife habitat. Only horseback riders and visitors walking behind the gate would views these effects.

Left: Gold Cabin Branch Road with white pine. Right: Example of 25' clearing along road

Woodland Creation

Woodland creation treatments would be consistent with assigned SIOs. These proposed treatments would mostly be unnoticed by visitors due to their locations along gated roads. Treatments near Gold Cabin Branch would be noticed primarily by equestrian users of the of the Gold Cabin Branch Road that accesses other wildlife habitat improvements such as the clearing in the previous photo captioned "*Cleared wildlife opening off Gold Cabin Branch Road.*" Created woodlands would appear more park-like with an open understory and herbaceous undergrowth a year or two after treatment.

Opportunities to view wildlife and the surrounding landscapes would be increased. Other noticeable visual impacts would include some slash and evidence of fire such as scorched and blackened trees and ground. Dead and dying underbrush and small trees would be noticeable for a short time after fire use and/or chemical treatments. These impacts would fade within a year of new growth and leaf litter.

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

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

Wildlife Habitat Improvements

Some of the proposed wildlife opening maintenance and non-native invasive species treatment areas would visible from open roads and trails. The maintenance of 56.5 acres of existing spot and linear wildlife openings would increase habitat and thereby have a potential to increase wildlife viewing and hunting opportunities. The proposed thinning and release of mast producing trees would benefit hunters by improving game habitat and would also improve hunting access. None of the roads proposed for treatment are currently open to the public for vehicular access.

Prescribed Burning

Prescribed burns would be planned in the most of the analysis area. Visitors to this area of the forest would perhaps notice linear fire line openings, scorched earth, dead or dying vegetation, or blackened vegetation in the burned area. The effects would be temporary. Perceivable effects after spring re-growth would 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 provide 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. Actions would be consistent with assigned SIOs.

Trail System

The Little Citico Horse Trail System would be improved and expanded to provide multiple day-riding opportunities in the Cherokee National Forest. The approximately 16 miles of new equestrian trails would connect various segments of the existing 13 miles of horse trails to create a managed network of trail loop options.

Construction of the proposed trailhead at the intersection of County Road 506 (Buck Highway) and Citico Creek Road would provide easier parking and access to the expanded horse trail system (see photo below). This trailhead facility would be accessed from either paved road and would minimize the need for trailer traffic on upper Citico Creek Road. The facility would be designed to accommodate vehicles and horse trailers with adequate space for maneuvering in and out of the parking and staging areas.

The proposed new trails would provide visitors with direct access from the new trailhead and to the horse trail system and Young Branch Horse Camp. These trails would also create a low challenge trail loop option near the trailhead and campground.

Proposed stabilization of the approaches to Trail #165-1 on Citico Creek would also provide for easier and well defined access to the trails system from Young Branch Horse Camp (see previous photo captioned, "*Ford Crossing of Citico Creek.*"

Left: View of proposed trailhead location from Citico Creek Road

Non-local use of the horse trail system would be expected to increase due to the additional mileage and variety riding opportunities created by the new designated trails. Visitors would have the opportunity to experience different trail loops over a multiple-day visit. This increase in non-local use would likely result in a higher occupancy of Young Branch Horse Camp.

Rerouting and reclassifying a segment of the Mill Branch hiking trail (Trail #96) to allow equestrian use would create an authorized and maintained horse trail connection to the existing Fodderstack Trail . The proposed changes to this 2.6 mile trail located within the Citico Creek Wilderness would create at least 6 additional miles of riding opportunities to the Little Citico Trail Complex.

Closure of Trail #165-2 would remove an existing horse trail out of several low, wet areas along and within Little Citico Creek. New access and trail connections would be provided by improvements to Trail #165-3 including an extension to Young Branch Horse Camp. These improvements would be implemented before closing Trail #165-2.

The potential increase of equestrian users would indirectly discourage existing unauthorized OHV use of some of the Little Citico Creek Trails and general area. The proposed

decommissioning of Tavern Branch Road would limit seasonal access for hunting. Miller Ridge (NFST 2033) would remain seasonally open to provide motorized access into the general area.

Cumulative Effects Scenery and Recreation Resources

Alternative A (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.

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 Middle Citico Creek analysis area would 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. The need to routinely clear trails would become more frequent.

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. Unauthorized OHV use would likely continue.

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

Alternative B (Proposed Action)

The cumulative effects would be similar to those described for the No Action Alternative. Assigned SIOs would be attained as described under direct and indirect effects. The new trailhead and connector trails near Little Citico would improve the quality of the equestrian recreation opportunities and would increase use of the area and Young Branch Horse Camp due to the additional day-ride opportunities

Existing Condition Heritage Resources

Heritage 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 heritage 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 heritage resources. This policy is based on adherence to Federal and state laws and regulations. Heritage 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 Forest Service regulations (Forest Service Manual 2360), a heritage resource inventory was performed to determine if potentially significant heritage resources would be affected by the project.

Direct and Indirect Effects Heritage Resources

Alternative A (No Action)

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

Alternative B (Proposed Action)

This alternative would not affect heritage 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 heritage resources were to be discovered during project implementation, the project would be halted until the resource(s) is/are evaluated

Cumulative Effects Heritage 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 A (No Action)

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

Alternative B (Proposed Action)

Economic effects are presented in Table 30. 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 30. Benefit Cost Ratio

	ALT B
REVENUES	
Timber	$368,738
Recreation	0
Wildlife	0
Other	0
Total Present Value Revenues	$368,738
FINANCIAL COSTS	
Harvest Administration	$27,230
Sale Preparation	$125,258
Analysis and Documentation	$13,615
Other Resource Support	$13,615
Brush Disposal (FS Component)	0
Road Design & Construction	$68,000
Reforestation	$58,943
KV Other	0
Silvicultural Exams	$4,306
Stand Improvement	$25,083
Timber & Transportation Planning	$500
Other	0
Total Present Value Financial Costs	$336,550
Present Net Value	$32,188

Cumulative Effects Economics

Alternative A (No Action)

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

Alternative B (Proposed Action)

Alternative B has a present net value of $32,188. Alternative B would produce 5.44 CCF (2.72 MMBF) of forest products. CCF is the notation for "hundred cubic feet" and MBF is the notation for "thousand board feet". Alternative B 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. Alternative B contributes to RLRMP objectives for providing sawtimber (Objective 19.01) and pulpwood (Objective 19.02).

Physical Factors

Existing Condition Soil and Water Resources

The Middle Citico analysis area is located about nine miles northeast of Tellico Plains, Tennessee in the Blue Ridge Mountains. The area is located in the Southern Metasedimentary Mountain Eco-region. The analysis area is approximately 24,200 acres in size. Elevation in the area ranges from about 1,000 feet along Citico Creek to 3,000 feet.

The analysis 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 somewhat 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.

The landform of the area is characterized by steep, dissected mountains and narrow V-shaped valleys. 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. The diverse parent material along with other factors such as aspect, topography, and climate has resulted in soil types with different characteristics.

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 area have a severe risk of erosion mainly due to their textures and slope.

Slopes range from 5% to 65% with some areas exceeding 65 %. 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 none eroded. The surface textures are silt loam, fine sandy loam, and 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, silty clay loam, cobbly sandy clay loam, and cobbly clay loam with a consistence of friable. Common soil series found within stand boundaries include Citico, Ditney, Ranger, Shelocta, Shouns, and, Sylco. Soil series percentages in the proposed treatment stands include Citico (14%), Ditney (1%), Ranger (43%), Shelocta (1%), Shouns (3%), and Sylco (38%). (Refer to project file for soil limitations and hazard ratings by soil mapping unit and soil mapping unit acres and location by compartment and stand).

Scope of Analysis

In general scope of this analysis includes the soil types where project activities would occur within the Citico Creek Watershed. Site specific analysis such as acres of soil types are derived only from areas where harvest operations are proposed. The time-period considers the past 10 years and future actions that could occur within five years of implementation.

Direct and Indirect Effect Soil and Water Resources

Alternative A (No Action)

With the exception of road and wildlife openings 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.

Under this alternative sections of legacy roads would not be rehabilitated to reduce erosion and portions of NFSR 36-1 and 284F would not be decommissioned therefore, sedimentation would continue.

Wildlife opening maintenance may include mowing, plowing, and fertilization. Mowing would not disturb the soil profile. Plowing exposes soils, and may lead to soil displacement. Fertilization when done as directed from soil sample collected on site would help maintain soil productivity.

Under the No Action Alternative Trail 165-2 would not be closed and sedimentation from the trail would continue and 1,300 feet of Trail 165-3 would not be improved. Trail approaches along Citico Creek would not be stabilized.

Alternative B (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 and harvest method (Swank et. al. 1989). Timber harvesting can directly affect the physical, chemical, and biological properties of the soil (Swank et. al. 1989). Effects from this action may include immediate changes in soil and/or organic matter displacement, water infiltration rates, and soil compaction.

Approximately 17 percent of the soils found within the harvest units consist of Citico and Shouns soil series. These soil types are formed in 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 et. al. 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 (rubber tired skidders/forwarder) is impacted by skid trails, temporary roads and log landings.

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 standards and guidelines (USDA 2004a), and implementing Tennessee BMP's.

Roads

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

Some soil types within the Citico 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.

During road reconstruction 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.

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.

Decommissioning and rehabilitating 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.

Prescribed Burning

Fire effects on soil properties and processes is quite varied, depending largely on fire intensity, fire severity, temperature, fuel type and amount, soil moisture, and other factors. 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). Prescribed burn activities have the potential to increase the solubility of some cations in the forest floor, but would not diminish water quality (Knoepp et. al. 2004). 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.

Burning under the Forest Service burning parameters minimizes the effects to the soil resources. Methods such as lighting ridges and upper slopes allows the fire to burn dryer sites and

extinguish in the more 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.

Normally existing roads and natural barriers (riparian areas, creeks, streams and rivers) are used as firelines during burning activities. However, 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.

All firelines should be reviewed for erosion potential. Bladed or plowed lines should be rehabbed using erosion control measures including water control structures, seeding (depending on sun light reaching the fireline) and/or mulching. Special attention would be used for firelines that connect to streams to avoid entry of storm water or sediments. RLRMP standards (USDA 2004a) would be followed during implementation.

Herbicide

Chemical treatments would be used for midstory control and site-preparation. Specific herbicides that could be used include triclopyr. A variety of application methods could be used, but each method would directly apply chemical to the targeted plants.

Triclopyr is not highly mobile in the soil, and is not a leaching problem under normal conditions since it binds to clay and organic matter in the soil. It may leach from sandy soils if rainfall is heavy after application. The herbicide is broken down by soil microorganisms and ultraviolet light, and persists for 30 to 90 days (46 day average) in the soil depending on soil type and weather (Extoxnet Fact Sheet 1996). Triclopyr BEE is much more toxic to aquatic species than triclopyr TEA, or triclopyr acid, the projected levels of exposure are much less even for acute scenarios because of the rapid hydrolysis of triclopyr BEE to triclopyr acid, as well as, the lesser runoff of triclopyr BEE because of its lower water solubility and higher affinity for soils (SERA 2003a). Nonetheless, triclopyr BEE is projected to be somewhat more hazardous when used near bodies of water where runoff to open water may occur (SERA 2003a).

JLB Oil is used as an adjuvant with triclopyr formulations such as Garlon 4. This is a mineral oil and Limonene or vegetable oil and Limonene mixture used as a carrier. This product has been reviewed according to the EPA hazard categories under section 311 and 312 of SARA Title III, 1986 and does not contain hazardous components that require reporting.

Glyphosate herbicide would be used without surfactants. It is applied to foliage and rapidly moves throughout the plant. It can also be applied to cut stumps. Glyphosate is inactivated when it comes into contact with soil since it is strongly adsorbed onto soil particles. It is readily metabolized by soil bacteria and many species of soil micro-organisms can use glyphosate as a carbon source. Many field studies involving microbial activity in soil after glyphosate exposures

note an increase in soil micro-organisms or microbial activity, while other studies have noted a transient decrease in soil fungi, bacteria and microbial activity (SERA 2003b). There is very little information suggesting that glyphosate would be harmful to soil microorganisms under field conditions and a substantial body of information indicating that glyphosate is likely to enhance or have no effect on soil microorganisms (SERA 2003b). Because of its adsorption to soil, glyphosate is not easily leached and is not likely to contaminate ground water. Glyphosate remains unchanged in the soil for varying lengths of time depending on soil texture, organic matter content and environmental conditions. The SERA risk assessment for glyphosate generally supports the conclusions reached by U.S. EPA: Based on the current data, it has been determined that effects to birds, mammals, fish and invertebrates are minimal (SERA 2003b). The use of less toxic formulations results in acute hazard quotients that do not approach a level of concern for any species. Nonetheless, the use of glyphosate near bodies of water where sensitive species of fish may be found (i.e., salmonids) should be conducted with substantial care to avoid contamination of surface water.

Trails

Recreational trails impact the soil resources to various degrees depending on trail location, type of users, maintenance methods, maintenance rotation, and amount of use. Findings include rutting, soil compaction, erosion, sedimentation, and loss of vegetation. Surface soil layers and vegetation would be removed in the tread path of the new 16 miles of equestrian trails and 1.2 miles of connector trail. This would increase the potential for erosion to occur within the trail tread. Erosion potential would be greater on sections located in steeper slopes, trail sections located in areas with coarse soil material, and areas void of overstory vegetation. Trails should be designed so that the trail contours with the terrain as this would decrease erosion potential. Coarse soils are more erodible and rutting can become a problem if traveled while wet. Rutting over time can accelerate erosion by entrenching the trail and concentrating water flows which would increase maintenance needs. The trail tread would also become compacted as use increased. Proper maintenance is essential to decrease the effects to the soil resource. Impacts to soils would be minimized by following existing RLRMP standards and guidelines (USDA 2004a).

Closing Trail 165-2 would reduce the sediment entering into Little Citico Creek from the trail. Portions of the trail are located in the flood plain of Little Citico Creek and due to its location and amount of use the trail tread is degraded to the point that it is causing resource damage. Most of the impact occurs during flood events when the creek rises over the trail and exposed soils are removed from the trail. Soils along the trail are coarse and tend to stay moist which leads to an increase in rutting, compaction, and/or trail entrenchment. Soil type's found within floodplains are not well suited for equestrian use. Once closed and stabilized vegetation would recover the trail over time which would stabilize the area. Improving approximately 1,300 feet of Trail 165-3 to FS standards would minimize the effects to the soil resources.

The potential for soil compaction occurs when using heavy equipment for the construction of the parking area. Tree removal and grading activities have the potential to increase soil erosion through vegetation clearing and soil disturbance. The parking area will be graded to minimize runoff, as well as, covered with gravel. The gravel would allow water to infiltrate rapidly resulting in little or no additional erosion. Erosion is typically short-term, lasting only until vegetation has become reestablished and gravel is placed in parking area. Silt fencing should be used to prevent any offsite movement of sediment.

Reclassifying 2.3 miles of Mill Branch Hiking Trail as a dual equestrian/hiking trail could create resource issues unless the trail is managed using equestrian trail standards. Horse hooves disturb the trail tread much more than hikers. This could lead to an increase in rutting, compaction, and trail entrenchment which then increases the need for maintenance. Impacts to soils would be minimized by following existing RLRMP standards and guidelines (USDA 2004a).

Stabilizing the approaches to Trail 165-1 on Citico Creek would have localized effects. It would decrease erosion, lessen impacts to the stream bank from repeated use, and reduce sediment.

Cumulative Effects Soil and Water Resources

Alternative A (No Action)

Alternative A 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, under this alternative soil erosion would continue along sections of legacy roads, portions of NFSR 36-1 and 284F, and Trails 165-1 and 165-2; which contribute to sedimentation into nearby streams and drainages. Activities, on NFS lands, that are reasonably foreseeable would be implemented under the standards for protecting soils listed in the RLRMP (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 B (Proposed Action)

Little timber harvesting has occurred over the last 10 years; 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.

Impacts on soils resulting from timber harvests normally recover 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.

Other activities on NFS lands within the analysis area 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. Closing Trail 165-2 would decrease the amount of sediment entering into Little Citico Creek over time and would restore the disturbed areas within the floodplain. Other trail improvements would also decrease erosion and sedimentation into nearby streams and drainages over time. These improvements would also reduce impacts to the soil resource over the long term.

Implementation of Alternative B considered together with past and reasonably foreseeable future activities is not expected to have a cumulative effect on the soil resource. Project design and/or mitigation that would be used during project implementation are primary factors 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 U.S. 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 approximately 24,200 acres of NFS lands in compartments 9, 10, 11, 13, 14, 15, 16, 17, 22, 23, 24, 25, 31, 32, 33, 40, 41, 42, 51, 402, 403, 404, 405, 406, 428, 429 and 430. The time frame used in this analysis is up to ten years after completion of the activities.

Direct and Indirect Effects Climate Change

Alternative A (No Action)

In general terms, Alternative A 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 B (Proposed Action)

It is not expected that the action alternatives would substantially alter the effects of climate change in the analysis area. The proposed fuels treatment in Alternative B 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. Each of the action alternatives 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)[1] 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

[1] 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. Ecosystems with a negative NEP are referred to as a carbon source.

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 CO_2 are miniscule. However, the forests of the U.S. significantly reduce atmospheric concentrations of CO_2 resulting from fossil fuel emissions. The forest and wood products of the U.S. currently sequester approximately 200 teragrams (Tg, equals 196,841,306 US tons) of carbon per year (Heath and Smith 2004). This rate of carbon sequestration offsets approximately 10% of CO_2 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).

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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REFERENCES

Birdsey , R.; Pregitzer, K.; Lucier, A. 2006. Forest carbon management in the United States: 1600-2100. Journal of Environmental Quality 35: 1461-1469.

Birdsey, R.; Jenkins, J.; Johnston, M.; Huber-Sannwald, E.; 2007. North American Forests. In King, A.W.; Dilling, L.; Zimmerman, G.P.; Fairman, D.M.; Houghton, R.A.; Marland, G.; Rose, A.Z.; Wilbanks, T.J.; eds. The First State of the Carbon Cycle Report (SOCCR): The North American carbon budget and implications for the global carbon cycle, a report by the US Climate Change Science Program and the Subcommittee on Global Change Research, National Oceanic and Atmospheric Administration, Asheville, NC; National Climatic Data Center: 117-126.

Chapin, F.S.; Woodwell, G.M.; Randerson, J.T.; Rastetter, E.B.; Lovett, G.M.; Baldocchi, D.D.; Clark, D.A.; Harmon, M.E.; Schimel, D.S.; Valentini, R.; Wirth, C.; Aber, J.D.; Cole, J.J.; Goulden, M.L.; Harden, J.W.; Heimann, M.; Howarth, R.W.; Matson, P.A.; McGuire, A.D.; Melillo, J.M.; Mooney, H.A.; Neff, J.C.; Houghton, R.A.; Pace, M.L.; Ryan, M.G.; Running, S.W.; Sala, O.E.; Schlesinger, W.H.; Schulze, E.-D. 2006. Reconciling Carbon-cycle Concepts, Terminology, and Methods. Ecosystems 9: 1041-150.

Cherokee National Forest. 2000. Cherokee National Forest 1999 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2001. Cherokee National Forest 2000 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2002. Cherokee National Forest 2001 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2003. Cherokee National Forest 2002 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2005. Cherokee National Forest 2004 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2008. Cherokee National Forest 2007 Monitoring and Evaluation Report. Cleveland , TN.

Cherokee National Forest. 2008a. Cherokee National Forest, Middle/Upper Citico Creek Ecosystem Assessment. Tellico Plains, TN.

Canadell, J.G., D.E. Pataki, R. Gifford, R.A. Houghton, Y. Luo, M.R. Raupach, P. Smith,W. Steffen. 2007. Saturation of the Terrestrial Carbon Sink. In Canadell JG, Pataki D, Pitelka L (eds) Terrestrial Ecosystems in a Changing World. The IGBP Series,Springer-Verlag, Berlin Heidelberg, pp. 59-78.

Copperhead Consulting. 2008. Botanical surveys of Hurricane Branch and Middle Citico Creek Project Area, Cherokee National Forest, Tennessee Contract Number: AG-4756-C-08-0005 Order Number: AG-4756-D-08-0021

DeGraaf, R. M., V. E. Scott, R. H. Hamre, L. Ernst, and S. H. Anderson. 1991. Forest and rangeland birds of the United States: natural history and habitat use. U.S. Dept. of Agriculture, Forest Service. Agriculture Handbook 688.

Ernst, J.P. and V. Brown. 1988. Conserving Endangered Species on Southern Forested Wetlands. Pages 135-145 in D. Hook and R. Lea, eds. Proceedings of the Symposium: The Forested Wetlands of the United States. USDA Forest Service Gen. Tech. Rep. SE-50. Asheville, NC. 168pp.

Etnier, David A. and Wayne C. Starnes 1993. The Fishes of Tennessee. The University of Tennessee Press, Knoxville, TN.681 pp.

Extension Toxicology Network (EXTOXNET). Pesticide Information Profiles – Triclopyr. 1996. Page 1-4.

Hamel, P. B. 1992. Land manager's guide to the birds of the South. The Nature Conservancy, Southeastern Region, Chapel Hill, NC. 437pp.

Harvey, M.J., C.S. Chaney, and M.D. McGimsey. 1991. Distribution, status, and ecology of small mammals of the Cherokee National Forest, Tennessee (Southern Districts). Report to the U.S. Forest Service Cherokee National Forest. Tenn. Tech. Univ. 65 pp.

Harvey, M.J., J.S. Altenbach, and T.L. Best. 1999. Bats of the United States. Arkansas Game and Fish Commission and U.S. Fish and Wildlife Service.

Heath, L.S. and J.E. Smith, 2004: Criterion 5, indicator 26: total forest ecosystem biomass and carbon pool, and if appropriate, by forest type, age class and successional change. In: *Data Report: A Supplement to the National Report on Sustainable Forests— 2003* [Darr, D.R. (coord.)]. FS-766A, U.S. Department of Agriculture, Washington, DC, 14 pp. Available at http://www.fs.fed.us/research/sustain/contents.htm

Hicks, M. L. 1992. Guide to the liverworts of North Carolina. Duke Univ. Press, Durham, NC. 239 pp.

Hubricht, L. 1985. The Distribution of the native land mollusks of the Eastern United States. *Fieldiana: Zoology* (New Series) 24. Field Museum of Natural History, Chicago.

Jennings, M. 2010. Letter of Concurrence #2010-CPA-0412.

Kauffman, G. 2006. Conservation Assessment for American Ginseng (Panax quinquefolius) L. Forest Service Eastern Region, National Forests in North Carolina. Asheville, NC.

Knoepp, Jennifer D., Vose, James M., Swank, Wayne D., August 2004. Long-Term Soil Response to Site Preparation Burning in the Southern Appalachians. Forest Science. Vol. 50 . No. 4. pages. 540-550.

Pacala, R.; Birdsey, R.A.; Bridgham, S.D.; Conant, R.T.; Davis, K.; Hales, B.; Houghton, R.A.; Jenkins, J.C.; Johnston, M.; Marland, G.; Paustian, K. 2007. The North American carbon budget past and present. In King, A.W.; Dilling, L.; Zimmerman, G.P.; Fairman, D.M.; Houghton, R.A.; Marland, G.; Rose, A.Z.; Wilbanks, T.J.; eds. The First State of the Carbon Cycle Report (SOCCR): The North American carbon budget and implications for the global carbon cycle, a report by the US Climate Change Science Program and the Subcommittee on Global Change Research, National Oceanic and Atmospheric Administration, Asheville, NC; national Climatic Data Center: 117-126.

Linzey, D.W. 1995. Mammals of Great Smoky Mountains National Park. McDonald & Woodward Publishing Company, Blacksburg, VA. 140pp.

NatureServe. 2002. NatureServe Explorer: An online encyclopedia of life [web application]. Version 3.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

NatureServe. 2004. NatureServe Explorer: An online encyclopedia of life [web application]. Version 3.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer.

Nicholson, C. P. 1997. Atlas of the breeding birds of Tennessee. The Univ. of Tenn. Press, Knoxville. 426pp.

Patric, J.H. October, 1976. Soil Erosion in the Eastern Forest. Journal of Forestry. Pages 671-677.

Patric, James. 1994. Water, Woods, and People: A Primer.

Peterson, R.T. 2002. A Field Guide to the Birds of Eastern and Central North America. Fifth edition. Houghton Mifflin Company, Boston, Mass. 427 pp.

Pregitzer, K.S. and Euskirchen, E.S. 2004. Carbon cycling and storage in world forests: biome patterns related to forest age. Global Change Biology 10: 2052-2077.

SAMAB. 1996. The Southern Appalachian Assessment Terrestrial Technical Report. Report 5 of 5. Atlanta: U.S. Department of Agriculture, Forest Service, Southern Region.

Sauer, J. R., J. E. Hines, and J. Fallon. 2005. The North American Breeding Bird Survey, Results and Analysis 1966 - 2005. Version 6.2.2006, USGS Patuxent Wildlife Research Center, Laurel, MD

Syracuse Environmental Research Associates, Inc. March 15, 2003a. Triclopyr – Revised Human Health and Ecological Risk Assessment Final Report. Task No. 13. SERA TR 02-43-13-03b.

Syracuse Environmental Research Associates (SERA), Inc. March 1, 2003b. Glyphosate - Human Health and Ecological Risk Assessment Final Report. Task No. 9. SERA TR 02-43-09-04a.

Swank, Wayne, and DeBano, Leonard, and Nelson, Devon. 1989. Effects of Timber Management Practices on Soil and Water. Pages 79-106. From the Scientific Basis for Silvicultural and Management Decisions in National Forest System. General Technical Report WO-55.

Swift, L. W., Elliot, K. J., Ottmar, R. D., and Vihnanek, R. D. 1993. Site preparation burning to improve southern Appalachian pine-hardwood stands: fire characteristics and soil erosion, moisture, and temperature. Can. J. For. Res. 23: 2242-2254
Tennessee Department of Environment and Conservation. 2003. Tennessee Natural Heritage program rare vertebrates list.

Tennessee Department of Environment and Conservation. 2000. Tennessee Natural Heritage program rare invertebrates list.

Tennessee Department of Environment and Conservation. 1999. Tennessee Natural Heritage program rare plant list.

Tennessee Department of Environment and Conservation, Division of Natural Heritage. 2003. Tennessee Natural Heritage Rare Species Databases. Available: http://www.state.tn.us/environment/nh.

The University of Tennessee Herbarium and the Center for Field Biology, Austin Peay State University. 1997-2002. Atlas of Tennessee Vascular Plants. Available: http://www.bio.utk.edu/botany/herbarium/vascular/atlas.html

Tennessee Wildlife Resources Agency. 2003. Big Game Harvest Report 2001-2002. Technical Report No. 03-1. Nashville, TN. 248pp.

USDA Forest Service. Regional office R8 FSVeg Database. Atlanta, GA.

USDA. Forest Service. 1995. FSH 2409.18.30

USDA Forest Service. 1997. Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region, R8-FR62.

USDA Forest Service, 1989. Final Environmental Impact Statement, Vegetation Management in the Appalachian Mountains, Atlanta, GA.

USDA Forest Service. 2004a. Revised Land and Resource Management Plan for the Cherokee

National Forest. Cherokee National Forest, Cleveland, TN. 463 pp.

USDA Forest Service. 2004b. Final Environmental Impact Statement for the Revised Land and Resource Management Plan for the Cherokee National Forest. Cherokee National Forest, Cleveland, TN. 535 pp.

USDA Forest Service. 2004c. Appendixes for the Environmental Impact Statement for the Revised Land and Resource Management Plan. Cherokee National Forest, Cleveland, TN. 380 pp.

USDA Forest Service. 2005. Restoration of Pine Oak Communities, Tellico Ranger District, Tellico Plains, TN.

USDA Forest Service. 2005b. Cherokee National Forest, Hemlock Wooly Adelgid Suppresion EA, Cleveland, TN.

USDA. Forest Service. 2008. Cherokee National Forest, Non Native Invasive Plant Control EA, Cleveland, TN

USDA Forest Service 2009. Aquatic database for the Cherokee National Forest. Cherokee National Forest, Cleveland, TN.

USDI Fish and Wildife Service. 1988. Endangered Species Act of 1973 as Amended through the 100th Congress.

U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions And Sinks: 1990 – 2007, April 2009

U.S. Global Change Research Program, National Assessment Synthesis Team. 2001. *Climate change impacts on the United States – the potential consequences of climate variability and change*. United Kingdom: Cambridge University Press, 612 pp.

Weakley, A.S. 2004. Flora of the Carolinas, Virginia, and Georgia, Working Draft of March 17, 2004. University of North Carolina Herbarium, NC Botanical Garden. Chapel Hill, NC

Webster, W.D, J.F. Parnell, and W.C. Biggs, Jr. 1985. Mammals of the Carolinas,Virginia, and Maryland. The University of North Carolina Press. Chapel Hill, NC. 255 pp.

Whitaker, Jr., J.O. and W.J. Hamilton, Jr. 1998. Mammals of the Eastern United States. Cornell Univ. Press, Ithaca, NY. 583pp.

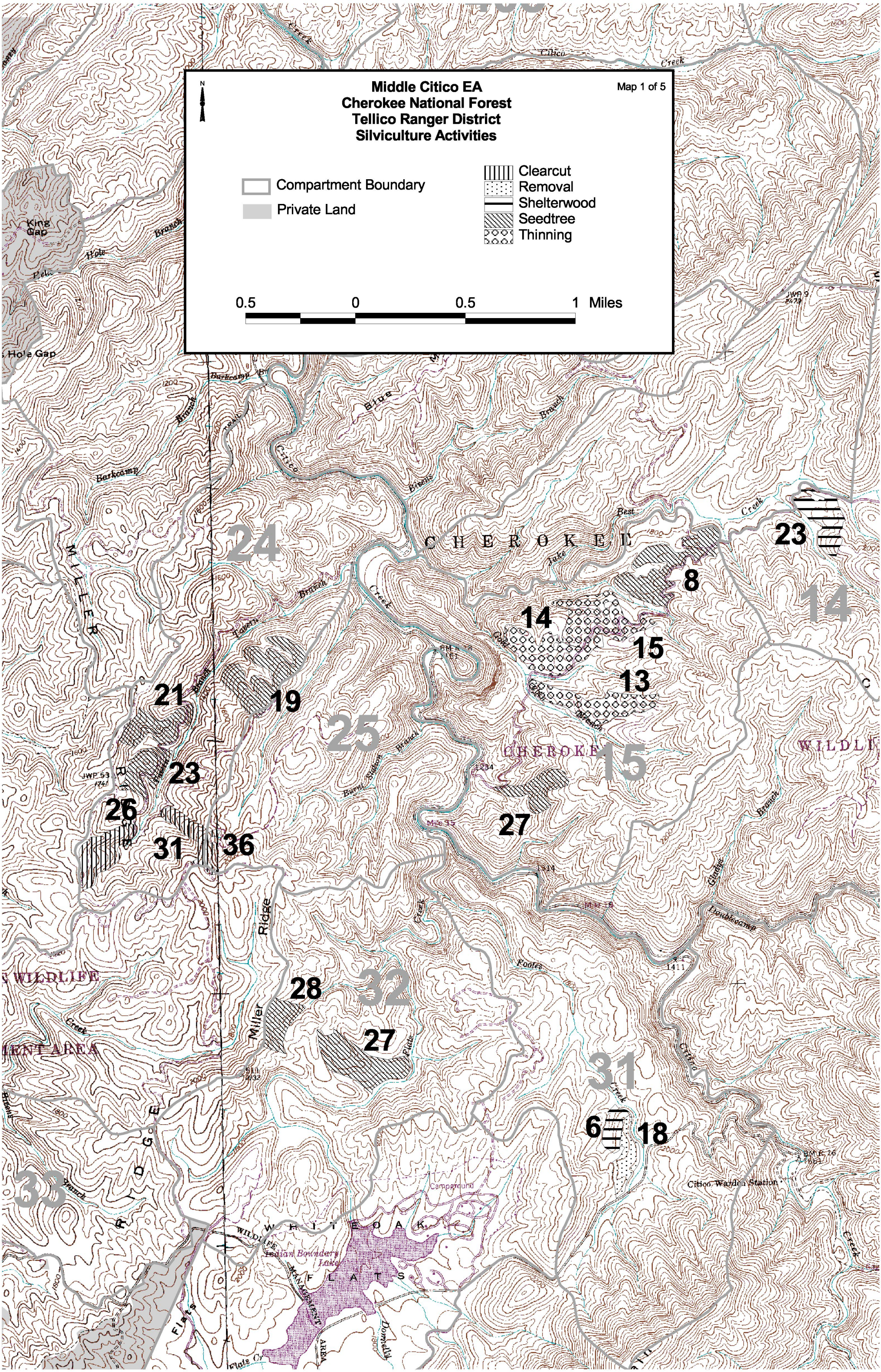
Wofford, B.E. 1989. Guide to the Vascular Plants of the Blue Ridge. Univ. of Georgia Press, Athens, GA. 384pp.

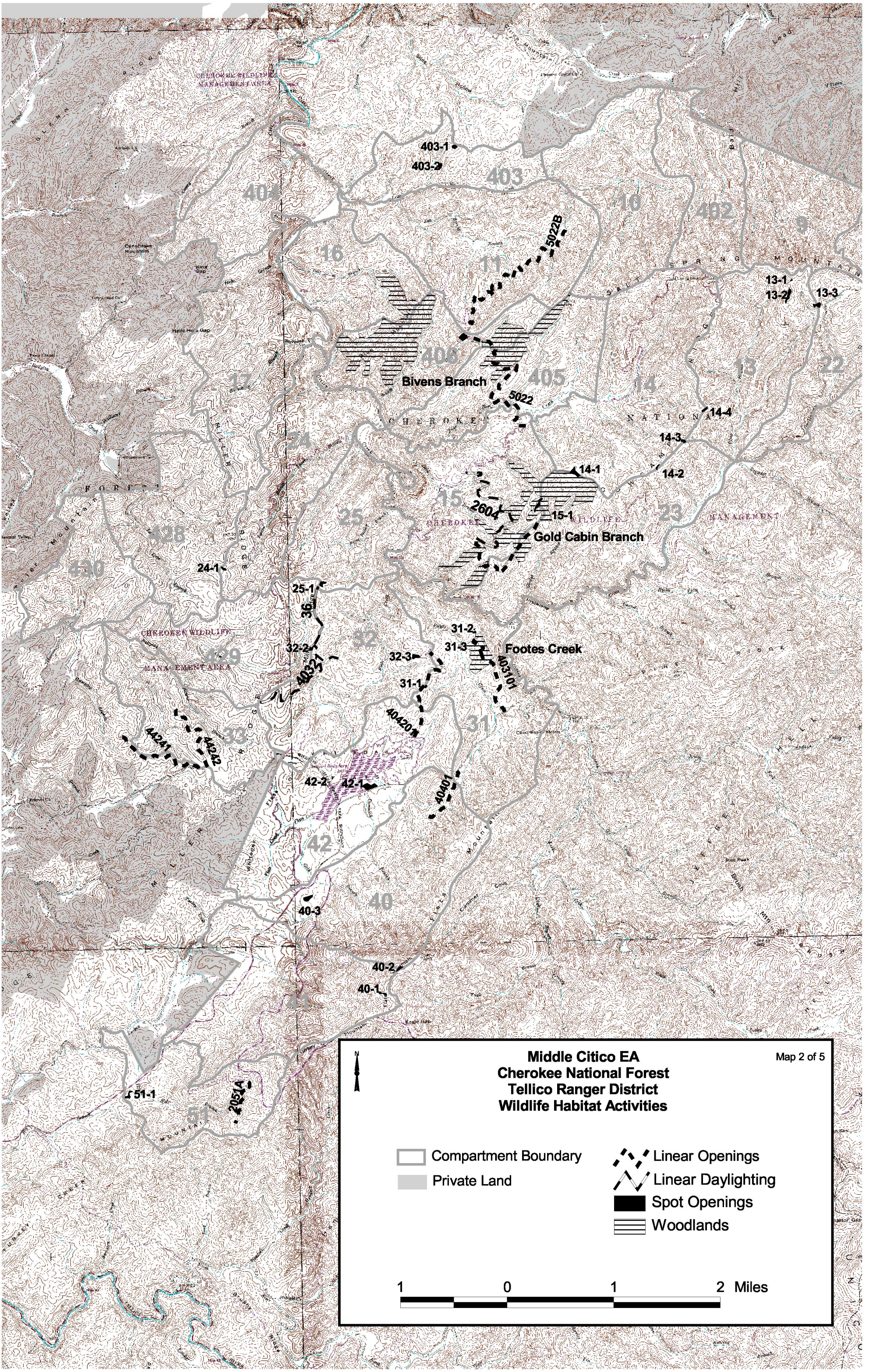
Wofford, B.E. and E.W. Chester. 2002. Guide to the Trees, Shrubs, and Woody Vines of Tennessee. Univ. of Tenn, Press, Knoxville, TN. 286pp.

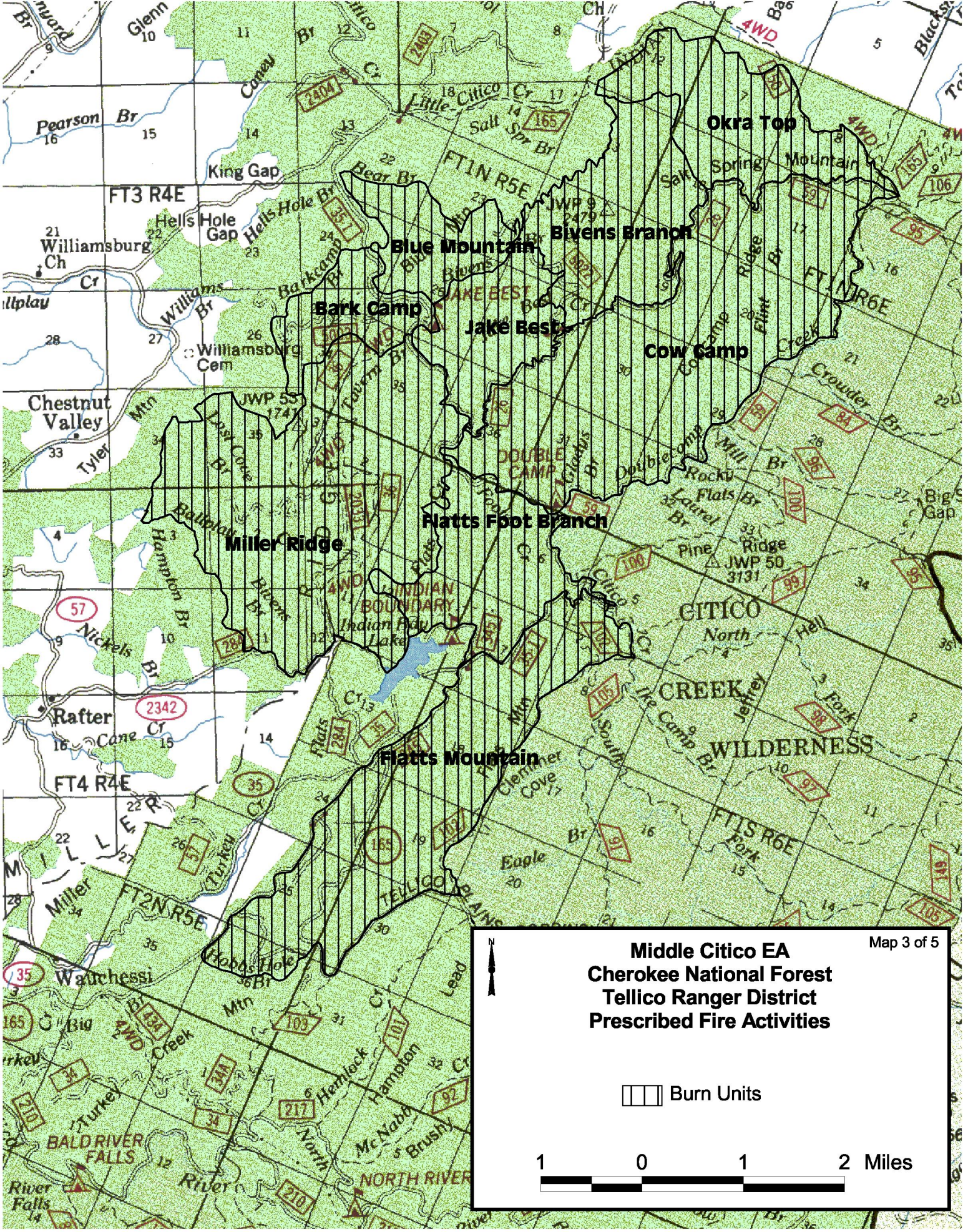
Appendix A

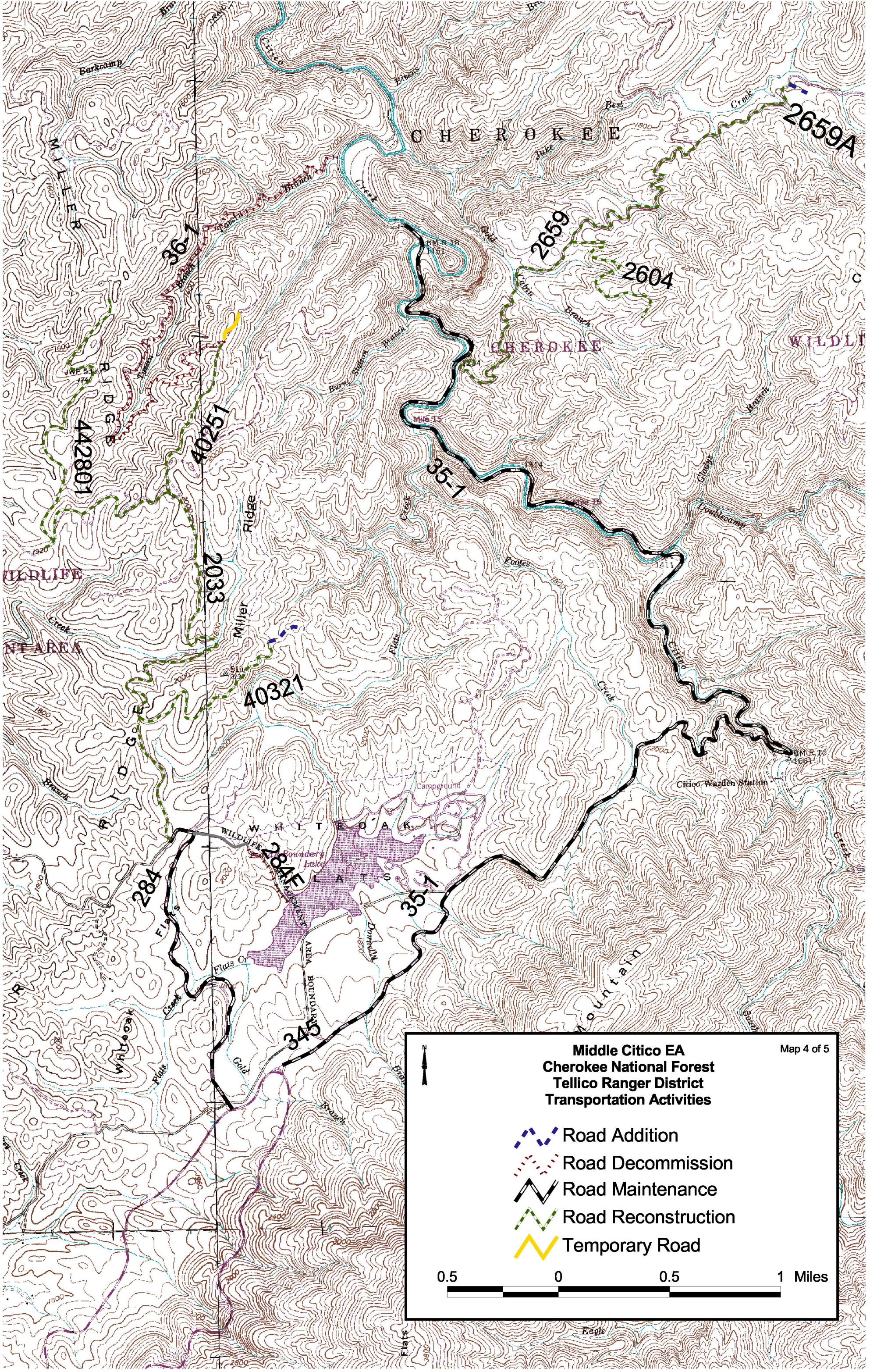
Maps

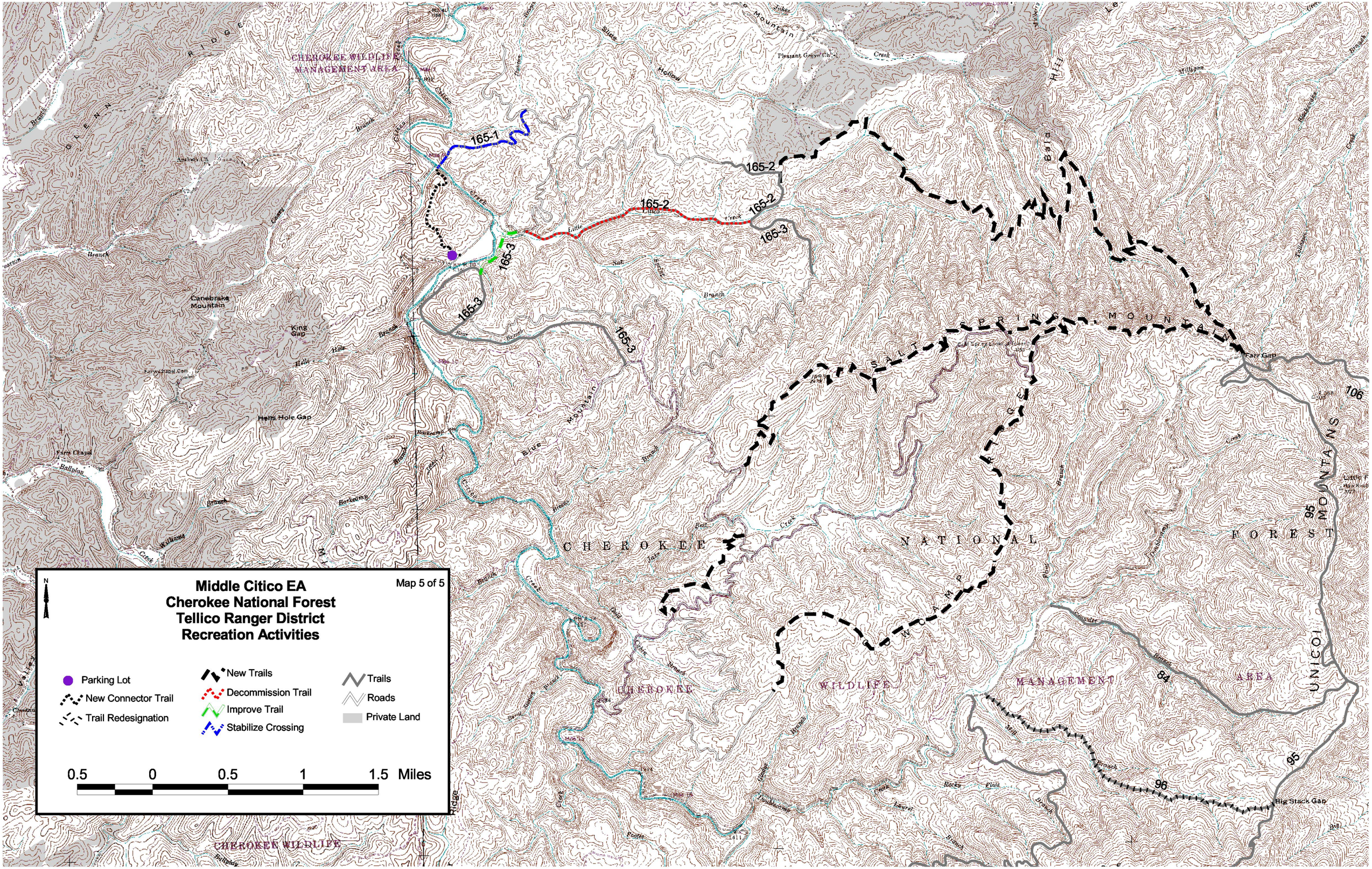
Middle Citico Environmental Assessment


Middle Citico EA
Cherokee National Forest
Tellico Ranger District
Silviculture Activities
Map 1 of 5
N
Compartment Boundary
Private Land
Clearcut
Removal
Shelterwood
Seedtree
Thinning
0.5
0
0.5
1 Miles
King Gap
Hole Gap
Citico Creek
Barkcamp Branch
Blue Branch
Best Creek
Lake Branch
Tavern Branch
Burns Branch
Footes Creek
Doublecamp Branch
Miller Ridge
Citico Wardens Station
Campground
Indian Boundary Lake
WHITE OAK FLATS
CHEROKEE WILDLIFE MANAGEMENT AREA
24
23
8
14
15
13
21
19
25
15
23
26
31
36
27
28
32
27
31
6
18
33


Middle Citico EA
Cherokee National Forest
Tellico Ranger District
Wildlife Habitat Activities
Map 2 of 5
Compartment Boundary
Private Land
Linear Openings
Linear Daylighting
Spot Openings
Woodlands
1 0 1 2 Miles
Bivens Branch
Gold Cabin Branch
Footes Creek
403-1
403-2
5022B
5022
13-1
13-2
13-3
14-1
14-2
14-3
14-4
15-1
2604
24-1
25-1
36
32-2
32-3
31-1
31-2
31-3
403101
40321
40420
44241
44242
42-1
42-2
40401
40-1
40-2
40-3
51-1
2051A


Okra Top
Bivens Branch
Blue Mountain
Bark Camp
Jake Best
Cow Camp
Flatts Foot Branch
Miller Ridge
Flatts Mountain
Map 3 of 5
Middle Citico EA
Cherokee National Forest
Tellico Ranger District
Prescribed Fire Activities
Burn Units
1 0 1 2 Miles


Middle Citico EA
Cherokee National Forest
Tellico Ranger District
Transportation Activities
Map 4 of 5
Road Addition
Road Decommission
Road Maintenance
Road Reconstruction
Temporary Road
0.5
0
0.5
1 Miles
CHEROKEE
WILDLIFE
MILLER RIDGE
WHITEOAK FLATS
Citico Warden Station
Campground
Miller Ridge
Whiteoak Flats
Flats Cr
Gold Branch
Doublecamp Branch
Footer Branch
Best Creek
Barkcamp Branch
Burn Stakes Branch
Cabin Branch
Jake Branch
Citico Creek
Mile 15
Mile 16
36-1
2659
2659A
2604
35-1
40251
442801
2033
40321
284
284E
351
345


Middle Citico EA
Cherokee National Forest
Tellico Ranger District
Recreation Activities
Map 5 of 5
N
Parking Lot
New Connector Trail
Trail Redesignation
New Trails
Decommission Trail
Improve Trail
Stabilize Crossing
Trails
Roads
Private Land
0.5 0 0.5 1 1.5 Miles
165-1
165-2
165-3
CHEROKEE WILDLIFE MANAGEMENT AREA
CHEROKEE NATIONAL FOREST
UNICOI MOUNTAINS
Canebrake Mountain
King Gap
Hells Hole Gap
Farr Gap
Big Stack Gap
Pleasant Grove Ch
106
95
96
84

APPENDIX B

BIOLOGICAL EVALUATION
Middle Citico Vegetation Management
Compartments 19, 20, 21, 22, 23, 25, 27, 28, 30, 31, 32, 34, 35, 37, 41, 42, 43, 44, 48, 50, 52, 53, 57, 63, 66, 72, 82 and 97
USDA FOREST SERVICE, SOUTHERN REGION
CHEROKEE NATIONAL FOREST
TELLICO 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 Tellico 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.

Silvicultural Treatments – Proposed Activities

1) **Restore natural oak and oak-pine communities and create early successional habitat through silvicultural treatments on approximately 35 acres of existing forested stands** that have been altered from desired conditions due to previous land use. Restore these stands to forested communities that would naturally occur on these sites. These are mostly upland sites that would support "dry to mesic oak forest" or "dry and dry mesic oak-pine forests". Regeneration sources would be existing seedlings, coppice or stump sprouts, and supplemental planting of oaks. Activities would occur in the stands listed in Table 1.

Table 1. Oak and oak-pine restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
14/23	25	Shelterwood w/reserves	Slashdown, plant white oak on 30' x 30' spacing, 2nd year chemical release.
31/6	10	Shelterwood w/reserves	Natural regeneration
TOTAL	**35**		

2) **Restore shortleaf pine, pitch pine and associated pine-oak communities and create early successional habitat through silvicultural treatments on approximately 233 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. These stands currently support a high component of Virginia pine, white pine or both of these species. Opportunities exist to increase table mountain pine in some of these stands. Site preparation, planting of pitch or shortleaf pine, and a second year chemical release using herbicide (triclopyr) would ensure the survival and establishment of desired oak and pine. Activities would occur in the stands listed in Table 2.

Table 2. Pine restoration

Comp/Stand	Acres	Type of Harvest	Reforestation
15/08	40	Seedtree w/reserves	Slashdown, site prep burn, plant shortleaf pine on 20' x 20' spacing, 2nd year chemical release.
15/27	18	Seedtree w/reserves	Slashdown, site prep burn, plant pitch pine on 20'x 20' spacing, 2nd year chemical release of pine seedlings.
24/19	40	Seedtree w/reserves	Slashdown, site prep burn, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/21	22	Seedtree w/reserves	Slashdown, site prep burn, plant shortleaf pine on 20'x 20' spacing, 2nd year chemical release of pine seedlings.
24/23	19	Seedtree w/reserves	Slashdown, site prep burn, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
24/26	24	Clearcut w/reserves	Slashdown, site prep burn, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
24/31	12	Clearcut w/reserves	Slashdown, site prep burn, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
25/36	5	Clearcut w/reserves	Slashdown, site prep burn, plant shortleaf pine on 12' x 12' spacing, 2nd year chemical release of pine seedlings.
32/27	36	Seedtree w/reserves	Slashdown, site prep burn, plant pitch pine on 20'x20' spacing, 2nd year chemical release.
32/28	17	Seedtree w/reserves	Slashdown, site prep burn, plant pitch pine on 20' x 20' spacing, 2nd year chemical release of pine seedlings.
TOTAL	**233**		

3) Improve forest health, species composition and promote advanced oak regeneration using intermediate stand treatments on approximately 123 acres. These upland stands are primarily white pine. Activities would occur in the stands listed in Table 3.

Table 3. White pine removal

Comp/Stand	Acres	Type of Harvest	Reforestation
15/13	34	Thinning	None
15/14	34	Thinning	None
15/15	40	Thinning	None
31/18	15	White pine removal	None
TOTAL	**123**		

Additional Wildlife Habitat Improvements – Proposed Activities

1) Create approximately 621 acres of open pine-oak woodlands on sites that would naturally support these communities. Dry and xeric oak and pine-oak forests were historically prone to wildfires, especially on south and west facing slopes and ridges. In conjunction with the thin, poor quality soils on these sites, open woodland conditions with a grassy herbaceous layer often developed. These communities provide important habitats for a wide variety of wildlife species. Game species such as white-tailed deer, eastern wild turkeys, and northern bobwhite utilized these areas for foraging, nesting, and brood rearing. Non-game species including grassland birds, neotropical migrants, raptors, and small mammals also utilize these areas. Treatments associated with creating woodland conditions may include prescribed burning on a rotation suitable to reduce woody vegetation in the understory and encourage establishment of desired herbaceous vegetation; herbicide application to reduce sprouting of woody vegetation; and cutting of understory and midstory vegetation with chainsaws or other hand tools to expose the forest floor to additional sunlight. Activities would occur on the stands listed in Tables 4, 5, and 6. Streams, roads, trails, handline, and dozer line (approximately 0.5 mile) would be used as fire line.

The stands vary considerably from xeric pine and oak to more mesic coves. Treatment would only occur in more xeric areas appropriate for this goal.

Activities would occur on the following stands:

Table 4. Woodland Creation Gold Cabin Branch

Comp/Stand	Acres	Treatment
15/18	19	Thin, burn, herbicide
15/19	10	Thin, burn, herbicide
15/20	27	Thin, burn, herbicide
15/21	18	Thin, burn, herbicide
15/23	24	Thin, burn, herbicide
15/39	20	Thin, burn, herbicide
23/4	15	Thin, burn, herbicide
23/10	91	Thin, burn, herbicide
TOTAL	224	Thin, burn, herbicide

Table 5. Woodland Creation Footes Creek

Comp/Stand	Acres	Treatment
31/8	14	Thin, burn, herbicide
31/15	22	Thin, burn, herbicide
TOTAL	36	Thin, burn, herbicide

Table 6. Woodland Creation Bivens Branch

Comp/Stand	Acres	Treatment
16/8	31	Thin, burn, herbicide
16/12	17	Thin, burn, herbicide
405/9	76	Thin, burn, herbicide
406/7	89	Thin, burn, herbicide
406/3	13	Thin, burn, herbicide
406/2	52	Thin, burn, herbicide
406/12	39	Thin, burn, herbicide
406/6	44	Thin, burn, herbicide
TOTAL	361	Thin, burn, herbicide

3) Maintain approximately 56.5 acres of existing spot and linear wildlife openings. Maintenance activities typically include, but are not limited to, mowing, fertilizing, sowing, burning, daylighting and rehabilitation the spot openings in Table 7 and linear openings in Table 8.

Table 7. Spot wildlife openings for maintenance and daylighting

Opening number	Acres	Opening number	Acres
13-1	0.5	31-3	0.5
13-2	2.0	32-2	2.5
13-3	1.5	32-3	1.5
14-1	3.5	40-1	1.5
14-2	2.0	40-2	2.0
14-3	2.5	40-3	2.5
14-4	2.5	42-1	2.5
15-1	3.5	42-2	1.0
24-1	1.5	51-1	1.0
25-1	1.0	403-1	0.5
31-1	0.5	403-2	1.0
31-2	0.5		

Table 8. Linear wildlife openings for maintenance and daylighting

NFSR	Opening number	Acres	Miles	NFSR	Opening number	Acres	Miles
40321	East Miller Ridge	3.0	1.5	5022B	Bivens Branch Spur	3.0	1.5
404201	Flats Creek	2.0	1.0	2604	Gold Cabin Branch	6.0	3.0
40401	Debety Gap	1.0	0.5	2051A	Butler Knob	3.5	1.75
403101	Footes Creek	2.0	1.0	44241	Murphy Left	3.0	1.5
5022	Bivens Branch	3.0	1.5	44242	Murphy Right	2.0	1.0

4) Seed areas of timber harvest that are site prep burned with a non invasive grass seed mixture following burn.
5) Install ephemeral pools in temporary roads and gated roads in appropriate areas (approximately 10-30 pools up to 0.25 acre each).
6) Remove timber by commercial means up to 25 feet either side of NFSR 36 Tavern Branch 0.75 miles, NFSR 40321 East Miller Ridge 1.25 miles, NFSR 2604 Gold Cabin Branch 2 miles.

Fuel Reduction – Proposed Activities
Prescribe burn the following units totaling approximately 18,100 acres: T05 Okra Top, T04 Bivens Branch, T07 Blue Mountain, T09 Cow Camp, T08 Jake Best, T06 Bark Camp, T10 Miller Ridge, T11 Flatts Foot Branch, T15 Flats Mountain. Streams, roads, trails and handline would be used as fire lines. Approximately two miles of ground disturbance is also needed for fire lines. Prescribed burning would not occur in wilderness areas and no ground disturbance would occur in wilderness associated with the burning.

Burning would occur over a period of time (no more then 5000 acres per year). Not all areas within the blocks would burn, resulting in a landscape of burned and unburned mosaic. Fire would be set along xeric ridgelines and allowed to back onto lower slopes and would likely not impact more mesic sites.

Transportation System – Proposed Activities
1) Reconstruct approximately 10-12 miles of existing NFSRs to bring them up to haul standards. Work would primarily consist; of widening curves, placing spot gravel, brushing, minor re-shaping, cleaning and constructing dips and other drainage structures to improve overall drainage, upgrading culverts, and replacing gates. (See Transportation Analysis in project file for details by road).
2) Construct approximately 1 mile of temporary roads to access treatment units. Temporary roads would be closed, stabilized and seeded with wildlife preferred species following completion of the project.

3) Decommission a portion of NFSR 36-1 and 284F to reduce sediment runoff. Decommissioning would involve; repairing ruts/erosion, constructing waterbars on grades that drain towards creek crossings, seeding the roadbed in areas where no vegetation exists and blocking the road with an earth berm.
4) Sections of unauthorized roads and trails will be rehabilitated using a combination of biotechnical techniques, rip rap and other materials to reconstruct the channels and banks. Unauthorized roads along tributaries to Little Citico Creek in several areas have diverted the stream from its channel, resulting in continuing erosion and sedimentation. Heavy equipment may be used during construction. Adverse effects are expected to be short term and of limited extent.
5) Perform prehaul maintenance on approximately 8-10 miles of NFSRs to prepare the roads for timber haul.
6) Perform routine maintenance on 15-20 miles of NFSRs needed for timber haul.

Trail System – Proposed Activities
1) Design and construct approximately 16 miles of new equestrian trails in the Citico Creek area originating from Young Branch Horse Camp. The trails would create several loops within the trail system. These additional equestrian trails would remove horses from forest system roads and provide greater opportunities for equestrians in the horse camp.
2) Close trail 165-2 and improve approximately 1300 feet of 165-3. Trail 165-2 is causing sediment into Little Citico Creek. Closing and stabilizing the trail will reduce sedimentation. Trail 165-3 will be improved to FS standards and provide safer passage for horses. Trail 165-2 will not be closed until other trails are constructed.
3) Construct a parking lot of approximately 4 acres and 1.2 miles of connector trail to access the new trails.
4) Reclassify 2.6 miles of Mill Branch Hiking Trail (FT 96) as a dual equestrian hiking trail and reroute a portion currently not appropriate for horse use.
5) Stabilize the approaches to Trail 165-1 on Citico Creek to prevent sedimentation.

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-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.

AFFECTED AREA

The project area is approximately eight miles northeast of Tellico Plains, Tennessee. The area encompasses approximately 26,286 acres within the Citico Creek 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 1000 feet to 3000 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.

Perennial water sources are readily accessible from all parts of the compartments. Openland, grassy wildlife openings within the compartments include approximately 23 miles of linear wildlife openings and 15 acres of spot openings.

The Middle Citico Creek project can be found on the Whiteoak Flats and Rafter quadrangle maps south of Chilhowee Lake. 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 2008 and 2009. 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).

Species known from the area or found during surveys include *Paravitrea placentula* (glossy supercoil), *Etheostoma sitikuense* (Citico darter), *Etheostoma vulneratum* (wounded darter), *Noturus baileyi* (smoky madtom), *Noturus flavipinnis* (yellowfin madtom), *Megaceros aenigmaticus* (a hornwort) and *Lophocolea appalachiana* (a liverwort). One occurrence of *Paravitrea placentula* was found on a portion of one of the new horse trails. The fish occur in Citico Creek. These three federally listed fish are monitored every year with multiple surveys

conducted by Conservation Fisheries, Inc. The results of their surveys are documented in the annual Monitoring and Evaluation Report which is available on the Cherokee National Forest webpage (http://www.fs.fed.us/r8/cherokee/). Current population trends for all three species are stable to improving. The bryophytes were found within stands proposed for vegetative treatments. Some species were not found during surveys but habitat is available within the burn areas. Thus they were given a review code of 4a and are analyzed. *Cheumatopsyche helma*, *Gomphus consanguis*, *Gomphus viridifrons*, *Macromia margarita*, *Ophiogomphus alleghaniensis*, and *Ophiogomphus incurvatus* are possible in or near the project area. These are riparian insects and would be protected by the riparian mitigation; thus there would be no effects to them. Those species are not further evaluated here.

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 Key (Attachment B).

Table 9 lists the species requiring further analysis and a determination of effects based on the analysis in the Project Review Form.

Table 9. Species Requiring Further Analysis

Scientific Name	Common Name
Fish	
Etheostoma sitikuense	Citico darter
Etheostoma vulneratum	Wounded darter
Noturus baileyi	Smoky madtom
Noturus flavipinnis	Yellowfin madtom
Phoxinus tennesseensis	Tennessee dace
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
Vertigo bollesiana	Delicate vertigo
Vertigo clappi	Cupped vertigo
Non-vascular Plants	
Ditrichum ambiguum	A moss
Homaliadelphus sharpii	A moss
Lophocolea appalachiana	A liverwort
Megaceros aenigmaticus	A hornwort
Vascular Plants	
Aster georgianus	Georgia aster
Berberis canadensis	American barberry
Botrychium jenmanii	dixie grapefern

Scientific Name	Common Name
Buckleya distichophylla	piratebush
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.

***Etheostoma sitikuense* Citico darter**

This fish inhabits large streams with low gradients at low elevations. It prefers gently flowing pools with large, flat rocks for spawning with a bedrock, sand, or gravel substrate. It is endemic to tributaries of the Tennessee River system. It occurs in Citico Creek on the Cherokee National Forest and a non-essential experimental population has been authorized on the Tellico River. Stocking began in 2003.

***Etheostoma vulneratum* wounded darter**

This species is found in large rivers (9+ stream order) having low gradient (<=2%). Deep water with gentle to moderate current over boulder to coarse rubble substrates are essential habitat components. The wounded darter is endemic to upper Tennessee River system where approximately 20 extant populations exist. It is known to occur Citico creek. This species is sensitive to habitat alterations, pollution or impoundments

***Noturus baileyi* smoky madtom**

This fish inhabits large streams with low gradients at low elevations. It prefers gently flowing pools with large, flat rocks for spawning with a bedrock, sand, or gravel substrate. It is endemic to the Little Tennessee River system. It occurs on the Cherokee National Forest in Citico Creek and a non-essential experimental population has been authorized on the Tellico River. Stocking began in 2003.

***Noturus flavipinnis* yellowfin madtom**

This species inhabits large streams to large rivers with a low gradient at lower elevations. It occurs in pools associated with cover (flat rocks for spawning and leaf packs for cover). It is endemic to the upper Tennessee River (above Chattanooga, Tennessee and occurs on the Cherokee National Forest in Citico Creek and a non-essential experimental population has been authorized on the Tellico River. Stocking began in 2003.

***Phoxinus tennesseensis* Tennessee dace**
This species is found in small streams (3 to 6 stream order) with low to moderate gradients (<=4%) at low elevation (<=1200 feet). Woodland streams associated with undercut banks and debris are typical habitats. The Tennessee dace is known to occur in Citico Creek, Duncan Branch, Slide Hollow, and Smoky Branch. Suitable habitat exists for this species in almost all of the other stream reaches in the analysis area. Its absence from other reaches may be due to waterfall barriers.

***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).

***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 mosses**
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.

Lophocolea appalachiana a liverwort
Lophocolea appalachiana is a rare liverwort that is restricted to shady gorges in mountain counties of NC and TN (Hicks 1992). A search of the NatureServe Database (2009) shows that this species is known from six extant occurrences and seven historical occurrences in North and South Carolina, Tennessee, and Kentucky. Habitat for this species is typically within shaded riparian zones, on wet, non calcareous rock faces and spray zones, dripping rocks, usually by waterfalls or cascades (NC Heritage, NatureServe 2009). *Lophocolea appalachiana* is previously known from one location on the Forest (F1). A new occurrence of this species was found within stand 406/7. The forest wide viability analysis (Cherokee National Forest 2004c) indicates that this species' viability is at moderately high to high risk based upon the habitats with which it is associated.

***Megaceros aenigmaticus* a hornwort**
Megaceros aenigmaticus is a rare endemic, originally thought to be confined to the southwest corner of North Carolina and adjacent Tennessee (Hicks 1992), but more recently described for a broader area including parts of northern GA (Unpublished data). Habitat includes shaded rocks in small streams and springs, or waterfall spray zones. This species is apparently very sensitive to changes in water quality such as sedimentation and increased water temperatures due to canopy removal in adjacent forests (NatureServe 2006). *Megaceros aenigmaticus* is previously known from approximately twenty five locations on the Forest (F3). The species was found within two stands proposed for treatments (15/15 and 406/7). The forest wide viability analysis (Cherokee National Forest 2004c) indicates that this species' viability is at moderate to moderately high risk based upon the habitats with which it is associated.

***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 southern Appalachian endemic often occurs with Carolina hemlock 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.

***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**
Diervilla rivularis 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. (Weakely 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 species is associated with open habitats and would probably benefit from careful removal of competing woody vegetation including the use

of prescribed fire (TN Dept. of Ag. 1994). The related species, *Diervilla lonicera,* is described as being susceptible to top kill during fires, but rapidly resprouting to pre-fire densities within two years after fire (USDA Fire Effects Information System 2005).

***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 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 A: No action
No new adverse effects would occur to aquatic habitats as a result of selecting this alternative. Existing sediment sources would not be remediated and would continue to contribute sediment to Little Citico Creek and then to Citico Creek.

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 B:

Aquatics
Alternative B would employ streamside filter zones between ground disturbing activities (roads and trails) and streams as prescribed by Forest Wide Standards-FW-3, FW-6 and FW-7. These standards minimize the movement of sediment into streams to an acceptable level. Where these standards cannot be met (horse trails), the trail beds will be out-sloped to minimize sediment runoff. Management activities (including construction or reconstruction of non-motorized trails) within defined riparian corridors are "...allowed to improve existing trail configuration..." (Riparian Prescription Standards-RX11-15). Decommissioned roads that are causing severe erosion would be stabilized. This activity may cause short term sediment production but will have long term beneficial effects.

Trail 165-2 is causing sediment into Little Citico Creek. Closing and stabilizing the trail will reduce sedimentation. Stabilizing the approaches to Trail 165-1 on Citico Creek will decrease sedimentation.

Herbicides would be used during timber stand improvement, site preparation activities, along road right of ways, and to treat invasive species. Forest Wide standards FW-14, FW-15, and FW-16; (USDA Forest Service 2004a) would be followed during implementation.

Full implementation of Alternative B with consideration of these standards would result in a decrease in sediment reaching the aquatic habitat.

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 (2010).

Snails
Areas of suitable habitat for the 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.

Megaceros aenigmaticus
Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the planning area will be protected. Due to habitat requirements, all locations of this species occur within streams that are protected by the unmapped riparian prescription. Adherence to riparian standards would minimize potential negative effects from all harvest and associated activities.

Potential effects to *Megaceros aenigmaticus* from harvest and associated activities would be eliminated with the adherence to riparian standards. It is expected that all populations would persist after harvest activities. Proposed fuel reduction burns and prescribed burns to promote creation of woodland habitat conditions are designed to avoid riparian areas and would have no effect on this species. None of the other proposed activities will occur in the vicinity of this species. Based upon the above information, the implementation of alternative B will have no effect on the species.

Lophocolea appalachiana
Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the planning area will be protected. Based upon habitat requirements, the newly discovered site for this species would be protected by the unmapped riparian prescription. Adherence to riparian standards would minimize potential negative effects from all harvest and associated activities.

A new site for *Lophocolea appalachiana* was found within stand 406/7. This stand is listed in the proposed action as a location for woodland creation, though those treatments would only occur within portions of stands that support xeric pine and pine-oak habitats. Stand 406/7 comprises 89 acres and has habitats varying from wetlands and mesic cove forests to xeric ridge tops. According to the botanical report for this stand, the dominant community type along the ridges and upper slopes is an Appalachian Mixed Pine/Little Bluestem Forest which would be suitable habitat for woodland management. The site where *Lophocolea appalachiana* was found is in a cove near the southeastern boundary of the stand in the headwaters of a tributary drainage to Bivens Branch. Potential effects to *Lophocolea appalachiana* from the proposed woodland

treatment activities would be eliminated with the adherence to riparian standards. It is expected that this population would persist after harvest activities. Proposed prescribed burns to promote creation of woodland habitat conditions are designed to avoid riparian areas and would have no effect on this species. None of the other proposed activities will occur in the vicinity of this species. Based upon the above information, the implementation of alternative B will have no effect on the species.

Vascular plants:

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.

<u>Cumulative Effects</u>

Cumulative effects analysis is based on the activities in Table 10 in addition to the proposed action.

Table 10. Past, Present, and Reasonably Foreseeable Activities in the Middle Citico Creek Project Area

Past	Present	Reasonably Foreseeable
White Oak Flats veg mgmt.		
	Hemlock Mortality from Wooly Adelgid	Hemlock Mortality from Wooly Adelgid
Impacts from Southern Pine Beetle	Restoration of areas impacted from Southern Pine Beetle	
Recreational Uses: IBRA, Jake Best, Young Branch, CC corridor improvements Dispersed hunting/fishing, campsites, hiking, horseback riding creek crossings, one motorcycle road, rock dams creation by public	Recreational Uses: IBRA, Jake Best, Young Branch, CC corridor improvements Dispersed hunting/fishing, campsites, hiking, horseback riding creek crossings, one motorcycle road, rock dams creation by public	Recreational Uses: IBRA, Jake Best, Young Branch, CC corridor improvements Dispersed hunting/fishing, campsites, hiking, horseback riding creek crossings, one motorcycle road, rock dams creation by public
Private land activities	Private land activities	Private land activities
Utility ROW's /electronic sites	Utility ROW's electronic sites	Utility ROW's electronic sites
Prescribed Burns		Prescribed Burns
Wild Fires	Wild Fires	Wild Fires
	Noxious Weeds Treatments	Noxious Weeds Treatments
Road maintenance	Road maintenance	Road maintenance
Citico Creek Wilderness Area	Citico Creek Wilderness Area	Citico Creek Wilderness Area
T&E in Citico Creek	T&E in Citico Creek	T&E in Citico Creek
Illegal OHV use	Illegal OHV use	Illegal OHV use

Alternative A: No action

Alternative A does not propose any new ground disturbance. Erosion is contributing sediment to streams from activities that occurred in the past or are presently occurring in the area. Management activities that would reduce sedimentation to streams (closure of illegal OHV trails; erosion control measures on decommissioned road beds; and closure and rerouting of poorly situated horse trails) would not occur. Adverse effects to aquatic T&E species would continue.

Management activities, on National Forest System (NFS) lands, that are reasonably foreseeable and under the control of the Forest Service would be implemented under the standards for protecting streams listed in the Revised Land and Resource Management Plan for the Cherokee National Forest (RLRMP) (USDA Forest Service 2004a). Implemented in conjunction with Alternative A, they would not increase the adverse cumulative effect on the aquatic habitats now occurring. Reasonably foreseeable activities that occur on private lands or are not controlled by the Forest Service could have negative impacts on the aquatic systems.

There would be no cumulative effects by non-action to the other TES species.

Alternative B:
Alternative B includes seed tree, shelterwood, and white pine removal treatments; woodlands creation; non-native plant control; maintenance of wildlife openings; wetland enhancement; seeding of prescribed burn areas; ephemeral pool construction; fuel reduction burns; maintenance and reconstruction of system roads including decommissioning of NFSR 36-1 and 284F to reduce sedimentation; construct 16 miles of horse trails and a horse trailer parking area with a connector trail; and closure/stabilization of illegal OHV trails, eroding decommissioned roads, and poorly situated horse trails. Each of these activities must follow the standards for protecting streams listed in the RLRMP (USDA Forest Service 2004a). Following these standards would result in minimum amounts of sediment reaching streams and rapid re-vegetation of exposed soils. Overall these activities would reduce the amount of sediment going into streams.

Other activities in the area (see Table 3) may be contributing sediment to streams. Past and present activities implemented in conjunction with Alternative B would not have an adverse cumulative effect on the aquatic habitats; in fact, sedimentation rates would decrease. Activities, on NFS lands, that are reasonably foreseeable would be implemented under the standards for protecting streams listed in the RLRMP (USDA Forest Service 2004a). Implemented in conjunction with Alternative B, they would not have an adverse cumulative effect on the aquatic habitats. 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.

***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 Middle Citico 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.

DETERMINATIONS OF EFFECT
Table 11 summarizes the determinations of effect for each species.

Table 11. Determinations of Effect

Scientific Name	Determination of Effect-Alternative A	Determination of Effect-Alternative B
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.
Etheostoma sitikuense	Based on cumulative effects without curbing sedimentation, Alternative A may affect, likely to adversely affect.	Alternative B is not likely to adversely affect. The proposed action is consistent with the Cherokee National Forest RLRMP.
Etheostoma vulneratum	Alternative A may impact individuals, but not likely to cause a trend to federal listing or a loss of viability.	Alternative B is not likely to adversely affect. The proposed action is consistent with the Cherokee National Forest RLRMP.
Noturus baileyi	Based on cumulative effects without curbing sedimentation, Alternative A may affect, likely to adversely affect.	Alternative B is not likely to adversely affect. The proposed action is consistent with the Cherokee National Forest RLRMP.
Noturus flavipinnis	Based on cumulative effects without curbing sedimentation, Alternative A may affect, likely to adversely affect.	Alternative B is not likely to adversely affect. The proposed action is consistent with the Cherokee National Forest RLRMP.
Phoxinus tennesseensis	Alternative A may impact individuals, but not likely to cause a trend to federal listing or a loss of viability.	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 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	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 B 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.
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.
Lophocolea	No effect: No activities would occur; no habitat would be	No effect with adherence to riparian

appalachiana	affected.	standards.
Megaceros aenigmaticus	No effect: No activities would occur; no habitat would be affected.	No effect with adherence to riparian standards.
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.
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.

Alternative A may affect, and is likely to adversely affect the Endangered *Etheostoma sitikuense*, *Noturus baileyi*, and Threatened *Noturus flavipinnis* based on cumulative effects. Alternative B is not likely to adversely affect *Etheostoma sitikuense*, *Noturus baileyi*, and *Noturus flavipinnis*. Alternatives A and B will have no direct, indirect or cumulative effects on the Endangered *Myotis grisescens.* Alternative A will have no direct, indirect or cumulative effects on the Endangered *Isotria medeoloides*, or *Myotis sodalis.* Alternative B is not likely to adversely affect the *Isotria medeoloides* or *Myotis sodalis.* The USDI, Fish and Wildlife Service concurs with these findings (Jennings 2010).

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.

REFERENCES

Bartlett, J.G. and D.A. Buehler. 1994. 1993 Annual report: population status, habitat associations, and relationship to forest management of breeding songbirds on the Cherokee National Forest. Univ. of Tenn., Knoxville. 14pp.

Buehler, D.A. and J.G. Bartlett. 1995. 1994 Annual report: population status, habitat associations, and relationship to forest management of songbirds on the Cherokee National Forest. Univ. of Tenn., Knoxville. 15pp.

Buehler, D.A. and N.A. Klaus. 1996. 1995 Annual report: population status, habitat associations, and relationship to forest management of songbirds on the Cherokee National Forest. Univ. of Tenn., Knoxville. 15pp.

Buehler, D.A. and N.A. Klaus. 1997. 1996 Annual report: population status, habitat associations, and relationship to forest management of songbirds on the Cherokee National Forest. Univ. of Tenn., Knoxville. 15pp.

Buehler, D.A. and N.A. Klaus. 1998. 1997 Annual report: population status, habitat associations, and relationship to forest management of songbirds on the Cherokee National Forest. Univ. of Tenn., Knoxville. 6pp.

Butterflies and Moths of North America http://www.butterfliesandmoths.org/ accessed 2006**.** Big Sky Institute at Montana State University and the NBII Mountain Prairie Information Node.

Callahan, E. V., R. D. Drobney, ad R. L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (MYOTIS SODALIS) in Missouri. Journal of Mammalogy 78:818-825.

Cherokee National Forest Habitat Types for TES Plants. 1996.

Cherokee National Forest Revised Land and Resource Management Plan. 2004. Cherokee National Forest, Cleveland, Tn.

Cherokee National Forest TES List. 2001. Cherokee National Forest, Cleveland, Tn.

Cherokee National Forest TES Database Maps.

Cochran, S. M., G. W. Libby, H. D. Bryan, and J. E. Spencer. 1999. A survey for the federally endangered Indiana bat (*Myotis sodalis*) on the Nolichucky and Tellico Ranger Districts of the Cherokee National Forest Tennessee.

Cochran, S. M., G. W. Libby, H. D. Bryan, Macgregor, J. R., and J. E. Spencer. 2000. A survey for the federally endangered Indiana bat (*Myotis sodalis*) on the Nolichucky-Unaka and Tellico Ranger Districts of the Cherokee National Forest Tennessee.

Copperhead Consulting. 2008. Botanical surveys of Hurricane Branch, Middle Citico and Middle Citico Creek Project Area, Cherokee National Forest, Tennessee Contract Number: AG-4756-C-08-0005 Order Number: AG-4756-D-08-0021

Crum, H.A. and L.E. Anderson. 1981. Mosses of Eastern North America, Vols. I & II. Columbia University Press. New York, NY.

Eager, D. C. and R. M. Hatcher. 1980. Tennessee's rare wildlife volume I: the vertebrates. Tennessee Wildlife Resources Agency and Tennessee Department of Conservation, Nashville

Etnier, David A. and Wayne C. Starnes. 1993. The Fishes of Tennessee. The University of Tennessee Press, Knoxville, TN.

Glassberg, J. 1999. Butterflies Through Binoculars: The East. A Field Guide to the Butterflies of Eastern North America.

Gumbert, M, D. Dourson, P. Sewell, P. Roby. 2006. Land snail survey of selected areas of the Cherokee National Forest, Tennessee

Harvey, M.J., C.S. Chaney, and M.D. McGimsey. 1991. Distribution, status, and ecology of small mammals of the Cherokee National Forest, Tennessee (Southern Districts). Report to the U.S. Forest Service Cherokee National Forest. Tenn. Tech. Univ. 65 pp.

Herrig, J. 2001. Sensitive aquatic TES species descriptions. Cherokee National Forest, Cleveland, Tn.

Herrig, J. 2009. Middle Citico Creek Aquatic Analysis. Cherokee National Forest, Cleveland, Tn.

Jennings, M. 2010. Letter of concurrence FWS #2010-CPA-0412.

Kiser, J.D. and R.R. Kiser. 1999. A survey for the federally endangered Indiana bat (Myotis sodalis) on the Hiwassee, Nolichucky, Tellico, and Watauga Ranger Districts of the Cherokee National Forest, Tennessee. Eco-Tech, Inc.

Leftwich, C, D. Dourson, B. Yahn, T. Littlefield, M. Hines and A. Risk. 2008. Terrestrial snail and botanical surveys for the Middle Citico Project Area, Cherokee National Forest, Tennessee, 2008.

Leftwich, C, D. Dourson, and P. Roby. 2008. Terrestrial land snail and Indiana bat surveys of Hurricane Branch, Middle Citico, and Spring Creek, Cherokee National Forest, Tennessee.

Libby, G. W., J. E. Spencer, H. D. Bryan, P. L. Droppelman. 2004. 2003 survey for the federally endangered Indiana bat (*Myotis sodalis*) and other rare bat species on the Nolichucky/Unaka, Ocoee-Hiwassee, Tellico, and Watauga Ranger Districts Cherokee National Forest, Tennessee. Eco-tech, Inc.

Libby, G. W., J. E. Spencer, H. D. Bryan, P. L. Droppelman, W. K. Campbell. 2005. 2004 surveys for the federally endangered Indiana bat (*Myotis sodalis*) on the Nolichucky-Unaka and Tellico Ranger Districts of the Cherokee National Forest. Eco-tech, Inc.

Mitchell, L.J. 2001. Sensitive species, terrestrial animals, Cherokee National Forest. Cherokee National Forest, Cleveland, Tn.

NatureServe Explorer: An online encyclopedia of life [web application]. 2001. Version 1.6 . Arlington, Virginia, USA: NatureServe. Available: http://www.natureserve.org/explorer. (Accessed: August 28, 2002).

NatureServe: An online encyclopedia of life [web application]. 2002. Version 1.5. Arlington, Virginia, USA: Association for Biodiversity Information. Available: http://www.natureserve.org/. (Accessed: October 31, 2002).

NatureServe. 2005. NatureServe Explorer: An Online Encyclopedia of Life. http://www.natureserve.org/explorer/ Version 4.3. NatureServe, Arlington, Virginia. (Accessed: March & April, 2005).

Pistrang, M. 2001. Sensitive plant descriptions. Cherokee National Forest, Cleveland, Tn.

Pistrang, M. 2005. An analysis of the effects of prescribed fire during the growing season on threatened, endangered, sensitive, and locally rare plant species within selected habitats on the Cherokee National Forest. Cherokee National Forest, Cleveland, Tn.

Pistrang, M. 2009. Middle Citico Creek botanical report. Cherokee National Forest, Cleveland, Tn.

Pyne, M. and A. Shea. 1994. Guide to rare plants: Tennessee Forestry District 2. Tennessee Department of Environment and Conservation. Ecological Services Division.

Radford, A.E., H.E. Ahles, and C.R. Bull. 1968. Manual of the vascular flora of the Carolinas. The University of North Carolina Press. Chapel Hill, N.C. 1183 pp.

Sewell, P, M Gumbert, P. Roby, and D. Foster. 2007. Mist net bat survey and rare species telemetry for the Cherokee National Forest, Tennessee, 2006.

Tennessee Department of Environment and Conservation. 2004. Tennessee Natural Heritage program rare animals list.

Tennessee Department of Environment and Conservation. 2008. Tennessee Natural Heritage program rare plant list.

3-D International, Inc. 1998. Survey for the endangered Indiana bat (Myotis sodalis) in the Nolichucky, Unaka, and Tellico Ranger Districts of the Cherokee National Forest, Tennessee.

University of Tennessee Herbarium Database of Tennessee Vascular Plants. 2002. http://tenn.bio.utk.edu/vascular/vascular.html

USDA Forest Service, Region 8. 2001. Regional Forester letter, subject: *Regional Forester's Sensitive Species List Update.* Dated 8/7/2001. Atlanta, GA.

USDA Forest Service. 2002. Forest Service Manual Supplement R8-2600-2002-2.

Weakley, A.S. 2004. Flora of the Carolinas, Virginia, and Georgia, Working Draft of March 17, 2004. University of North Carolina Herbarium, NC Botanical Garden. Chapel Hill, NC.

Widlak, J.C. 1997. Biological opinion on the impacts of forest management and other activities to the Indiana Bat on the Cherokee National Forest, Tennessee. U.S. Fish and Wildlife Service, Cookeville, TN.

Wofford, B.E. 1989. Guide to the vascular plants of the Blue Ridge. Univ. of Ga. Press, Athens. 384 pp.

/s/ Mary Dodson 30 June 2010
MARY M. DODSON
South Zone Wildlife Biologist Date

Attachment A
CHEROKEE NATIONAL FOREST
Threatened, Endangered and Sensitive Species 2001 List
Revised 2/08/2010 by mjp

*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
7b	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
7b	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
7b	Noturus baileyi	Smoky madtom	LT	2 occ Citico Cr #1 & Experimental pop. in Tellico R #1.	Large streams, low gradient, low elevation.	E	G1
7b	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
2a	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
2a	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
2a	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
7b	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

*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
1a	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
1a	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

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
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
1a	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
7b	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
1a	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
4a	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
4a	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	1 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

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
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	1 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
7b	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
7b	Megaceros aenigmaticus	A hornwort	NC, TN, and GA. Monroe and Cocke Co's.	31 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	Undocumented 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

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
1a	Plagiochila echinata	A liverwort	Mountains of TN, NC, and SC. Monroe and Polk Co's.	5 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.	3 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	1 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

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
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	3 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	37 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
7a	Collinsonia verticillata	Stoneroot	MD to GA; OH, KY, TN. Monroe, McMinn, Blount, Sevier, Johnson, and several counties to west.	3 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.	88 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.	10 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

Attachment A
CHEROKEE NATIONAL FOREST
Threatened, Endangered and Sensitive Species 2001 List
Revised 2/08/2010 by mjp

*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.	13 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.	11 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.	9 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.	15 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.	6 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.	0 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.	10 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	13 Records; Polk Co.	Crevices in phyllite & graywacke boulders in historical flood zone Ocoee & Hiwassee Rivers.	E	G1

*PRC**	Scientific Name	Common Name	Range/Watersh/Co*	CNF Records	Habitat Information	TES	G-Rank
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	49 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	10 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	29 Records	Openings and ridges in dry woodlands. Often on road banks.	S	G4? T3?

Attachment A
CHEROKEE NATIONAL FOREST
Threatened, Endangered and Sensitive Species 2001 List
Revised 2/08/2010 by mjp

*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	56 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.
* Co. = Counties from which the species is currently known. Does not represent potential occurrence. Counties of occurrence for vascular plants obtained from University of TN Plant Atlas, online version, 4/04.
*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 Revised Land and Resource Management Plan (RLRMP) lists species of viability concern known to occur on the Forest (USDA 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 Carex scabrata (rough sedge)

Carex scabrata is a widespread species known from the eastern Canadian provinces south through the mid-Atlantic states to Georgia and Alabama, and scattered west throughout that range to the Mississippi River (NatureServe 2009). Typical habitat includes seeps and stream banks (Weakley 2004). The species was included as a viability concern species for the Cherokee National Forest (CNF) primarily due to the limited distribution of wetland habitat. This species is not tracked by the Tennessee Division of Natural Heritage (DNH), thus records have not been kept on known occurrences. Populations on the CNF have been previously estimated to number between 1 and 5 (F1), though as with many cryptic species, this one is easily overlooked and it is likely that many more populations occur. *Carex scabrata* was found at several locations within the project area; within a small streamside seep in stand 15/21, at two streamside locations within stand 24/31, two locations with stand 406/2, and within a seep in stand 406/7. The forest wide viability analysis (USDA 2004c) indicates very high risk levels for this species.

Direct and Indirect Effects Carex scabrata (rough sedge)

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the planning area will be protected. *Carex scabrata* is a widespread species that is naturally limited on the CNF based upon the distribution of suitable wetland habitat. Several populations were found within the project area though all of these occur along streams or within small wetlands and seeps that will be protected from disturbance though adherence to riparian prescription standards.

Alternative A (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 A would have no effect on the viability of *Carex scabrata*

Alternative B (Proposed Action)

The newly discovered populations of *Carex scabrata* within the project area all occur with riparian features and thus would be protected from any ground disturbing activities or dormant season fuel reduction burns. Based upon the above information, the implementation of Alternative B would have no effect on the viability of *Carex scabrata*.

Cumulative Effects Carex scabrata (rough sedge)

All Alternatives

Carex scabrata is a widespread species that is naturally limited on the CNF due to the distribution of suitable habitat. The new locations for this species within the Middle Citico analysis area will be protected. This species would continue to have viable populations within the analysis area and on the CNF. No negative cumulative effects are expected

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 CNF (north of the Great Smoky Mountains National Park) this species is frequently found along roadsides and trails above 2,000' elevation within suitable habitat. Five new locations were found for this species during the botanical surveys, within stands 15/8, 15/15, 24/26, FSR 2604, and along a proposed segment of the middle Citico horse trail system. Populations on the CNF were estimated to number between 6 and 20 locations (F2) during Forest Plan revision. The forest wide viability analysis (USDA 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 CNF.

Direct and Indirect Effects Eupatorium steelei (Steele's Joe Pye weed)

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. This species is widespread on the Forest and tends to occur frequently in openings within suitable habitat, including disturbed roadsides where it flourishes. All newly discovered sites were marked in the field by the botanical contractor and the following coordinates recorded for each site:

35.440590	-84.091340	Stand 15/15
35.445004	-84.085390	Stand 15/8
35.425591	-84.133541	Stand 24/26
35.436780	-84.091740	FSR 2604
35.472700	-84.041280	Horse Trail

Alternative A (No Action)

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

Alternative B (Proposed Action)

Under this alternative the new sites of *Eupatoreum steelei* could be directly impacted through management activities. Three sites occur in stands proposed for silvicultural treatments (15/8, 15/15, and 24/26), one site along a road with a proposed "daylighting" treatment, and one site along a proposed horse trail segment. Four of these five sites occur along an existing disturbed feature (Forest Service roads or old woods roads) which is a very common situation for this species as it tends to colonize openings and disturbed areas. All five sites have been marked in the field and would be avoided by project activities where feasible. Fuel reduction burns would occur during the dormant season and no effects to the species from this activity are expected. While it is possible that some direct impacts could occur to individuals through silvicultural treatments and daylighting, it is also likely that the secondary effect of the treatments (opening the canopy) would have some beneficial effect to the species. With over 68 known occurrences on the Forest these impacts would not likely affect the overall species viability in a negative way.

Cumulative Effects Eupatorium steelei (Steele's Joe Pye weed)

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 Lygodium palmatum (American climbing fern)

Lygodium palmatum is widespread in the eastern US, from Maine and Michigan south to Florida and east to Mississippi, but is considered to be rare throughout its range. Habitats are described as bogs, moist thickets, and swamp forests in strongly acid soils (Weakley 2004), yet this species is often found in xeric openings on the CNF. This species was included as a viability concern species for the CNF primarily due to a possible association with wetland habitats. This species is not tracked by the Tennessee DNH, thus records have not been kept on known occurrences. Populations have been estimated to number between 6 and 20 locations (F2). This species was found at one location during the botanical surveys, along FSR 2604 in a disturbed road cut. The forest wide viability analysis (USDA 2004c) indicates that this species' viability is at moderate to high risk

Direct and Indirect Effects Lygodium palmatum (American climbing fern)

Lygodium palmatum is widespread in the eastern US, but is considered rare throughout its range. The species is not currently tracked by the Tennessee DNH due to a fairly widespread distribution in the eastern third of the state. One new population of this species was found during the botanical surveys, along the cut-slope of an existing road that has proposed "daylighting" treatments. This site has been marked in the field (35.42947 -84.09065) and can be easily avoided. The site should be marked on the implementation cards as a "no-skid zone". No additional mitigation is proposed.

Alternative A (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 A would have no effect on the viability of *Lygodium palmatum*.

Alternative B (Proposed Action)

The newly discovered site of *Lygodium palmatum* occurs along an existing roadway that is proposed for a daylighting treatment. The sites would be avoided if possible by the designation of a no-skid zone during harvest activities. Incidental damage could occur at this site, but it is expected that the population would remain viable at the site. No information on the effects of fire on *Lygodium palmatum* was found in the literature, however two related species (*Lygodium japonicum* and *Lygodium microphyllum*) were found to be quite resistant to fire (Munger 2005). All fuel reduction burns would occur during the dormant season when effects to this species would be minimized. Based upon the above information, the implementation of Alternative B may affect individuals but will not lead toward a loss of viability for *Lygodium palmatum*.

Cumulative Effects Lygodium palmatum (American climbing fern)

All Alternatives

Lygodium palmatum is widespread in the eastern US and the species is not considered to be rare by the Tennessee DNH. One new location was found for this species within the Middle Citico analysis area and it is expected that this species would continue to have viable populations within the analysis area and on the CNF. 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 15/18 (several plants), 32/27 (several plants), and along portions of the proposed horse trail.

Direct and Indirect Effects Rhododendron cumberlandense (Cumberland azalea)

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 A (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 A would have no effect on the viability of *Rhododendron cumberlandense*.

Alternative B (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. The proposed new horse trails all follow existing old woods roads and individuals of *Rhododendron cumberlandense* occurring along the margins of these would not be affected. Based upon the above information, the implementation of Alternative B may affect individuals but will not lead toward a loss of viability for *Rhododendron cumberlandense.*

Cumulative Effects Rhododendron cumberlandense (Cumberland azalea)

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, it is expected that this species would continue to have viable populations within the Middle Citico 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 2009). It typically occurs within openings in mesic forests, especially acidic bluffs or Rhododendron thickets (Weakley 2004). Stewartia ovata is not tracked by the Tennessee DNH 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 within ten different stands during the botanical surveys. Most populations are associated with small stream drainages within the stands and some, but not all individuals, occur within the unmapped riparian reserve. The forest wide viability analysis (USDA 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. Numerous new sites for *Stewartia ovata* were found within stands proposed for timber harvest activities. The following locations were recorded:

35.427930	-84.095610	Stand 15/23
35.446228	-84.085653	Stand 15/8
35.436610	-84.074000	Stand 23/10
35.434320	-84.127440	Stand 24/21
35.427914	-84.131854	Stand 24/26

35.407721	-84.091892	Stand 31/18
35.407208	-84.093899	Stand 31/6
35.410457	-84.113634	Stand 32/27
35.411854	-84.115853	Stand 32/27
35.459200	-84.107690	Stand 406/2
35.455706	-84.105039	Stand 406/7
35.457477	-84.103929	Stand 406/7

Some of these sites would be protected through the adherence to riparian standards. All sites have been marked in the field and should be avoided where possible through directional felling and designation of no skid zones. No additional mitigations are proposed.

Alternative A (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 A would have no effect on the viability of *Stewartia ovata*.

Alternative B (Proposed Action)

Potential effects to some individuals of *Stewartia ovata* from harvest activities would be mitigated with the adherence to riparian standards. All sites have been marked in the field and GPS locations will be recorded on cutting cards. All sites will be avoided where feasible and it is expected that the populations would persist after harvest activities. A search of the literature yielded no information on the effect of fire on *Stewartia ovata,* however proposed fuel reduction burns are designed to avoid riparian areas and would also be conducted during the dormant season when potential effects to vegetation are minimized. Thus, fuel reduction burns could affect individuals, but would not be expected to have any negative long-term effect on this species. No individuals of this species occur in areas proposed for new horse trail construction Based upon the above information; the implementation of Alternative B may affect individuals but would not have a negative effect on the continued viability of the species.

Cumulative Effects Stewartia ovata (mountain camelia)

All Alternatives

Stewartia ovata occurs throughout the southeastern states and is not considered to be rare by the Tennessee DNH. Numerous new locations were found for this species within the Middle Citico Creek analysis area and it is expected that this species would continue to have viable populations within the analysis area and on the Forest as a whole regardless of the chosen alternative. No negative cumulative effects are expected.

Existing Condition Trichomanes petersii (dwarf filmy fern)

Trichomanes petersii is a diminutive species that is easily overlooked and often mistaken to be a bryophyte. The species occurs from Arkansas and Louisiana east through the southern states to the Carolinas, Georgia and Florida. Typical habitat includes seepy, vertical rock faces and grottoes on acidic rock outcrops in humid gorges (Weakley 2004). At the time of the writing of the RLRMP *Trichomanes petersii* was known from less than five locations on the Forest (F1)

however the most recent version of the Natural Heritage database (7/09) contains 6 records for the CNF (F2). The species was found at four locations within two stands proposed for treatments (15/8 and 15/23). The forest wide viability analysis (USDA 2004c) indicates that this species' viability is at high risk based upon the habitat with which it is associated. Previously known locations of this species fall under the following mapped prescription allocations:

Prescription Allocation	Number of Occurrences
1.A – Designated Wilderness	1
1.B – Recommended Wilderness Study Area	1
7.B – Scenic Corridors/Sensitive Viewsheds	1
8.B – Early Successional Habitat Emphasis	3

Direct and Indirect Effects Trichomanes petersii (dwarf filmy fern)

Forest Wide Standard 28 states that individuals needed to maintain viability of a species within the CNF will be protected. Three of the six previously known sites occur within allocations (1.A, 1.B, 7.B) that would at least minimize potential negative effects from management at a programmatic level. New sites were recorded at:

35.445218 -84.086242 Stand 15/8
35.426380 -84.099360 Stand 15/23
35.426970 -84.097340 Stand 15/23
35.427170 -84.096940 Stand 15/23

All the new sites are associated with large rock outcrops that would not be directly affected by the proposed activities.

Alternative A .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 A would have no effect on the viability of *Trichomanes petersii*.

Alternative B (Proposed Action)

The four newly discovered sites of *Trichomanes petersii* occur on fairly large rock outcrops that would not be directly impacted by the proposed action. Secondary effects due to the removal of the canopy nearby these sites could lead to increased sunlight and/or changes in the hydrology of the micro-site. Desiccation of a site could lead to the decline of a local population though such effects are not expected. Based upon the above information, the implementation of Alternative B may affect individuals but will not lead toward a loss of viability for *Trichomanes petersii.*

Cumulative Effects Trichomanes petersi (dwarf filmy fern)

All Alternatives

Trichomanes petersii is a rare fern that is limited in distribution throughout its range, though is easily overlooked and may be more numerous than currently known. Four new locations were

discovered during the botanical surveys for this project and none should be negatively impacted by the proposed action. Based upon the above analysis, it is expected that this species would continue to have viable populations within the Middle Citico Creek analysis area and on the CNF. No negative cumulative effects are expected.

REFERENCES

Coladonato, M. 1992. Rhododendron periclymenoides. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2006, August 22].

Copperhead Environmental Consulting, Inc. 2008. Botanical Surveys of Hurricane Branch, Middle Citico, and Spring Creek Project Area, Cherokee National Forest, Tennessee. Contract AG-4756-C-08-0005.

Munger, Gregory T. 2005. Lygodium spp. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 5.0. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: February, 2007).

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: February, 2009).

USDA FS 2004c. Appendixes for the Environmental Impact Statement for the Cherokee National Forest Revised Land and Resource Management Plan. Management Bulletin R8-MB 114F.

Weakley, A.S. 2004. Flora of the Carolinas, Virginia, and Georgia. Working Draft of March 17, 2004. University of North Carolina, Chapel Hill.