



United States  
Department of  
Agriculture

Forest Service  
Southern Region

# Appendixes Final Environmental Impact Statement for the Revised Land and Resource Management Plan

## *Sumter National Forest*



The picnic shelter on the cover was originally named the Charles Suber Recreational Unit and was planned in 1936. The lake and picnic area including a shelter were built in 1938-1939. The original shelter was found inadequate and a modified model B-3500 shelter was constructed probably by the CCC from camp F-6 in 1941. The name of the recreation area was changed in 1956 to Molly's Rock Picnic Area, which was the local unofficial name. The name originates from a sheltered place between and under two huge boulders once inhabited by an African-American woman named Molly.

**Appendixes Final Environmental Impact Statement for the Revised  
Land and Resource Management Plan**

**SUMTER NATIONAL FOREST**

Oconee, Chester, Fairfield, Laurens, Newberry, Union, Abbeville, Edgefield,  
Greenwood, McCormick and Saluda Counties in South Carolina

**Responsible agency:** USDA – Forest Service

**Responsible official:** Robert T. Jacobs  
USDA – Forest Service, Southern Region  
1720 Peachtree Road NW  
Atlanta, GA 33067-9102

**For Information contact:** Jerome Thomas, Forest Supervisor  
Francis Marion and Sumter National Forests  
4931 Broad River Road  
Columbia, South Carolina 29210-4021

Telephone (803) 561-4000

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## APPENDIX A

### SUMMARY OF PUBLIC INVOLVEMENT

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#### SOUTHERN APPALACHIAN ASSESSMENT (SAA)

- Conducted from April 1994-June 1996, the SAA was a state and federal agency effort to assess the state of the environment in the Southern Appalachians. The project, spearheaded by the Southern Appalachian Man and the Biosphere cooperative, made no decisions – so was therefore outside of the requirements of the National Environmental Policy Act for public involvement. However, the agencies decided to conduct open, working meetings and a number of public meetings to engage the public in an informal, ongoing basis. The public involvement framework of the SAA heavily influenced the public involvement effort of the Sumter Plan Revision.

#### SUMTER PLAN REVISION

Generally, the Sumter National Forest's approach to public involvement centered on meaningful and ongoing involvement. Frequently going above and beyond the legal requirements for public involvement, the interdisciplinary team worked to foster an ongoing dialogue with groups, agencies, and individuals, providing for a two-way dialogue rather than one-way communication. The team accomplished this through a variety of methods, including regular mailings and a newsletter (*The Sumter Scribe*), increased use of the forest's Internet site ([www.fs.fed.us/r8/fms](http://www.fs.fed.us/r8/fms)), and conducting their working meetings in the open. The meetings were on a regular schedule, although the location changed to provide access to interested individuals across the state. The planning newsletter announced the meeting locations and dates.

#### Scoping

- In August 1996, a Notice of Intent to revise 5 Forest Plans appeared in the *Federal Register*. The 5 forests listed in the notice were involved in the SAA, including the Sumter National Forest.
- That month, the Sumter National Forest sent about 299 copies of *The Sumter Scribe*, comment forms, and Summaries of the Analysis Situation to individuals, organizations,

businesses, county, state, and federal agencies. The newsletter and a news release announced the upcoming public meetings.

- The forest's districts and interdisciplinary planning team hosted open houses in Columbia, Edgefield, Union, Newberry, Greenville, and Walhalla, August-November 1996. During the open houses, employees conducted field trip to the forest to familiarize everyone with the relationship between forest plan decisions and project-level decisions.
- Beginning in November 1996, the interdisciplinary team distributed a weekly internal newsletter named *Scribbles*. This publication continued until October 1998.
- The forest's interdisciplinary planning team conducted a number of open, working meetings across the forest during this time, and invited the public to accompany team members as they field-verified roadless area characteristics.
- Individuals and organizations submitted 659 responses during this comment period.
- The planning team identified about 6,000 individual comments within those responses.
- The mailing list grew by 300 names during this comment period.

## Issue Development

- The Southern Region of the Forest Service completed guidance for managing old-growth forests in June 1997. In August, forest employees conducted public information sessions in Walhalla and Columbia.
- In March 1997, the Sumter's interdisciplinary and management teams reviewed the comments generated during the scoping process, and agreed on 5 local issues.
- These issues were submitted to the Forest Service's Regional Office in Atlanta.
- The Regional Office developed issue statements common to all forests in the Southern Appalachians, and a standard set of 12 issues was given to each forest. Individual forests were allowed to add local issues to ensure the issues reflected local public input during scoping. The Sumter added 2 local issues.
- In July 1997, forest employees used *The Sumter Scribe* planning newsletter to distribute the 14 issues to 1,020 organizations and businesses on the mailing list.

## Alternative Development

- The five Southern Appalachian Forests developed four alternative themes. Along with the description of the current management situation, these became the building blocks of the alternative descriptions.
- The four alternatives were distributed in April 1998 edition of *The Sumter Scribe*. The newsletter and a news release announced upcoming public meetings.
- The Sumter National Forest conducted public meetings in September-October 1998 to display the Alternatives A, B, C and D, which grew out of the alternative themes. Open houses were in Walhalla, Newberry, Columbia, Edgefield, and Greer, and facilitated sessions were in Greenville and Clayton, Georgia (conducted in partnership with the Chattahoochee-Oconee National Forest). A news release and the newsletter announced the meetings. Using interpretive concepts, trigger questions, photos displaying the different alternatives, and prepared response forms, Sumter employees worked hard to make the meetings more meaningful to the public.
- In October 1999, the team held public meetings to review 9 alternatives, now A-I. A mailer and a news release announced these meetings. The two-day sessions were in Whitmire, Clemson, and McCormick, and participants reviewed the alternatives and provided comments on what they liked, or what they thought needed more work or changing. Alternative I became known as the “rolling alternative,” as it was designed to change and evolve based on public, scientific, and management input.
- During this alternative development stage, the forest received about 500 comments from the meetings and mailings (including several petitions, form letters, and postcards). The interdisciplinary team worked to analyze and address the comments during the following months.
- During this same time frame, the Forest Service began work on an initiative to develop a national roadless policy. Meetings were in Columbia: a scoping meeting in December 1999, an informational meeting in May 2000, and a hearing in June 2000. The meetings were announced in mailings and news releases.
- During 1999-2000, the 5 forests involved in the revision process worked to ensure consistency in their products and scientific guidelines. On the Sumter, the interdisciplinary team also worked with forest managers to ensure that the final product they produce will be workable on the ground. The forest also met with cooperating and regulatory agencies during this time, and with other groups upon request.
- In August 2002, the planning team hosted an open house in Laurens to display the changes in the rolling alternative since the last public meetings. Also at that meeting, the team made available the draft plan and maps of other alternatives for review. Prior to the meeting, the forest distributed a news release about the event and mailed about 420 newsletters to organizations and individuals on the recently updated mailing list.

Throughout the last 6 years, the interdisciplinary team conducted formal presentations or informational meetings at the request of a number of groups, including:

American Forest and Paper Associations, Special Areas Coordinators  
American Whitewater Association  
Chattooga River Trout Unlimited  
Chattooga River Watershed Coalition  
Chester County Forestry Association  
Clemson Environmental Awareness Club  
Clemson Student Chapter, The Wildlife Society  
Carolina Paddlers  
Fairfield County Forestry Association  
Laurens County Forestry Association  
Newberry County Forestry Association  
South Carolina Forest Watch  
South Carolina Native Plant Society  
Union County Forestry Association

## **Draft Environmental Impact Statement**

The Proposed Sumter National Forest Land and Resource Management Plan, and the Draft Environmental Impact Statement for the Proposed Plan were published and released for public review and comment on February 7, 2003.

Four public meetings were held in April 2003 to address any questions the public would have. The dates and locations were the following:

April 8, Ramada Inn, Clemson  
April 10, Clemson Extension Meeting Facility, Union  
April 28, Savannah Lakes Resort and Marina, McCormick  
April 29, Forest Headquarters, Columbia

The Forest received over 1000 letters and emails by the July 3, 2003 deadline. Comments from these letters and e-mails were summarized into approximately 650 public concerns by the Content Analysis Team in Salt Lake City. Each comment within a letter that provided factual information, professional opinion, or informed judgment relating to the DEIS and Forest Plan was entered into a data base. The letters and comments are part of the process records located in the Supervisor's Office. Responses to the public concerns can be found in Appendix L.

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## APPENDIX B

### DESCRIPTION OF THE ANALYSIS PROCESS

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#### INTRODUCTION

Appendix B presents a technical discussion of the analysis process and computer models used in the revision planning effort. This appendix focuses on the quantitative methods used to perform the analysis and documents how the analysis was done.

The Forest's major planning goal is to provide enough information to help decision makers and the public determine which combinations of goods, services, and land allocations will maximize *net public benefits* (NPB). The regulations (*36 CFR 219*) developed under the National Forest Management Act (NFMA) provide the analytical framework within which these decisions are made.

The NFMA and its regulations also state that the requirements of the National Environmental Policy Act (NEPA) and its regulations (*40 CFR 1500–1508*) must be applied in the analytical process. NEPA regulations require that the environmental effects of a proposed action, and alternatives to that proposed action, must be disclosed in an *environmental impact statement* (EIS).

Information presented in this chapter supplements the broader and less technical descriptions included in the body of the EIS. This discussion includes basic assumptions, modeling components and inputs, rules, methods, and constraints. Additional information and documents used in the analysis process are contained in the planning records. The planning record in its entirety is incorporated here by reference.

The results from the modeling process are estimates of what can be expected if alternatives are implemented and facilitate the comparison of alternatives.

#### THE 10-STEP PLANNING PROCESS

Land and resource management planning requires that processes formally used to make individual resource decisions be combined into integrated management decisions. It also requires that mathematical modeling techniques be used to identify the most economically efficient solution to meet the goals and objectives of any alternative. The general planning process described in *36 CFR 219.12* guides the revision of a Forest Plan. This section



describes ten steps that lead from the completion of a Forest Plan to the completion of a revised Forest Plan.

*This appendix describes the analysis phase of this process that includes steps 3 and 6 of the 10-Step process.* Other steps in the process are described elsewhere in the Forest Plan, EIS, and the Process Record.

*STEP 1 - Identification of purpose and need: issues, concerns, and opportunities.* The Forest interdisciplinary team assessed changes in public issues, management concerns and resource use and developmental opportunities since the Forest Plan was initially developed and subsequently amended. Appendix A of this EIS documents this step.

*STEP 2 - Planning criteria:* - Criteria are designed to guide the collection and use of inventory data and information; the analysis of the management situation; and the design, formulation, and evaluation of alternatives. The NFMA regulations require planning criteria be developed to guide each step in the planning process. Process criteria are standard rules and tests to guide and measure the effectiveness of the planning process. They apply to collection and use of inventory data and information; analysis of the management situation; and the design, formulation, and evaluation of alternatives.

Planning criteria are based on:

1. Laws, executive orders, regulations and agency policy as set forth in the Forest Service Manual
2. Goals and objectives in the USDA Forest Service's Strategic Plan.
3. Recommendations and assumptions developed from public issues, management concerns, and resource use and development opportunities
4. The plans and programs of other federal agencies, state and local governments, and Indian tribes
5. Ecological, technical, and economic factors
6. The resource integration and management requirements in **36 CFR 219.13 through 219.27**
7. Alternatives that are technically possible to implement
8. Alternatives that meet management requirements or standards
9. Various levels of multiple-use objectives and outputs achieved
10. This step establishes guidelines for accomplishing the next five steps. Planning process records document this step.

*STEP 3 - Inventory data and information collection.* The kind of data and information needed is determined in Step 2 based on the issues, concerns, and opportunities identified and the resulting assessment of the management situation and determination of what needs to change. Data collection is part of normal forest operations. Existing data is used whenever possible and supplemented with new data, when practicable, if new data will contribute to more responsive analysis. Data accuracy is continually evaluated. Much of this data and background documentation is part of the planning process records on file in the Supervisor's Office. This Appendix contains the description of this step.

*STEP 4 - Analysis of the management situation (AMS).* This step consists of assessing the existing situation on the forest and determining opportunities for resolving issues and concerns. This information provides the basis for formulating an appropriate range of reasonable alternatives. Step 4 is described in Chapter 1 of the Forest Plan.

This analysis brings existing information together, puts it into a total forest perspective, and examines the range of possible situations to resolve issues. It examines supply potentials and market assessments for goods and services, and determines suitability and feasibility for meeting needs.

Other objectives of the analysis of the management situation are:

- Assessing current direction, including a schedule of the goods and services that are most likely to be provided if current direction is continued.
- Assessing the demand for goods and services from national forest lands.
- Determining if there is a need to change current management direction.

*STEP 5 - Formulation of alternatives.* A reasonable range of alternatives is formulated according to NEPA procedures. Alternatives are formulated to assist in identifying one that comes nearest to maximizing NPB. They provide for the resolution of significant issues and concerns identified in Step 1.

The alternatives reflect a range of resource management programs. Each identified significant issue and management concern is addressed in different ways in the alternatives. Both priced and non-priced goods and services (outputs) are considered in formulating each alternative.

Steps 5 is described in chapter 2 of the FEIS.

*STEP 6 - Estimated effects of alternatives.* . The physical, biological, economic, and social effects of implementing each alternative are considered in detail, responding to the issues and need for change.

The SPECTRUM model estimates some, but not all, of the economic and physical effects. Other effects examined outside the model include ecological and social considerations. The effects of the alternatives are displayed in Chapters 2 and 3 of this EIS.

*STEP 7 - Evaluation of alternatives.* Significant physical, biological, economical, and social effects of implementing alternatives are used to evaluate each alternative and compare them with each other. Typically, each alternative can be judged on how it addresses the significant issues identified in Chapter 1 of the EIS. Chapter 2 of the EIS summarizes the comparisons of the alternatives with regard to the issues. Step 7 is described in chapter 2 of the FEIS.

*STEP 8 - Preferred alternative.* The Forest Supervisor reviews the interdisciplinary team's evaluation of each alternative and the public issues and concerns. The Forest Supervisor then recommends a preferred alternative to the Regional Forester. The Regional Forester either selects the recommendation, another alternative, or modifies the recommended alternative.

That alternative is described as the *preferred alternative* in the Draft EIS and is displayed as the *proposed revised Forest Plan*. Public comments are solicited and considered in finalizing a revised Forest Plan and Final EIS. Step 8 is implemented by the issuance of the Draft Forest Plan and DEIS and the subsequent public comment period.

*STEP 9 - Plan approval and implementation.* After the interdisciplinary team has reviewed public comments and incorporated any necessary changes into the EIS or revised Forest Plan, the Regional Forester reviews and approves the revised Forest Plan and final environmental impact statement. This step is described in Chapter 5 of the Forest Plan and a *record of decision* (ROD) documents this step.

*STEP 10 - Monitoring and evaluation.* The revised Forest Plan establishes a system of measuring, on a sample basis, actual activities and their effects, and compares these results with projections contained in the revised Forest Plan. Monitoring and evaluation comprise an essential feedback mechanism to ensure the revised Forest Plan is dynamic and responsive to change. Chapter 5 of the revised Forest Plan described the monitoring and evaluation program.

## **Inventory Data And Information Collection (Step 3)**

### **Data and information sources for the AMS**

The AMS used numerous data sources, including:

- The Five-Year Review of the Sumter National Forest Land and Resource Management Plant (1991)
- The Southern Appalachian Assessment
- Forest Plan monitoring and evaluation reports
- The Sumter National Forest Evaluation of Current Management (1993)
- Supply and demand studies
- Public comments received at open houses
- Reviews of published documents
- General correspondence
- South Carolina Department of Health and Environmental Control (DHEC) air quality violation records
- Sumter National Forest fire records
- Records of occurrence for proposed, endangered, threatened and sensitive species in a database managed by the South Carolina Department of Natural Resources, Wildlife Diversity Section
- Old growth inventories by Steve Jones and by Paul Carlson for the Chattooga Watershed Project
- 2 reports used to help determine recreation demand:
  - 1) *State Comprehensive Outdoor Recreation Plan* (SCORP, South Carolina Department of Parks, Recreation and Tourism, 1995 Draft

2) *Outdoor Recreation in South Carolina and Its Surrounding Market Area* (Outdoor Recreation and Wilderness Assessment Group, USDA Forest Service, 1996)

- Census data
- A 1995 South Carolina Parks, Recreation, and Tourism Department report entitled *The Tourism Industry in South Carolina*
- 1993 Resource Planning Act (RPA) Timber Assessment Update
- Various office records
- Forest Inventory and Analysis (FIA) records and reports

The Forest Geographic Information System (GIS) and Continuous Inventory of Stand Conditions (CISC) databases were used extensively for the AMS analysis, building the SPECTRUM linear programming model, and analyses in the EIS. The GIS and the CISC databases contain information related to the classification of land into categories with unique properties. This classification was based on attributes significant to the planning issues. This type of information was tied directly to the map base (current alternative, Alt-F, excepted). In the case of the Forest, this map base was its GIS and CISC databases.

The second type of information is not directly tied to a map base but has more to do with the estimation of how land will respond to certain management activities within a given alternative. This can be viewed as the goods and services discussed in the EIS, Chapters 2 and 4. In linear programming, these are called production coefficients. This type of information came from many sources: *regional procedural handbooks, professional research studies, master's theses, etc. The most up-to-date and verifiable information was utilized.*

## **Database Development**

In 1991, a computerized Geographic Information System (GIS) was completed forestwide for the Forest. GIS links natural resource data with spatial (map) information. This linkage enabled valuable spatial analysis and rapid display of resource information for Forest planning. Region 8's Continuous Inventory of Stand Conditions (CISC) data base was also used.

Inventories were continually updated to reflect current conditions and verification of existing information was an on-going effort. GIS data layers that were used in this analysis are listed in Table B-1.

*Table B-1. Primary GIS Data Layers used in Alternative Development and Analysis*

<b>GIS Layer</b>	<b>Common Name or Description</b>
Alt_(x)_dis	Alternative Layers
	Digital Elevation Models
DIST	District Boundary
HYDRO	Major Hydrologic Units
NF	National Forest ownership
PETS	Protected, Endangered, Threatened and Sensitive species
RAIL	Railroads
	Riparian Areas
ROADS	Roads
ROS	Recreation Opportunity SPECTRUM
SMS	Scenery Management System
SOILS	Soil types
SPECIAL	Specifically Identified Special Areas
STANDS	Timber stands
STREAMS	USGS drainages PLUS fine stream detail from DBRU manuscripts
SYS_RD	Maintained system roads
TRAILS	Maintained trails
UTIL	Utility lines
WATER	Water bodies
	5 <sup>th</sup> Order Watershed Boundaries
WILD	Wilderness Boundaries
WLDF_OP	Wildlife Openings not yet identified in stands and CISC

Note: GIS Layer names typically follow the above conventions although in some cases district specific data layer names may vary.

Where names are not listed, multiple files comprise the specific layer.

## **Analysis Prior To SPECTRUM**

Prior to SPECTRUM analysis there was considerable analysis done directly related to preparing data for input to SPECTRUM. This analysis included: identification of lands tentatively suitable for timber harvest (per *36 CFR 219.14*); analysis area development; yield table development for timber resources; economic information development; management prescription development; and determination of suitable acreage.

There are several steps in building the growth and yield tables. The first step was to stratify the Forest. Forested areas were stratified as discussed later in this appendix under analysis areas: levels 1, 2 and 3.

## **PreSuppose**

Pre-Suppose is a program to query and sort Forest Inventory and Analysis (FIA) data for use in Suppose. The program will prepare the locations and stand list file needed by Suppose to use the pre-sorted data.

The next step was to generate a sample of forest stand data. Forest Inventory and Analysis (FIA) data was used to obtain adequate stand level information for development of growth and yield tables. For the piedmont, FIA data from the South Carolina piedmont was used. When this did not provide sufficient plots, FIA data from the Georgia piedmont and sometimes the North Carolina piedmont were used in addition to South Carolina plots. For the mountains, FIA data from the South Carolina, North Carolina and Georgia blue ridge provinces was used. When this did not provide sufficient plots, mountain data from Tennessee and sometimes Georgia mountain data from outside the blue ridge province was used in addition.

For both piedmont and mountains, where a sufficient sample was available from plots on National Forest lands, these plots were used. More often, plots on private lands were used as well. On examination, plots from private and National Forest lands usually had very similar diameter and volume characteristics for the same forest type, age and site index range.

## **Suppose**

Suppose is a computer program that can simulate the changes in forest vegetation over a long time span (100-400 years) and over a “landscape” spatial scope. A landscape is defined to be 1 to about 1,000 forest stands.

Suppose accomplishes the simulation by creating an input file used by the Forest Vegetation Simulator (FVS) and by then starting the appropriate FVS program that reads and processes the input file. The program contains the desired geographic variant and extensions to the base FVS system. FVS, and not Suppose, actually accomplishes the desired simulation.

Suppose has these missions:

- To provide a working tool for standard FVS runs and some post-processors.
- To provide an evaluation platform that can be used to gather user feedback. The feedback will be used for redesigning Suppose, as necessary, so that it meets its mission.

## **Forest Vegetation Simulation (FVS) Model**

The primary tool used for estimating growth and yield used in the SPECTRUM model is the Forest Vegetation Simulation Model (FVS), formerly called Prognosis. FVS is an individual-tree, distance-independent, growth and yield model. It has its structural roots in the Stand Prognosis Model developed by Albert Stage from the Intermountain Research Station. Staff at the USFS Forest Management Service Center in Fort Collins have now calibrated sixteen additional variants of the model to specific geographic areas throughout the west, Midwest, and northeastern United States.



FVS allows the user to calculate estimates of forest stand structure and species composition over time and quantify this information to (1) describe current and future forest stand conditions, (2) simplify complex concepts of forest vegetation into user-defined indices, attributes, etc., and (3) allow the manager to ask better questions about growth and yield of forested stands and complete analyses to answer those questions.

The FVS model structure contains modules for growing trees; predicting mortality; establishing regeneration; simulating growth reductions, damage, and mortality due to insects and disease; performing management activities; calculating tree volumes; and producing reports. One of the strengths of the FVS system is its ability to incorporate local growth rate data directly into the simulation results.

Growth rates for common species on FIA plots were compared to growth rates generated by FVS. The coefficients generated by this comparison were used to calibrate FVS. . .

For shortleaf pine, upland hardwoods and yellow-poplar, FVS produced higher basal areas than indicated by well accepted yield tables. This was corrected by reducing the maximum basal area coefficients in FVS.

For mature to advanced stand ages, FVS tended to under predict mortality for most forest/community types. To correct this tendency, mortality coefficients were increased for most species at ages 65 and above, and then again for ages 100 and above.

For common forest tree species, cull volume is deducted from the gross volume figures. The data source was two reports run by the FIA Unit in Asheville, NC; one of which reported gross volumes and the other reporting net volumes by species, diameter class, and survey unit. From these reports, the cull volume amount and its percentage of gross volume was calculated using a spreadsheet. These percentages were then keyed into an FVS addfile by species and diameter class. Although reported survey units were North, North Central, and Central; no attempt was made to derive separate cull percentages by ecological Section because: (a) the data set was not large, especially in the larger diameters with the greater cull, and (b) there is no apparent reason to believe that cull percentages would vary significantly on the basis of ecological Section.

Yields were developed for each analysis area under scenarios for different regeneration harvest methods and for thinned and un-thinned conditions. FVS reported projected yields for each product class at 5 year intervals. These yields were then used to build the yield tables for the SPECTRUM model.

### **Forest Planning Model (SPECTRUM)**

A computerized model called SPECTRUM has been developed by the Forest Service to help each National Forest analyze the management situation, formulate management alternatives, and estimate effects of management alternatives. The computer programs that comprise SPECTRUM are the same for all forests; however, each Forest is responsible for defining the way SPECTRUM features will be used (i.e. the structure of the model) and for estimating

the outputs per acre that are stored in yield tables. These outputs per acre are commonly referred to as Output Coefficients and have been developed and verified by the ID Team. For this analysis, a standard SPECTRUM model shell was developed with common level identifiers, qualifiers, treatment types, activities, outputs, cost data, objective function, and yield data. This shell model was customized for the individual alternatives by adding analysis areas and constraints unique to each alternatives. The sections of the SPECTRUM model are described in the following section.

### **Planning Horizon**

Each model has a specified time frame called a “planning horizon” that may be as short or long as desired. The planning horizon is broken down into time “periods,” each containing an equal number of years. A maximum of 90 periods may be specified.

The SPECTRUM model for this analysis was designed with the following planning horizon (Table B-2).

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*Table B-2. Planning Horizon for SPECTRUM model.*

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PLANNING HORIZON		
Beginning Year	Number of Periods	Period Length
2000	20	10 Years

### **Analysis Areas**

The different types and localities of land that are modeled in SPECTRUM are stratified into Analysis Areas. Analysis areas are defined as areas of land (stands), not necessarily contiguous, which can be considered to be homogeneous with respect to responses to treatment in terms of yields, costs of treatments and values received for resource outputs. Individual stand data from the CISC data base were used to define analysis areas. Four hierarchical categories referred to as layer identifiers were to describe the Analysis Areas for the analysis used for the DEIS and Forest Plan. These levels identifiers were developed from the issues described in Appendix A of this FEIS.

During the initial development of the analysis areas, each analysis area was defined by three levels of identifiers with respective categories. Each land unit or stand displayed in the resource data base was assigned to a specific analysis area based upon that stand's characteristics. The analysis area acreages used in the SPECTRUM model are an aggregation of the stand acreages from GIS.

Each analysis area is composed of similar stands, with similar vegetation and representing similar opportunities. Overlaying all of the identified layers from GIS and CISC would have resulted in thousands of analysis areas. Grouping was used to aggregate and condense these

into the minimum number of areas that still retained sufficient site-specificity to analyze resource allocation and scheduling options needed to address issues. The result was a base map with the Forest stratified into 63 analysis areas. After the forest was stratified into separate analysis areas, the GIS layers containing management prescriptions for the individual alternatives was merged with the base map to create a unique combination of analysis areas that include management prescriptions for each alternative (Table B-3). The individual analysis area datasets for each alternative were then used in the SPECTRUM model.

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*Table B-3. Analysis units by Alternative.*

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Alternative	A	B	D	E	F	G	I
Number of Analysis Units	386	560	331	487	254	544	508

The level identifiers that were used to build the analysis area datasets are described below. Levels 1 through Level 3 are common across all alternatives. Level 4 provides the unique combinations that allow for the modeling of the different alternatives. The minimum size for Analysis Units is 1 acre.

*LEVEL 1* - District or Ecological Strata (DIST): This identifier was used to identify on which portion of the forest the analysis unit occurred. Two strata were used: Mountain and Piedmont. For modeling purposes, all lands on the Andrew Pickens Ranger District were classified as mountain and lands on the Enoree and Long Cane Ranger Districts were classified as Piedmont.

*LEVEL 2* - Community Code (COMM): Forest Community types and site class are identified in this level. Within each District stratum, two factors went into the assignment of Community Codes for individual stands: forest type based on stand information in the CISC database (Table B-4) and site index range. Dry and dry-mesic oak-pine and pine communities are further separated by site class. In addition four groups of communities were aggregated into single Community Codes. Table B-5 contains a depiction of how forest community types and site quality variables were combined into forest communities and the aggregation of forest communities for this analysis level.

*Table B-4. – Forest Types and CISC Codes on the Sumter National Forest.*

<b>Forest Type</b>	<b>CISC Code</b>	<b>Forest Type</b>	<b>CISC Code</b>
White Pine	3	Northern Red Oak-Hickory-Yellow Pine	48
White Pine-Hemlock	4	Bear Oak-Southern Scrub Oak-Yellow Pine	49
Hemlock	5	Yellow Poplar	50
Hemlock-Hardwood	8	Post Oak-Black Oak	51
White Pine-Cove Hardwood	9	Chestnut Oak	52
White Pine-Upland Hardwood	10	White Oak-Red Oak-Hickory	53
Eastern Red Cedar-Hardwood	11	White Oak	54
Shortleaf Pine-Oak	12	Northern Red Oak	55
Loblolly Pine-Hardwood	13	Yellow Poplar-White Oak-Northern Red Oak	56
Pitch Pine-Oak	15	Scrub Oak	57
Virginia Pine-Oak	16	Sweet Gum-Yellow Poplar	58
Red Spruce-Northern Hardwoods	17	Scarlet Oak	59
Longleaf Pine	21	Chestnut Oak-Scarlet Oak	60
Loblolly Pine	31	Swamp Chestnut Oak-Cherrybark Oak	61
Shortleaf Pine	32	Sweet Gum-Oak-Willow	62
Virginia Pine	33	Sugarberry-American Elm-Green Ash	63
Pitch Pine	38	Laurel Oak-Willow Oak	64
Table Mountain Pine	39	Overcup Oak-Water Hickory	65
Hardwood-Pond Pine	40	Sweet Bay-Swamp Tupelo-Red Maple	68
Cove Hardwoods-White Pine-Hemlock	41	Beech-Magnolia	69
Upland Hardwoods-White Pine	42	Black Ash-American Elm-Red Maple	71
Oak-Eastern Red Cedar	43	River Birch-Sycamore	72
Southern Red Oak-Yellow Pine	44	Cottonwood	73
Chestnut Oak-Scarlet Oak-Yellow Pine	45	Willow	74
Bottomland Hardwood-Yellow Pine	46	Sycamore-Pecan-American Elm	75
White Oak-Black Oak-Hickory-Yellow Pine	47	Black Walnut	82

From: Silvicultural Examination and Prescription Field Book. USDA Forest Service Southern Region. 1988.

Table B-5. Structure of District and Community Code SPECTRUM Level Identifiers from CISC Forest Community, Forest Type, Site Class, and Site Index Data.

Dist	Comm Code	Comm Type	Forest Community	CISC Forest Type Codes	Site Class	Site Index Range
Piedmont  (P)	5	5	Mixed mesophytic forest	41, 50, 56	All	>=50
	13	13	River floodplain hardwood forest	46, 58, 61 - 65, 68, 69, 71	All	>=50
		28	Eastern riverfront forest	72 - 76, 82		>=50
	21	21	Dry-mesic oak forest	51, 52, 53, 54, 55, 57, 59, 60	All	>65
	22	22	Dry-xeric oak forest	51, 52, 53, 54, 55, 57, 59, 60	All	>=50 and <=65
		24	Xeric pine, pine-oak forest	11, 12, 13, 21, 31, 32, 33		>=50 and <60
	25L	25	Dry and dry-mesic oak pine forest: pine	11, 12, 13, 21, 31, 32, 33	Low	>=60 and <=75
	25I	25	Dry and dry-mesic oak pine forest: pine	11, 12, 13, 21, 31, 32, 33	Medium	>=76 and <=85
	25H	25	Dry and dry-mesic oak pine forest: pine	11, 12, 13, 21, 31, 32, 33	High	>85
	52	25	Dry and dry-mesic oak pine forest: oak-pine	42 - 45, 47, 48, 49	All	>=50
Mountain  (M)	5	2	Northern hardwood forest - Conifer	3, 4, 5, 8, 9, 17	All	>=50
		5	Mixed mesophytic forest	41, 46, 50, 56, 58, 61 - 65, 68, 69, 71		>=50
	21	21	Dry-mesic oak forest	51, 52, 53, 54, 55, 57, 59, 60		>65
	22	22	Dry-xeric oak forest	51, 52, 53, 54, 55, 57, 59, 60		>=50 and <65
		24	Xeric pine, pine-oak forest	10, 12, 15, 16, 32, 33, 38, 39		>=50 and <60
	25	25	Dry and dry-mesic oak pine forest: pine (non-loblolly)	10, 12, 15, 16, 32, 33, 38, 39		>=60
	52	25	Dry and dry-mesic oak pine forest: oak-pine	42 - 45, 47, 48, 49	All	>=50
	53	25	Dry and dry-mesic oak pine forest: loblolly pine	13, 31	All	>=50

**LEVEL 3 - Successional Class (AGE):** Successional classes for the different forest communities groups are identified on this level. These successional classes are based on the age of the different forest communities and vary by community (Table B-6). For the M22 community group (a combined grouping of the Community Type 22 - Dry-xeric oak forest and Type 24 - Xeric pine, pine-oak forest), the Late and Old Growth successional stages are based on the actual community type. In addition, the Second Mid-successional stage is only used for the pine communities in the Piedmont and communities with loblolly pine in the mountains in order to better model those communities. In the existing distribution, all communities are not represented in all successional stages.

*Table B-6. Initial Forest Community Age Distribution (in decades) for Successional Stages*

District/ Community	Successional Stage					
	Early (E)	Pole (P)	Mid (M)	2 <sup>nd</sup> Mid (M2)	Late (L)	Old Growth (O)
M5	1	2 - 4	5 - 8	na	9 - 13	14 - 15
M21	1	2 - 4	5 - 8	na	9 - 13	14 - 15
M22 (Type 22)	1	2 - 4	5 - 8	na	9 - 11	12 - 15
M22 (Type 24)	1	2 - 4	5 - 8	na	9 - 10	11 - 15
M25	1	2	3 - 6	na	7 - 12	13 - 15
M52	1	2 - 4	5 - 8	na	9 - 12	13 - 15
M53	1	2	3	4 - 5		
P5	1	2 - 4	5 - 8	na	9 +	
P13	1	2	3 - 6	na	7 - 10	11 - 12
P21	1	2 - 4	5 - 8	na	9 - 13	14 +
P22	1	2 - 4	5 - 8	na	9 - 10	
P25H	1	2	3	4 - 6	7 - 11	
P25I	1	2	3	4 - 6	7 - 10	11+
P25L	1	2	3	4 - 6	7 - 10	
P52	1	2 - 4	5 - 8	na	9 - 10	

**LEVEL 4 - Forest Plan Management Prescription (MGT\_RX):** A narrative list of management prescriptions is contained in the Forest Plan and the FEIS. A summary of the prescriptions is shown in Table B-7. Each prescription is a different mix of integrated management activities that are intended to accomplish specific objectives. (Table B-8) These prescriptions were developed through the coordinated efforts of a Regional team addressing public issues and management concerns. For more details about the coordinated development of management prescriptions see Chapter 2 of the EIS. For modeling purposes, groups (or composites) of management prescriptions have been defined as described in Table B-9.



*Table B-7. Management Prescriptions used for Alternatives on the Sumter National Forest.*

<b>MGT_RX Code</b>	<b>Prescription Description</b>
1A	Designated Wilderness/ Wilderness Study Area - Unsuitable
1B	Recommended Wilderness Study Area - Unsuitable
2A1	Wild River - Unsuitable
2A2	Scenic River - Unsuitable
2A3	Recreational River – Unsuitable
2B1	Eligible Wild River prior to Designation - Unsuitable
2B2	Eligible Scenic River prior to Designation - Unsuitable
2B3	Eligible Recreational River prior to Designation - Unsuitable
4D	Botanical - Zoological Areas - Unsuitable
4F	Scenic Areas - Unsuitable
4G1	Experimental Forest (25 percent of this area is unsuitable)
5A	Administrative Sites - Unsuitable
5C	Designated Utility Corridors - Unsuitable
6A	Natural Process Emphasis - Unsuitable
6B	Areas Managed to Restore/Maintain Old Growth Characteristics - Unsuitable
6C	Old Growth Areas Managed with a Mix of Natural Processes and Restoration Activities - Unsuitable
6D	Core Areas of Old Growth surrounded by areas with extended forest rotations – Unsuitable
6E	Core Areas of Old Growth surrounded by Areas under Uneven-Aged Management - Suitable
7A	Scenic Byway Corridor - Unsuitable
7C	OHV Use Areas - Unsuitable
7D	Concentrated Recreation Zone - Unsuitable
7E1	Dispersed Recreation Areas - Unsuitable
7E2	Dispersed Recreation Areas with Vegetation Management - Suitable
8A1	Mix of Successional Forest Habitats - Suitable
8A2	Area-Sensitive Mid- to Late-Successional Forest Habitats - Unsuitable
8B2	Woodland and Grassland Savanna Habitats - Suitable
8C	Black Bear Habitat Management - Suitable
8D	Red-Cockaded Woodpecker Habitat Management Areas - Suitable
9A3	Watershed Restoration Area - Suitable
9A4	Aquatic Habitat Watersheds - Unsuitable
9E	Maintenance and Restoration of Pine and Pine-Oak Forests - Suitable
9F	Rare Communities - Unsuitable
9G2	Maintenance and Restoration of Upland Oak-Hickory and Mixed Pine-Oak Forests - Suitable
9H	Management Maintenance and Restoration of Plant Associations in the Chattooga River Waters - Suitable

<b>MGT_RX Code</b>	<b>Prescription Description</b>
10B	High Quality Forest Products - Suitable
11	Riparian Prescription Areas - Unsuitable
12A	Remote Backcountry Recreation - Few Roads - Unsuitable
12B	Remote Backcountry Recreation - Non-Motorized - Unsuitable

*Table B-8. Management Prescription By Alternative*

<b>Prescription</b>	<b>Alternative</b>						
	<b>A</b>	<b>B</b>	<b>D</b>	<b>E</b>	<b>F</b>	<b>G</b>	<b>I</b>
1A	X	X	X	X	X	X	X
1B	X	X	X	X	X	X	X
2A1	X	X	X	X	X	X	X
2A2	X	X	X	X	X	X	X
2A3	X	X	X	X	X	X	X
2B1	X	X	X	X		X	
2B2	X	X	X	X			
2B3	X	X	X	X			
4D	X	X	X	X	X	X	X
4F	X	X	X	X	X	X	X
4G1	X	X	X	X	X	X	X
5A	X	X	X	X	X	X	X
5C	X	X	X	X	X	X	X
6A						X	
6B		X		X		X	
6C	X	X	X	X		X	X
6D		X		X		X	
6E						X	
7A							X
7C	X			X			
7D	X	X	X	X	X	X	X
7E1					X		X
7E2	X			X			X
8A1				X	X		X
8A2		X					
8B2		X		X		X	X
8C		X					
8D					X		

Prescription	Alternative						
	A	B	D	E	F	G	I
9A3		X				X	X
9A4						X	
9E		X					
9F	X	X	X	X		X	X
9G2		X				X	X
9H		X					
10B	X		X		X	X	X
11	X	X	X	X	X	X	X
12A	X			X			X
12B			X	X			

*Table B-9. Management Prescription Composite descriptions*

Rx Composite	Description
2Age_1	2-Age Rx All but P22 and P25 communities. Includes Rx 2A3, 6D, 7A, 7C, 7E2, 8B2, 8D, 9A3, 9E, and 9G2
2Age_2	2-Age Rx P22, P25s communities. Includes Rx 6D, 7E2, 8D, 9A3, 9E, and 9G2
2Age_P	2- Age grouping for pine. Includes Rx 6D, 7E2, 8D, 9A3, and 9E
8B_grp	Has all 8B rx to account for RX name changes – Rx 8B2
CC_M53	Seed Tree or Clearcut Rx No Thin - M53 community only. Rx 10B, 2A3, 6D, 7A, 7C, 7E2, 8A1, 8A2, 8C, 9H
CChwd	Hardwood Clearcut/Seed tree Group. Rx 10B, 4G1, 7C, 7E2, 8A1, 8A2, 8B2, 8C, 8D, 9E, 9G2, 9H
CCpinT	Seed Tree or Clearcut w Thinning Prescription Group - Pine Only. Rx 10B, 4G1, 7C, 7E2, 8A1, 8A2, 8B2, 8C, 8D, 9A3, 9E, 9H
CCPine	Seed Tree /Clearcut Prescription Group - Pine community only. Rx 10B, 4G1, 7C, 7E2, 8A1, 8A2, 8B2, 8C, 9A3, 9E, 9H
GSHdwd	Rx That Allow Group Selection in Hardwoods. Rx 2A3, 4G1, 6D, 7A, 7C, 7E2, 8A1, 8A2, 8C, 9A3, 9E, 9G2, 9H
GSPine	Rx That Allow Group Selection in Pine Do not use for Mtn Pine M53. Rx 2A3, 4G1, 6D, 7A, 7C, 7E2, 8A1, 8A2, 8C, 9A3, 9E, 9G2, 9H
MinMgt	Unsuitable Group. Rx 10A, 11, 12A, 12B, 1A, 1B, 1C, 2A1, 2A2, 2B1, 2B2, 2B3, 4D, 4F, 5C, 6A, 6B, 6C, 6D, 7B, 7D, 7E1, 8A2, 8E, 9a1, 9a4, 9F
SW_HdM	Shelterwood Rx Hardwoods in Mountains only, Rx 10B, 2A3, 6D, 7A, 7C, 7E2, 8a1, 8A2, 8C, 9H
SW_HdP	Shelterwood Rx Hardwoods in Piedmont only includes 8B. Rx 10B, 4G1, 6D, 7E2, 8A1, 8A2, 8B2, 8D, 9A3, 9E, 9G2,
SWpinP	Rx That Allow Shelterwood - 4G1 - Piedmont Pine Only. Rx 4G1, 6D

<b>Rx Composite</b>	<b>Description</b>
Wdln25	Woodlands Rx Group Pine - M22, M25 and P25s Only. Rx 10B, 7E2, 8A1, 8B2, 8C, 9E, 9G2, 9H.

### **Activities and Outputs**

A forest management model consists of a set of management actions applied to specific land units. Management actions consist of activities, outputs, treatments, and land conditions. Up to 2000 actions can be defined in a model.

ACTIVITIES are actions such as harvest administration, inventory, NEPA, etc. Table B-10 contains the listing of activities used in this model and associated economic (cost in dollars) information that are forest-wide in nature. Table B-11 contains detailed information for regeneration costs that are dependent on forest community and type of silvicultural treatment.

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*Table B-10. Forest-wide Activities and Cost Information. Costs are Per Acre.*

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<b>Category</b>	<b>Description/Source</b>	<b>Amount</b>
Woodland Management	From age 40 to regeneration age, cost is \$72 per acre per decade - 4 prescribed burns per decade at \$18/acre.	\$72
Harvest Administration	TSPIRS	31.50
Inventory and NEPA	TSPIRS	50.35
Sale Preparation	TSPIRS	\$88.15
Road Costs (Harvests and Thinning)	Average cost per acre for road construction and reconstruction. Based on 13 open sales on September 9, 2002.	\$42.35

*Table B-11. Regeneration Costs for Communities by Silvicultural Treatment. Costs are per Acre.*

<b>Stratum</b>	<b>Seed Tree or CC</b>	<b>Shelterwood</b>	<b>*Group Selection</b>	<b>2-Aged</b>	<b>Woodland</b>	<b>9G</b>
<b>Piedmont</b>						
P5	\$89	\$89	\$0	\$89	NA	NA
P13	\$89	\$89	\$0	\$89	NA	NA
P21	\$54	\$54	\$0	\$54	NA	NA
P22	\$89	\$89	\$0	\$89	\$54	NA
P25	\$179	\$179	\$0	\$179	\$54	\$54
P52	\$54	\$54	\$0	\$54	NA	NA
<b>Mountains</b>						
M5	\$89	\$89	\$0	\$89	NA	NA
M21	\$54	\$54	\$0	\$54	NA	NA
M22	\$89	\$89	\$0	\$89	\$54	NA
M25	\$179	\$179	\$0	\$179	\$54	NA
M52	\$54	\$54	\$0	\$54	NA	NA
M53	\$159	NA	NA	NA	NA	NA

\*Group selection: No site prep or release stand tending activities are expected. Therefore yields should be an estimated 30 % less, due to more cull and rough stems and no stocking control.

OUTPUTS are those goods and services that are produced purposely or incidentally as a result of management (Activities) on the Forest. Selection of outputs to be used in SPECTRUM has major bearing on the structure of the model and on the results of the analysis. Outputs include timber volumes, acres of different successional stages, acres of specific treatments, and standing inventory. Table B-12 details outputs used in this model. Table B-13 contains economic information used in this model for timber volumes. Economic values for composite outputs (ASQ, VOL, etc.) are the sum of the values of the individual components.

Table B-12. Output Description.

Name	Description	Units	Economics
ESS	Early Successional Habitat	Acres	
HST	Hardwood Sawtimber	MCF	Y
HWP	Hardwood Pulpwood	MCF	Y
INV	PREDEFINED: Ending Inventory	MCF	
LSS	Late Successional Habitat	Acres	
LTSY	PREDEFINED: Long Term Sustained Yield	MCF	
MSS	Mid Successional Stage	Acres	
OSS	Old-growth Stage	Acres	
PPW	Pulpwood - Pine/Softwoods	MCF	Y
RealThin	Actual Acres Thinned	Acres	
SAV	PREDEFINED: Stand Average Volume	MCF	
SSS	Sapling/Pole	Acres	
SYP	Pine Sawtimber	MCF	Y
TACRE	Total Acres	Acres	
UE_acres	Acres of Uneven-aged Management	Acres	
WTP	White Pine (Mountains Only)	MCF	Y
Tot_vol	Total Volume	MCF	
ASQ	Allowable Sale Quantity – composite sum of merchantable volumes (pine and hardwood pulpwood and sawtimber)	MCF	
VOL	Volume Composite of all Volumes	MCF	
Tot_saw	Volume Composite of all sawtimber volumes	MCF	
Totpulp	Volume Composite of all pulpwood volumes	MCF	

Table B-13. Average Timber Values for Sumter LMP SPECTRUM Model

District	Product	Unit	Value
Mountains	Hardwood Pulpwood	MCF	\$55.30
	Hardwood Sawtimber	MCF	\$626.90
	Pine Pulpwood	MCF	\$49.10
	Southern Yellow Pine Sawtimber	MCF	\$571.50
	White Pine Sawtimber	MCF	\$771.90
Piedmont	Hardwood Pulpwood	MCF	\$178.90
	Hardwood Sawtimber	MCF	\$388.66
	Pine Pulpwood	MCF	\$255.70
	Southern Yellow Pine Sawtimber	MCF	\$1,411.80



## Management Actions

A management action consists of a set of activities, applied to a particular piece of ground that results in outputs and/or conditions. The management action has an objective or desired outcome that may or may not be commodity based. For example, a management action may be implemented to produce as much timber as possible, to improve biological diversity, to increase recreation visitor days, or some mix of the above.

Management actions are modeled in five steps in the SPECTRUM model:

1. *Defining vegetation treatments called Treatment Types.* Table B-14 lists the Treatment Types utilized in the Sumter Model. In addition, Treatment Types were grouped in the following combinations: AllSW – All Shelterwood seed and overstory removal treatments, CC-All – All Seed-tree or Clearcut treatments, EA\_reg – Even-aged regeneration treatments, NonThn – Treatments that do not include thinnings, SW-All – all Shelterwood seed treatments, UA\_reg – uneven-age regeneration treatments, allthn – all treatments that include thinnings.

Table B-14. Treatment Types

Name	Final Harvest Sequence				Other Harvest	Counts Toward		Description
	Beginning	Middle	End	Regen. Occurs		Inventory	LTSYC	
CC-Ex	X	X	X	X		X		PREDEFINED: Seed-tree or Clearcut in existing stand
CC-Rgn	X	X	X	X		X	X	PREDEFINED: Seed-tree or Clearcut in regenerated stand
OverE2			X					PREDEFINED: overstory removal existing stand - 2 step shelterwood
OverR2			X				X	PREDEFINED: overstory removal regenerated stand - 2 step shelterwood
SeedE2	X	X		X				PREDEFINED: prep/seed cut in an existing stand - 2 step shelterwood
SeedR2	X	X		X			X	PREDEFINED: prep/ Seed cut in a regenerated stand - 2 step shelterwood
Sel-F					X			PREDEFINED: selection cut - first entry

Name	Final Harvest Sequence				Other Harvest	Counts Toward		Description
	Beginning	Middle	End	Regen. Occurs		Inventory	LTSYC	
Sel-L					X			PREDEFINED: selection cut - latter entries
Selinv	X	X	X	X		X		PREDEFINED: Selection inventory - existing stand
Thin					X			PREDEFINED: general thinning
ThnEst					X			PREDEFINED: thinning in the existing stand
ThnReg					X		X	PREDEFINED: thinning in the regenerated stand

*Thinning harvest.* Analysis units were not modeled as 1 thin, 2 thins, 3 thins, etcetera between stand establishment and regeneration, or between current stand age and regeneration. Instead, for scenarios that included thinning, individual plots were modeled for thinning if they met thinning criteria for existing basal area, minimum harvest volume and required residual basal area after thinning.

For example, suppose 50 plots represent an analysis area, and that 20 of these meet thinning criteria. In this case, 40 percent of the analysis area would be thinned. For this reason, a variable (RealThin) was created in SPECTRUM to track the actual acres thinned.

Continuing with the same example, FVS shows average volume per acre for all 50 plots. Therefore, the volume per acre had to be adjusted to reflect only the plots being thinned. An average volume per acre across the 20 thinned plots of 1000 cubic feet per acre would average across all 50 analysis area plots as  $(20 \times 1000) / 50$  or 400 cubic feet/acre. To correct this, a factor of (total plots/thinned plots) times the FVS per acre volume was used in SPECTRUM to reflect an accurate per acre volume estimate. Using the same example, (total plots/thinned plots) =  $50 / 20$  or 2.5. 2.5 times 400 again equal 1000 cubic feet per acre.

2. *Defining Management Action Attributes.* Each management action has an “emphasis” and “intensity” attribute. The emphasis attribute describes the general management goal, and the intensity attribute describes the varying levels of management used to achieve the goal. Management action emphases (Table B-15) describe the general management goals, such as: Uneven-aged management, Two-aged management, Shelterwood, Seed tree-aged management, Woodlands management, etc. In addition, composites, or groups, of management emphases are defined. Composites are used where multiple emphases may be an option and eliminate the need to list each

individually in the model. Management Action Intensities (Table B-16) describe the varying levels of management used in the model. These intensity levels include timing options for thinning or not thinning, minimum level management, uneven-aged management timing options. Just as land attributes are used to describe analysis areas, management attributes are used to describe management actions. The management emphasis and management intensity define “what” the action is trying to accomplish and “why” the action was developed.

*Table B-15. Management Action Emphasis*

<b>Attribute</b>	<b>Description</b>
2A	Two-Aged Management
9G-CC	Rx 9G Seed tree or Clearcut Conversion from Pine to Type 52 Piedmont only
9G-SW	9G Shelterwood Conversion from Pine to Type 52 Piedmont only
CC	Seed Tree or Clearcut
GrpSel	Group Selection - Uneven-aged management
MN	Minimum level Mgt
SW	Shelterwood
UE	Uneven-aged Mgt
Wdland	Woodland
9G_all	Composite of all 9G Prescriptions
*EA	Composite of Even Aged Management treatments – 2A, CC, and SW
EA2AGS	Even-aged, 2 aged, and Group Selection composite – 2A, CC, GrpSel, SW, UE
EA9Gwd	Composite of EA, 2 aged, and 9G and Woodland treatments – 2A, 9G-CC, 9G-SW, CC, SW, Wdland
*EA_MN	Composite containing EA – Min. Level Management treatments – 2A, CC, MN, SW
EAmnAL	Composite containing All Even-Aged and Min Level treatments - 2A, 9G-CC, 9G-SW, CC, MN, SW, Wdland
SW_all	Composite of All Shelterwood treatments - 9G-SW, SW

Table B-16. Management Action Intensity

Attribute	Description
1T/1T	1 Thin in existing stand; 1 Thin in regenerated stand
MinMgt	Minimum Level Management
0T/1T	No Thins in Existing Stand/1 Thin in Reg. Stand
0T/0T	No Thins in Existing Stand/No Thins in Reg. Stand
UE_EV	Uneven Aged Mgt Even Ages 60, 80, 100 etc.
UE_OD	Uneven Aged Mgt Odd Ages 70, 90, 110, etc
*0T_MN	Aggregate - Min level 0T/0T 0T/1T
ALLTHN	For regeneration tables for 0T/1T or 1T/1T
*NoThin	Aggregate - No Thin in Existing Group 0T/0T
*Thins	Aggregate - Thins in Existing 1T/1T, 0T/1T

3. *Defining Management Actions.* These consist of a set of activities applied to an area of land to produce a set of outputs. Each management action is assigned an emphasis, intensity, schedule type (described below), and a Yield Composite (described below) (Table B-17).

Table B-17. Management Action Definitions

Management Action	Emphasis	Intensity	Schedule Type	Yield Composite
Min Level Mgt	MN	MinMgt	Clearcut	Unsuit
Seed-tree Thin 0T/1T ( <i>note: include seed-tree + thins</i> )	CC	1T/1T	Clearcut	Actmgt
Seed-tree Thin 1T/1T ( <i>note: include seed-tree + thins</i> )	CC	1T/1T	Clearcut	Actmgt
Seed-tree No thins ( <i>note: include seed-tree</i> )	CC	0T/0T	Clearcut	Actmgt
Shelterwood No Thins	SW	0T/0T	Shelterwood	Actmgt
Shelterwood Thin 1T/1T	SW	1T/1T	Shelterwood	Actmgt
Shelterwood Thin 0T/1T	SW	1T/1T	Shelterwood	Actmgt
Uneven Even Years	UE	UE_EV	Uneven-aged	Actmgt
Uneven Odd Years	UE	UE_OD	Uneven-aged	Actmgt
Woodlands	Wdland	1T/1T	Clearcut	Actmgt
2-aged	2A	0T/0T	Shelterwood	Actmgt
9G Seed Tree/CC 1T/1T	9G-CC	1T/1T	Clearcut	Actmgt
9G Seed Tree/CC 0T/1T	9G-CC	0T/1T	Clearcut	Actmgt

4. *Specify the land themes (groups of analysis areas by attributes).* Once management actions are defined, sets of analysis units eligible for the different management actions are defined via relational theming. Relational theming matches analysis unit land attributes with land attributes used to define management actions to determine which analysis units may receive which management actions. The final model solution will determine how many acres of each analysis unit, if any, will receive each management action. In addition, limits on the size of an analysis unit eligible for a management action can be specified to which the management actions may be applied. Each management action is associated with specific analysis units where that action is allowed (Table B-18). Where one of the level identifiers is blank, a management action is applicable to all variables for that level (i.e., all ages, districts, communities, or prescriptions).

*Table B-18. Management actions and analysis unit themes.*

<b>Management Action</b>	<b>Dist</b>	<b>COMM</b>	<b>Age</b>	<b>MGT_rx</b>
2-Aged		5		2Age_1
2-Aged	P	13		2Age_1
2-Aged		21		2Age_1
2-Aged	P	22		2Age_2
2-Aged	M	22		2Age_1
2-Aged	P	Pine		2Age_P
2-Aged	M	25		2Age_1
2-Aged		52		2Age_1
9G2 Seed Tree 0T/1T	P	25I	O	9G2
9G2 Seed Tree 1T/1T	P	Pine	M2-L	9G2
Min Level Mgt				
Seed Tree - No thins	P	5_13		CChwd
Seed Tree - No thins	P	Pine		CCpine
Seed Tree - No thins	P	21_22		CChwd
Seed Tree - No thins	P	52		CChwd
Seed Tree - No thins	M	5		CChwd
Seed Tree - No thins	M	21		CChwd
Seed Tree - No thins	M	22		CChwd
Seed Tree - No thins	M	25		CCPine
Seed Tree - No thins	M	53		CC_M53
Seed Tree - Thin 0T/1T	P	5_22	L	CChwd
Seed Tree - Thin 0T/1T	P	13	O	CChwd
Seed Tree - Thin 0T/1T	P	21	O	CChwd
Seed Tree - Thin 0T/1T	P	25I	O	CCpinT
Seed Tree - Thin 0T/1T	M	5	L -O	CChwd
Seed Tree - Thin 0T/1T	M	21	O	CChwd
Seed Tree - Thin 0T/1T	M	22	O	CChwd
Seed Tree - Thin 0T/1T	M	52	LO	CChwd

<b>Management Action</b>	<b>Dist</b>	<b>COMM</b>	<b>Age</b>	<b>MGT_rx</b>
Seed Tree - Thin 0T/1T	M	25	O	CCpinT
Seed-tree Thin 1T/1T	P	5_22	E-M	CChwd
Seed-tree Thin 1T/1T	P	Pine		CCpinT
Seed-tree Thin 1T/1T	P	Pine	E-M	9G2
Seed-tree Thin 1T/1T	P	13	E-L	CChwd
Seed-tree Thin 1T/1T	P	52	E-L	CChwd
Seed-tree Thin 1T/1T	P	21	E-L	CChwd
Seed-tree Thin 1T/1T	M	5	E-M	CChwd
Seed-tree Thin 1T/1T	M	21	E-L	CChwd
Seed-tree Thin 1T/1T	M	22	E-L	CChwd
Seed-tree Thin 1T/1T	M	52	E-M	CChwd
Seed-tree Thin 1T/1T	M	25	E-L	CCpinT
Shelterwood - No Thins	P	5	P	SW_HdP
Shelterwood - No Thins	P	5	M	SW_HdP
Shelterwood - No Thins	P	13	E-L	SW_HdP
Shelterwood - No Thins	P	21	E-L	SW_HdP
Shelterwood - No Thins	P	22	E-L	SW_HdP
Shelterwood - No Thins	P	Pine	E-L	SWpinP
Shelterwood - No Thins	P	25I	O	SWpinP
Shelterwood - No Thins	P	52	E-L	SW_HdP
Shelterwood - No Thins	M	5		SW_HdM
Shelterwood - No Thins	M	21		SW_HdM
Shelterwood - No Thins	M	22		SW_HdM
Shelterwood - No Thins	M	52		SW_HdM
Shelterwood - No Thins	M	25		SW_HdM
Shelterwood - Thin 0T/1T	P	22	L	SW_HdP
Shelterwood - Thin 0T/1T	P	21	O	SW_HdP
Shelterwood - Thin 0T/1T	P	25I	O	SWpinP
Shelterwood - Thin 0T/1T	P	13	O	SW_HdP
Shelterwood - Thin 0T/1T	P	5	L	SW_HdP
Shelterwood - Thin 0T/1T	M	5	L-O	SW_HdM
Shelterwood - Thin 0T/1T	M	21	O	SW_HdM
Shelterwood - Thin 0T/1T	M	22	O	SW_HdM
Shelterwood - Thin 0T/1T	M	25	O	SW_HdM
Shelterwood - Thin 0T/1T	M	52	L-O	SW_HdM
Shelterwood Thin 1T/1T	P	5_22	E-M	SW_HdP
Shelterwood Thin 1T/1T	P	13	E-L	SW_HdP
Shelterwood Thin 1T/1T	P	52	E-L	SW_HdP
Shelterwood Thin 1T/1T	P	21	E-L	SW_HdP
Shelterwood Thin 1T/1T	P	Pine	E-L	SWpinP
Shelterwood Thin 1T/1T	M	5	E-M	SW_HdM
Shelterwood Thin 1T/1T	M	21	E-L	SW_HdM
Shelterwood Thin 1T/1T	M	22	E-L	SW_HdM
Shelterwood Thin 1T/1T	M	52	E-M	SW_HdM

Management Action	Dist	COMM	Age	MGT_rx
Shelterwood Thin 1T/1T	M	25	E-L	SW_HdM
Uneven Even Years	P	13		GSHdwd
Uneven Even Years		21		GSHdwd
Uneven Even Years		22		GSHdwd
Uneven Even Years	P	Pine		GSPine
Uneven Even Years		52		GSHdwd
Uneven Even Years		5		GSHdwd
Uneven Even Years	M	25		GSPine
Uneven Odd Years	P	13		GSHdwd
Uneven Odd Years		21		GSHdwd
Uneven Odd Years		22		GSHdwd
Uneven Odd Years	P	Pine		GSPine
Uneven Odd Years		52		GSHdwd
Uneven Odd Years		5		GSHdwd
Uneven Odd Years	M	25		GSPine
Woodlands		22		Wdln22
Woodlands		Pine		Wdln25

5. *Define Schedule options for each management action.* Each management action is linked to schedule types and schedule timing options. Schedule timing options define stand ages or time periods in which a management action may take place. . The schedule type defines “how” and “when” the action will be implemented, and the yield composite contains the set of activities, outputs and conditions that occur as a result of the action being implemented. . . Each management action has a schedule for combinations of analysis units where that action allowed. Min Level Management is included in the lists of schedules as a possible option for all analysis units. Schedules also define at which age thinnings can occur and the age range for regeneration harvests. Schedules used in this model are contained in Table B-19. . Management actions that use Shelterwood schedules also include timing and proportions for seed cuts and overstory removal cuts,. In this model Shelterwood schedules are used for Shelterwood and 2-aged management actions. Table B-20 contains the shelterwood proportions and timing choices for these actions.

Table B-19. Schedules used in SPECTRUM Model

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Min Level Mgt	Exist							30	31
Min Level Mgt	Regen							30	31
Clearcut - No thins	Exist	P	5	L	CChwd	0	0	9	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - No thins	Regen	P	5	L	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	5	M	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	5	M	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	5	P	CChwd	0	0	6	15
Clearcut - No thins	Regen	P	5	P	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	13	E-M	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	13	E-M	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	13	L	CChwd	0	0	8	15
Clearcut - No thins	Regen	P	13	L	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	13	O	CChwd	0	0	11	15
Clearcut - No thins	Regen	P	13	O	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	21	E-P	CChwd	0	0	6	15
Clearcut - No thins	Regen	P	21	E-P	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	21	L	CChwd	0	0	9	15
Clearcut - No thins	Regen	P	21	L	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	21	M	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	21	M	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	21	O	CChwd	0	0	14	15
Clearcut - No thins	Regen	P	21	O	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	22	E	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	22	E	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	22	P	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	22	P	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	22	L	CChwd	0	0	10	15
Clearcut - No thins	Regen	P	22	L	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	22	M	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	22	M	CChwd	0	0	7	12
Clearcut - No thins	Exist	P	52	E-P	CChwd	0	0	6	15
Clearcut - No thins	Regen	P	52	E-P	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	52	L	CChwd	0	0	9	15
Clearcut - No thins	Regen	P	52	L	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	52	M	CChwd	0	0	7	15
Clearcut - No thins	Regen	P	52	M	CChwd	0	0	6	12
Clearcut - No thins	Exist	P	25I	O	CCPine	0	0	15	16
Clearcut - No thins	Regen	P	25I	O	CCPine	0	0	5	12
Clearcut - No thins	Exist	P	Pine	E-M2	CCPine	0	0	5	15
Clearcut - No thins	Regen	P	Pine	E-M2	CCPine	0	0	5	12
Clearcut - No thins	Exist	P	Pine	L	CCPine	0	0	5	15



MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - No thins	Regen	P	Pine	L	CCPine	0	0	8	12
Clearcut - Thin 0T/1T	Exist	P	5	L	CChwd	0	0	9	15
Clearcut - Thin 0T/1T	Regen	P	5	L	CChwd	5	5	5	12
Clearcut - Thin 0T/1T	Exist	P	21	O	CChwd	0	0	14	15
Clearcut - Thin 0T/1T	Regen	P	21	O	CChwd	7	7	7	12
Clearcut - Thin 0T/1T	Exist	P	22	L	CChwd	0	0	10	15
Clearcut - Thin 0T/1T	Regen	P	22	L	CChwd	7	7	7	12
Clearcut - Thin 0T/1T	Exist	P	25I	O	CCpinT	0	0	15	15
Clearcut - Thin 0T/1T	Regen	P	25I	O	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	5	M	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	5	M	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	5	P	CChwd	5	5	5	15
Clearcut - Thin 1T/1T	Regen	P	5	P	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	13	E	CChwd	6	6	7	15
Clearcut - Thin 1T/1T	Regen	P	13	E	CChwd	6	6	7	12
Clearcut - Thin 1T/1T	Exist	P	13	L	CChwd	8	8	8	15
Clearcut - Thin 1T/1T	Regen	P	13	L	CChwd	6	6	7	12
Clearcut - Thin 1T/1T	Exist	P	13	M	CChwd	5	5	6	15
Clearcut - Thin 1T/1T	Regen	P	13	M	CChwd	6	6	7	12
Clearcut - Thin 1T/1T	Exist	P	13	P	CChwd	5	5	7	15
Clearcut - Thin 1T/1T	Regen	P	13	P	CChwd	6	6	7	12
Clearcut - Thin 1T/1T	Exist	P	21	E	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	21	E	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	21	L	CChwd	9	9	9	15
Clearcut - Thin 1T/1T	Regen	P	21	L	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	21	M	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	21	M	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	21	P	CChwd	5	5	6	15
Clearcut - Thin 1T/1T	Regen	P	21	P	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	22	E	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	22	E	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	22	M	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	22	M	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	22	P	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	22	P	CChwd	7	7	7	12
Clearcut - Thin 1T/1T	Exist	P	52	E	CChwd	5	5	6	15
Clearcut - Thin 1T/1T	Regen	P	52	E	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	52	L	CChwd	9	9	9	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - Thin 1T/1T	Regen	P	52	L	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	52	M	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	P	52	M	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	52	P	CChwd	6	6	6	15
Clearcut - Thin 1T/1T	Regen	P	52	P	CChwd	5	5	6	12
Clearcut - Thin 1T/1T	Exist	P	25H	E	CCpinT	3	3	4	15
Clearcut - Thin 1T/1T	Regen	P	25H	E	CCpinT	3	3	4	12
Clearcut - Thin 1T/1T	Exist	P	25H	L	CCpinT	8	8	8	15
Clearcut - Thin 1T/1T	Regen	P	25H	L	CCpinT	3	3	4	12
Clearcut - Thin 1T/1T	Exist	P	25H	M	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	P	25H	M	CCpinT	3	3	4	12
Clearcut - Thin 1T/1T	Exist	P	25H	M2	CCpinT	5	5	5	15
Clearcut - Thin 1T/1T	Regen	P	25H	M2	CCpinT	3	3	4	12
Clearcut - Thin 1T/1T	Exist	P	25H	P	CCpinT	2	2	5	15
Clearcut - Thin 1T/1T	Regen	P	25H	P	CCpinT	3	3	4	12
Clearcut - Thin 1T/1T	Exist	P	25I	E	CCpinT	2	2	5	15
Clearcut - Thin 1T/1T	Regen	P	25I	E	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	25I	L	CCpinT	8	8	8	15
Clearcut - Thin 1T/1T	Regen	P	25I	L	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	25I	M	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	P	25I	M	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	25I	M2	CCpinT	5	5	5	15
Clearcut - Thin 1T/1T	Regen	P	25I	M2	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	25I	P	CCpinT	2	2	5	15
Clearcut - Thin 1T/1T	Regen	P	25I	P	CCpinT	2	2	5	12
Clearcut - Thin 1T/1T	Exist	P	25L	E	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	P	25L	E	CCpinT	3	3	5	12
Clearcut - Thin 1T/1T	Exist	P	25L	L	CCpinT	8	8	8	15
Clearcut - Thin 1T/1T	Regen	P	25L	L	CCpinT	3	3	5	12
Clearcut - Thin 1T/1T	Exist	P	25L	M	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	P	25L	M	CCpinT	3	3	5	12
Clearcut - Thin 1T/1T	Exist	P	25L	M2	CCpinT	5	5	5	15
Clearcut - Thin 1T/1T	Regen	P	25L	M2	CCpinT	3	3	5	12
Clearcut - Thin 1T/1T	Exist	P	25L	P	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	P	25L	P	CCpinT	3	3	5	12
Shelterwood - Thin 0T/1T	Exist	P	21	O	SW_HdP	0	0	14	15
Shelterwood - Thin 0T/1T	Regen	P	21	O	SW_HdP	7	7	7	12
Shelterwood - Thin 0T/1T	Exist	P	22	L	SW_HdP	0	0	10	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - Thin 0T/1T	Regen	P	22	L	SW_HdP	7	7	7	12
Shelterwood - Thin 0T/1T	Exist	P	13	O	SW_HdP	0	0	11	15
Shelterwood - Thin 0T/1T	Regen	P	13	O	SW_HdP	6	6	7	12
Shelterwood - Thin 0T/1T	Exist	P	25I	O	SWpinP	0	0	15	16
Shelterwood - Thin 0T/1T	Regen	P	25I	O	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	5	M	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	5	M	SW_HdP	5	5	7	12
Shelterwood - Thin 1T/1T	Exist	P	5	P	SW_HdP	5	5	5	15
Shelterwood - Thin 1T/1T	Regen	P	5	P	SW_HdP	5	5	7	12
Shelterwood - Thin 1T/1T	Exist	P	13	E	SW_HdP	6	6	7	15
Shelterwood - Thin 1T/1T	Regen	P	13	E	SW_HdP	6	6	7	12
Shelterwood - Thin 1T/1T	Exist	P	13	L	SW_HdP	8	8	8	15
Shelterwood - Thin 1T/1T	Regen	P	13	L	SW_HdP	6	6	7	12
Shelterwood - Thin 1T/1T	Exist	P	13	M	SW_HdP	5	5	6	15
Shelterwood - Thin 1T/1T	Regen	P	13	M	SW_HdP	6	6	7	12
Shelterwood - Thin 1T/1T	Exist	P	13	P	SW_HdP	5	5	7	15
Shelterwood - Thin 1T/1T	Regen	P	13	P	SW_HdP	6	6	7	12
Shelterwood - Thin 1T/1T	Exist	P	21	E	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	21	E	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	21	L	SW_HdP	9	9	9	15
Shelterwood - Thin 1T/1T	Regen	P	21	L	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	21	M	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	21	M	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	21	P	SW_HdP	5	5	6	15
Shelterwood - Thin 1T/1T	Regen	P	21	P	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	22	E	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	22	E	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	22	M	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	22	M	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	22	P	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	22	P	SW_HdP	7	7	7	12
Shelterwood - Thin 1T/1T	Exist	P	52	E	SW_HdP	5	5	6	15
Shelterwood - Thin 1T/1T	Regen	P	52	E	SW_HdP	5	5	6	12
Shelterwood - Thin 1T/1T	Exist	P	52	L	SW_HdP	9	9	9	15
Shelterwood - Thin 1T/1T	Regen	P	52	L	SW_HdP	5	5	6	12
Shelterwood - Thin 1T/1T	Exist	P	52	M	SW_HdP	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	P	52	M	SW_HdP	5	5	6	12
Shelterwood - Thin 1T/1T	Exist	P	52	P	SW_HdP	6	6	6	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - Thin 1T/1T	Regen	P	52	P	SW_HdP	5	5	6	12
Shelterwood - Thin 1T/1T	Exist	P	25H	E	SWpinP	3	3	4	15
Shelterwood - Thin 1T/1T	Regen	P	25H	E	SWpinP	5	5	5	12
Shelterwood - Thin 1T/1T	Exist	P	25H	L	SWpinP	8	8	8	15
Shelterwood - Thin 1T/1T	Regen	P	25H	L	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25H	M	SWpinP	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	P	25H	M	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25H	M2	SWpinP	5	5	5	15
Shelterwood - Thin 1T/1T	Regen	P	25H	M2	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25H	P	SWpinP	2	2	5	15
Shelterwood - Thin 1T/1T	Regen	P	25H	P	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25I	E	SWpinP	2	2	4	15
Shelterwood - Thin 1T/1T	Regen	P	25I	E	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	25I	L	SWpinP	8	8	8	15
Shelterwood - Thin 1T/1T	Regen	P	25I	L	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	25I	M	SWpinP	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	P	25I	M	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	25I	M2	SWpinP	5	5	5	15
Shelterwood - Thin 1T/1T	Regen	P	25I	M2	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	25I	P	SWpinP	2	2	5	15
Shelterwood - Thin 1T/1T	Regen	P	25I	P	SWpinP	2	2	5	12
Shelterwood - Thin 1T/1T	Exist	P	25L	E	SWpinP	3	3	4	15
Shelterwood - Thin 1T/1T	Regen	P	25L	E	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25L	L	SWpinP	8	8	8	15
Shelterwood - Thin 1T/1T	Regen	P	25L	L	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25L	M	SWpinP	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	P	25L	M	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25L	M2	SWpinP	5	5	5	15
Shelterwood - Thin 1T/1T	Regen	P	25L	M2	SWpinP	3	3	5	12
Shelterwood - Thin 1T/1T	Exist	P	25L	P	SWpinP	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	P	25L	P	SWpinP	3	3	5	12
Shelterwood - No Thins	Exist	P	5	L	SW_HdP	0	0	9	15
Shelterwood - No Thins	Regen	P	5	L	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	5	M	SW_HdP	0	0	7	15
Shelterwood - No Thins	Regen	P	5	M	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	5	P	SW_HdP	0	0	6	15
Shelterwood - No Thins	Regen	P	5	P	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	13	E-M	SW_HdP	0	0	7	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - No Thins	Regen	P	13	E-M	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	13	L	SW_HdP	0	0	8	15
Shelterwood - No Thins	Regen	P	13	L	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	13	O	SW_HdP	0	0	11	15
Shelterwood - No Thins	Regen	P	13	O	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	21	E-P	SW_HdP	0	0	6	15
Shelterwood - No Thins	Regen	P	21	E-P	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	21	L	SW_HdP	0	0	9	15
Shelterwood - No Thins	Regen	P	21	L	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	21	M	SW_HdP	0	0	7	15
Shelterwood - No Thins	Regen	P	21	M	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	21	O	SW_HdP	0	0	14	15
Shelterwood - No Thins	Regen	P	21	O	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	22	E-P	SW_HdP	0	0	7	15
Shelterwood - No Thins	Regen	P	22	E-P	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	22	L	SW_HdP	0	0	10	15
Shelterwood - No Thins	Regen	P	22	L	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	22	M	SW_HdP	0	0	7	15
Shelterwood - No Thins	Regen	P	22	M	SW_HdP	0	0	7	12
Shelterwood - No Thins	Exist	P	52	E-P	SW_HdP	0	0	6	15
Shelterwood - No Thins	Regen	P	52	E-P	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	52	L	SW_HdP	0	0	9	15
Shelterwood - No Thins	Regen	P	52	L	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	52	M	SW_HdP	0	0	7	15
Shelterwood - No Thins	Regen	P	52	M	SW_HdP	0	0	6	12
Shelterwood - No Thins	Exist	P	25I	O	SWpinP	0	0	15	16
Shelterwood - No Thins	Regen	P	25I	O	SWpinP	0	0	5	12
Shelterwood - No Thins	Exist	P	Pine	E-M2	SWpinP	0	0	5	15
Shelterwood - No Thins	Regen	P	Pine	E-M2	SWpinP	0	0	5	12
Shelterwood - No Thins	Exist	P	Pine	L	SWpinP	0	0	8	15
Shelterwood - No Thins	Regen	P	Pine	L	SWpinP	0	0	5	12
Uneven Even Years	uneven	P	13	E	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	13	E	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	13	L	GSHdwd	8	8	0	0
Uneven Odd Years	uneven	P	13	L	GSHdwd	9	9	0	0
Uneven Even Years	uneven	P	13	M	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	13	M	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	13	O	GSHdwd	12	12	0	0

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Uneven Odd Years	uneven	P	13	O	GSHdwd	11	11	0	0
Uneven Even Years	uneven	P	13	P	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	13	P	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	21	E	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	21	E	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	21	L	GSHdwd	10	10	0	0
Uneven Odd Years	uneven	P	21	L	GSHdwd	9	9	0	0
Uneven Even Years	uneven	P	21	M	GSHdwd	8	8	0	0
Uneven Odd Years	uneven	P	21	M	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	21	O	GSHdwd	14	14	0	0
Uneven Odd Years	uneven	P	21	O	GSHdwd	15	15	0	0
Uneven Even Years	uneven	P	21	P	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	21	P	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	22	E	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	22	E	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	22	L	GSHdwd	10	10	0	0
Uneven Odd Years	uneven	P	22	L	GSHdwd	11	11	0	0
Uneven Even Years	uneven	P	22	M	GSHdwd	8	8	0	0
Uneven Odd Years	uneven	P	22	M	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	22	P	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	22	P	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	25H	E	GSPine	4	4	0	0
Uneven Odd Years	uneven	P	25H	E	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25H	L	GSPine	8	8	0	0
Uneven Odd Years	uneven	P	25H	L	GSPine	9	9	0	0
Uneven Even Years	uneven	P	25H	M	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25H	M	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25H	M2	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25H	M2	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25H	P	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25H	P	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25I	E	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25I	E	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25I	L	GSPine	8	8	0	0
Uneven Odd Years	uneven	P	25I	L	GSPine	9	9	0	0
Uneven Even Years	uneven	P	25I	M	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25I	M	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25I	M2	GSPine	6	6	0	0

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Uneven Odd Years	uneven	P	25I	M2	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25I	O	GSPine	16	16	0	0
Uneven Odd Years	uneven	P	25I	O	GSPine	15	15	0	0
Uneven Even Years	uneven	P	25I	P	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25I	P	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25L	E	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25L	E	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25L	L	GSPine	8	8	0	0
Uneven Odd Years	uneven	P	25L	L	GSPine	9	9	0	0
Uneven Even Years	uneven	P	25L	M	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25L	M	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25L	M2	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25L	M2	GSPine	5	5	0	0
Uneven Even Years	uneven	P	25L	P	GSPine	6	6	0	0
Uneven Odd Years	uneven	P	25L	P	GSPine	5	5	0	0
Uneven Even Years	uneven	P	52	E	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	52	E	GSHdwd	5	5	0	0
Uneven Even Years	uneven	P	52	L	GSHdwd	10	10	0	0
Uneven Odd Years	uneven	P	52	L	GSHdwd	9	9	0	0
Uneven Even Years	uneven	P	52	M	GSHdwd	8	8	0	0
Uneven Odd Years	uneven	P	52	M	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	52	P	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	52	P	GSHdwd	5	5	0	0
Uneven Even Years	uneven	P	5	L	GSHdwd	10	10	0	0
Uneven Odd Years	uneven	P	5	L	GSHdwd	9	9	0	0
Uneven Even Years	uneven	P	5	M	GSHdwd	8	8	0	0
Uneven Odd Years	uneven	P	5	M	GSHdwd	7	7	0	0
Uneven Even Years	uneven	P	5	P	GSHdwd	6	6	0	0
Uneven Odd Years	uneven	P	5	P	GSHdwd	5	5	0	0
Clearcut - Thin 0T/0T	Exist	M	5	E	CChwd	0	0	6	15
Clearcut - Thin 0T/0T	Regen	M	5	E	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	5	P	CChwd	0	0	7	15
Clearcut - Thin 0T/0T	Regen	M	5	P	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	5	M	CChwd	0	0	7	15
Clearcut - Thin 0T/0T	Regen	M	5	M	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	5	L	CChwd	0	0	11	15
Clearcut - Thin 0T/0T	Regen	M	5	L	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	5	O	CChwd	0	0	14	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - Thin 0T/0T	Regen	M	5	O	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	21	E	CChwd	0	0	6	15
Clearcut - Thin 0T/0T	Regen	M	21	E	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	21	P	CChwd	0	0	6	15
Clearcut - Thin 0T/0T	Regen	M	21	P	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	21	M	CChwd	0	0	7	15
Clearcut - Thin 0T/0T	Regen	M	21	M	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	21	L	CChwd	0	0	11	16
Clearcut - Thin 0T/0T	Regen	M	21	L	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	21	O	CChwd	0	0	14	15
Clearcut - Thin 0T/0T	Regen	M	21	O	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	22	P	CChwd	0	0	6	15
Clearcut - Thin 0T/0T	Regen	M	22	P	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	22	M	CChwd	0	0	7	15
Clearcut - Thin 0T/0T	Regen	M	22	M	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	22	L	CChwd	0	0	10	15
Clearcut - Thin 0T/0T	Regen	M	22	L	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	22	O	CChwd	0	0	13	15
Clearcut - Thin 0T/0T	Regen	M	22	O	CChwd	0	0	6	8
Clearcut - Thin 0T/0T	Exist	M	52	E	CChwd	0	0	5	15
Clearcut - Thin 0T/0T	Regen	M	52	E	CChwd	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	52	P	CChwd	0	0	5	15
Clearcut - Thin 0T/0T	Regen	M	52	P	CChwd	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	52	M	CChwd	0	0	6	15
Clearcut - Thin 0T/0T	Regen	M	52	M	CChwd	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	52	L	CChwd	0	0	10	15
Clearcut - Thin 0T/0T	Regen	M	52	L	CChwd	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	52	O	CChwd	0	0	13	15
Clearcut - Thin 0T/0T	Regen	M	52	O	CChwd	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	25	E	CCpine	0	0	5	15
Clearcut - Thin 0T/0T	Regen	M	25	E	CCpine	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	25	P	CCpine	0	0	5	15
Clearcut - Thin 0T/0T	Regen	M	25	P	CCpine	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	25	M	CCpine	0	0	5	15
Clearcut - Thin 0T/0T	Regen	M	25	M	CCpine	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	25	L	CCpine	0	0	10	15
Clearcut - Thin 0T/0T	Regen	M	25	L	CCpine	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	25	O	CCpine	0	0	14	15



MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - Thin 0T/0T	Regen	M	25	O	CCpine	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	53	E	CC_M53	0	0	4	15
Clearcut - Thin 0T/0T	Regen	M	53	E	CC_M53	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	53	P	CC_M53	0	0	4	15
Clearcut - Thin 0T/0T	Regen	M	53	P	CC_M53	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	53	M	CC_M53	0	0	4	15
Clearcut - Thin 0T/0T	Regen	M	53	M	CC_M53	0	0	5	7
Clearcut - Thin 0T/0T	Exist	M	53	M2	CC_M53	0	0	4	15
Clearcut - Thin 0T/0T	Regen	M	53	M2	CC_M53	0	0	5	7
Uneven Odd Years	Uneven	M	21	E	GSHdwd	7	7	0	0
Uneven Odd Years	Uneven	M	21	L	GSHdwd	1	1	0	0
Uneven Odd Years	Uneven	M	21	M	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	21	O	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	21	P	GSHdwd	5	5	0	0
Uneven Odd Years	Uneven	M	22	L	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	22	M	GSHdwd	1	1	0	0
Uneven Odd Years	Uneven	M	22	O	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	22	P	GSHdwd	5	5	0	0
Uneven Odd Years	Uneven	M	25	E	GSPine	5	5	0	0
Uneven Odd Years	Uneven	M	25	L	GSPine	2	2	0	0
Uneven Odd Years	Uneven	M	25	M	GSPine	2	2	0	0
Uneven Odd Years	Uneven	M	25	O	GSPine	2	2	0	0
Uneven Odd Years	Uneven	M	25	P	GSPine	4	4	0	0
Uneven Odd Years	Uneven	M	52	E	GSHdwd	5	5	0	0
Uneven Odd Years	Uneven	M	52	L	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	52	M	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	52	O	GSHdwd	1	1	0	0
Uneven Odd Years	Uneven	M	52	P	GSHdwd	3	3	0	0
Uneven Odd Years	Uneven	M	5	E	GSHdwd	7	7	0	0
Uneven Odd Years	Uneven	M	5	L	GSHdwd	1	1	0	0
Uneven Odd Years	Uneven	M	5	M	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	5	O	GSHdwd	2	2	0	0
Uneven Odd Years	Uneven	M	5	P	GSHdwd	5	5	0	0
Uneven Even Years	Uneven	M	21	E	GSHdwd	6	6	0	0
Uneven Even Years	Uneven	M	21	L	GSHdwd	2	2	0	0
Uneven Even Years	Uneven	M	21	M	GSHdwd	3	3	0	0
Uneven Even Years	Uneven	M	21	O	GSHdwd	1	1	0	0
Uneven Even Years	Uneven	M	21	P	GSHdwd	4	4	0	0

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Uneven Even Years	Uneven	M	22	L	GSHdwd	1	1	0	0
Uneven Even Years	Uneven	M	22	M	GSHdwd	2	2	0	0
Uneven Even Years	Uneven	M	22	O	GSHdwd	3	3	0	0
Uneven Even Years	Uneven	M	22	P	GSHdwd	4	4	0	0
Uneven Even Years	Uneven	M	25	E	GSPine	6	6	0	0
Uneven Even Years	Uneven	M	25	L	GSPine	1	1	0	0
Uneven Even Years	Uneven	M	25	M	GSPine	3	3	0	0
Uneven Even Years	Uneven	M	25	O	GSPine	1	1	0	0
Uneven Even Years	Uneven	M	25	P	GSPine	5	5	0	0
Uneven Even Years	Uneven	M	52	E	GSHdwd	6	6	0	0
Uneven Even Years	Uneven	M	52	L	GSHdwd	1	1	0	0
Uneven Even Years	Uneven	M	52	M	GSHdwd	1	1	0	0
Uneven Even Years	Uneven	M	52	O	GSHdwd	2	2	0	0
Uneven Even Years	Uneven	M	52	P	GSHdwd	4	4	0	0
Uneven Even Years	Uneven	M	5	E	GSHdwd	6	6	0	0
Uneven Even Years	Uneven	M	5	L	GSHdwd	2	2	0	0
Uneven Even Years	Uneven	M	5	M	GSHdwd	3	3	0	0
Uneven Even Years	Uneven	M	5	O	GSHdwd	1	1	0	0
Uneven Even Years	Uneven	M	5	P	GSHdwd	6	6	0	0
Shelterwood - No Thins	Exist	M	5	E	SW_HdM	0	0	6	15
Shelterwood - No Thins	Regen	M	5	E	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	5	P	SW_HdM	0	0	7	15
Shelterwood - No Thins	Regen	M	5	P	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	5	M	SW_HdM	0	0	7	15
Shelterwood - No Thins	Regen	M	5	M	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	5	L	SW_HdM	0	0	11	15
Shelterwood - No Thins	Regen	M	5	L	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	5	O	SW_HdM	0	0	14	15
Shelterwood - No Thins	Regen	M	5	O	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	21	E	SW_HdM	0	0	6	15
Shelterwood - No Thins	Regen	M	21	E	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	21	P	SW_HdM	0	0	6	15
Shelterwood - No Thins	Regen	M	21	P	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	21	M	SW_HdM	0	0	7	15
Shelterwood - No Thins	Regen	M	21	M	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	21	L	SW_HdM	0	0	11	16
Shelterwood - No Thins	Regen	M	21	L	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	21	O	SW_HdM	0	0	14	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - No Thins	Regen	M	21	O	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	22	P	SW_HdM	0	0	6	15
Shelterwood - No Thins	Regen	M	22	P	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	22	M	SW_HdM	0	0	7	15
Shelterwood - No Thins	Regen	M	22	M	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	22	L	SW_HdM	0	0	10	15
Shelterwood - No Thins	Regen	M	22	L	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	22	O	SW_HdM	0	0	13	15
Shelterwood - No Thins	Regen	M	22	O	SW_HdM	0	0	6	8
Shelterwood - No Thins	Exist	M	52	E	SW_HdM	0	0	5	15
Shelterwood - No Thins	Regen	M	52	E	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	52	P	SW_HdM	0	0	5	15
Shelterwood - No Thins	Regen	M	52	P	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	52	M	SW_HdM	0	0	6	15
Shelterwood - No Thins	Regen	M	52	M	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	52	L	SW_HdM	0	0	10	15
Shelterwood - No Thins	Regen	M	52	L	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	52	O	SW_HdM	0	0	13	15
Shelterwood - No Thins	Regen	M	52	O	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	25	E	SW_HdM	0	0	5	15
Shelterwood - No Thins	Regen	M	25	E	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	25	P	SW_HdM	0	0	5	15
Shelterwood - No Thins	Regen	M	25	P	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	25	M	SW_HdM	0	0	5	15
Shelterwood - No Thins	Regen	M	25	M	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	25	L	SW_HdM	0	0	10	15
Shelterwood - No Thins	Regen	M	25	L	SW_HdM	0	0	5	7
Shelterwood - No Thins	Exist	M	25	O	SW_HdM	0	0	14	15
Shelterwood - No Thins	Regen	M	25	O	SW_HdM	0	0	5	7
Clearcut - Thin 1T/1T	Exist	M	5	E	CChwd	6	6	6	15
Clearcut - Thin 1T/1T	Regen	M	5	E	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	5	P	CChwd	7	7	7	15
Clearcut - Thin 1T/1T	Regen	M	5	P	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	5	M	CChwd	6	6	7	15
Clearcut - Thin 1T/1T	Regen	M	5	M	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	21	E	CChwd	6	6	6	15
Clearcut - Thin 1T/1T	Regen	M	21	E	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	21	P	CChwd	6	6	6	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Clearcut - Thin 1T/1T	Regen	M	21	P	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	21	M	CChwd	6	6	7	15
Clearcut - Thin 1T/1T	Regen	M	21	M	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	21	L	CChwd	11	11	11	16
Clearcut - Thin 1T/1T	Regen	M	21	L	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	22	P	CChwd	6	6	6	15
Clearcut - Thin 1T/1T	Regen	M	22	P	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	22	M	CChwd	8	8	8	15
Clearcut - Thin 1T/1T	Regen	M	22	M	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	22	L	CChwd	10	10	10	15
Clearcut - Thin 1T/1T	Regen	M	22	L	CChwd	6	6	6	8
Clearcut - Thin 1T/1T	Exist	M	52	E	CChwd	5	5	5	15
Clearcut - Thin 1T/1T	Regen	M	52	E	CChwd	5	5	5	7
Clearcut - Thin 1T/1T	Exist	M	52	P	CChwd	4	4	5	15
Clearcut - Thin 1T/1T	Regen	M	52	P	CChwd	5	5	5	7
Clearcut - Thin 1T/1T	Exist	M	52	M	CChwd	6	6	6	15
Clearcut - Thin 1T/1T	Regen	M	52	M	CChwd	5	5	5	7
Clearcut - Thin 1T/1T	Exist	M	25	E	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	M	25	E	CCpinT	3	3	5	7
Clearcut - Thin 1T/1T	Exist	M	25	P	CCpinT	3	3	5	15
Clearcut - Thin 1T/1T	Regen	M	25	P	CCpinT	3	3	5	7
Clearcut - Thin 1T/1T	Exist	M	25	M	CCpinT	6	6	6	15
Clearcut - Thin 1T/1T	Regen	M	25	M	CCpinT	3	3	5	7
Clearcut - Thin 1T/1T	Exist	M	25	L	CCpinT	10	10	10	15
Clearcut - Thin 1T/1T	Regen	M	25	L	CCpinT	3	3	5	7
Shelterwood - Thin 1T/1T	Exist	M	5	E	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	5	E	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	5	P	SW_HdM	7	7	7	15
Shelterwood - Thin 1T/1T	Regen	M	5	P	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	5	M	SW_HdM	6	6	7	15
Shelterwood - Thin 1T/1T	Regen	M	5	M	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	21	E	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	21	E	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	21	P	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	21	P	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	21	M	SW_HdM	6	6	7	15
Shelterwood - Thin 1T/1T	Regen	M	21	M	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	21	L	SW_HdM	11	11	11	16

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - Thin 1T/1T	Regen	M	21	L	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	22	P	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	22	P	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	22	M	SW_HdM	8	8	8	15
Shelterwood - Thin 1T/1T	Regen	M	22	M	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	22	L	SW_HdM	10	10	10	15
Shelterwood - Thin 1T/1T	Regen	M	22	L	SW_HdM	6	6	6	8
Shelterwood - Thin 1T/1T	Exist	M	52	E	SW_HdM	5	5	5	15
Shelterwood - Thin 1T/1T	Regen	M	52	E	SW_HdM	5	5	5	7
Shelterwood - Thin 1T/1T	Exist	M	52	P	SW_HdM	4	4	5	15
Shelterwood - Thin 1T/1T	Regen	M	52	P	SW_HdM	5	5	5	7
Shelterwood - Thin 1T/1T	Exist	M	52	M	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	52	M	SW_HdM	5	5	5	7
Shelterwood - Thin 1T/1T	Exist	M	25	E	SW_HdM	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	M	25	E	SW_HdM	3	3	5	7
Shelterwood - Thin 1T/1T	Exist	M	25	P	SW_HdM	3	3	5	15
Shelterwood - Thin 1T/1T	Regen	M	25	P	SW_HdM	3	3	5	7
Shelterwood - Thin 1T/1T	Exist	M	25	M	SW_HdM	6	6	6	15
Shelterwood - Thin 1T/1T	Regen	M	25	M	SW_HdM	3	3	5	7
Shelterwood - Thin 1T/1T	Exist	M	25	L	SW_HdM	10	10	10	15
Shelterwood - Thin 1T/1T	Regen	M	25	L	SW_HdM	3	3	5	7
Clearcut - Thin 0T/1T	Exist	M	5	L	CChwd	0	0	11	15
Clearcut - Thin 0T/1T	Regen	M	5	L	CChwd	6	6	6	8
Clearcut - Thin 0T/1T	Exist	M	5	O	CChwd	0	0	14	15
Clearcut - Thin 0T/1T	Regen	M	5	O	CChwd	6	6	6	8
Clearcut - Thin 0T/1T	Exist	M	21	O	CChwd	0	0	14	15
Clearcut - Thin 0T/1T	Regen	M	21	O	CChwd	6	6	6	8
Clearcut - Thin 0T/1T	Exist	M	22	O	CChwd	0	0	13	15
Clearcut - Thin 0T/1T	Regen	M	22	O	CChwd	6	6	6	8
Clearcut - Thin 0T/1T	Exist	M	52	L	CChwd	0	0	10	15
Clearcut - Thin 0T/1T	Regen	M	52	L	CChwd	5	5	5	7
Clearcut - Thin 0T/1T	Exist	M	52	O	CChwd	0	0	13	15
Clearcut - Thin 0T/1T	Regen	M	52	O	CChwd	5	5	5	7
Clearcut - Thin 0T/1T	Exist	M	25	O	CCpinT	0	0	14	15
Clearcut - Thin 0T/1T	Regen	M	25	O	CCpinT	3	3	5	7
Shelterwood - Thin 0T/1T	Exist	M	5	L	SW_HdM	0	0	11	15
Shelterwood - Thin 0T/1T	Regen	M	5	L	SW_HdM	6	6	6	8
Shelterwood - Thin 0T/1T	Exist	M	5	O	SW_HdM	0	0	14	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
Shelterwood - Thin 0T/1T	Regen	M	5	O	SW_HdM	6	6	6	8
Shelterwood - Thin 0T/1T	Exist	M	21	O	SW_HdM	0	0	14	15
Shelterwood - Thin 0T/1T	Regen	M	21	O	SW_HdM	6	6	6	8
Shelterwood - Thin 0T/1T	Exist	M	22	O	SW_HdM	0	0	13	15
Shelterwood - Thin 0T/1T	Regen	M	22	O	SW_HdM	6	6	6	8
Shelterwood - Thin 0T/1T	Exist	M	25	O	SW_HdM	0	0	14	15
Shelterwood - Thin 0T/1T	Regen	M	25	O	SW_HdM	3	3	5	7
Shelterwood - Thin 0T/1T	Exist	M	52	L	SW_HdM	0	0	10	15
Shelterwood - Thin 0T/1T	Regen	M	52	L	SW_HdM	5	5	5	7
Shelterwood - Thin 0T/1T	Exist	M	52	O	SW_HdM	0	0	13	15
Shelterwood - Thin 0T/1T	Regen	M	52	O	SW_HdM	5	5	5	7
Woodland – Thin 1T/1T	Exist	M	22	P	Wdln22	5	5	8	15
Woodland – Thin 1T/1T	Regen	M	22	P	Wdln22	5	5	8	12
Woodland – Thin 1T/1T	Exist	M	22	M	Wdln22	7	7	8	15
Woodland – Thin 1T/1T	Regen	M	22	M	Wdln22	5	5	8	12
Woodland – Thin 1T/1T	Exist	M	22	L	Wdln22	10	10	13	15
Woodland – Thin 1T/1T	Regen	M	22	L	Wdln22	5	5	8	12
Woodland – Thin 1T/1T	Exist	M	22	O	Wdln22	13	13	13	18
Woodland – Thin 1T/1T	Regen	M	22	O	Wdln22	5	5	8	12
Woodland – Thin 1T/1T	Exist	M	25	E-P	Wdln22	3	3	8	15
Woodland – Thin 1T/1T	Regen	M	25	E-P	Wdln22	3	3	8	12
Woodland – Thin 1T/1T	Exist	M	25	M	Wdln22	5	5	8	15
Woodland – Thin 1T/1T	Regen	M	25	M	Wdln22	3	3	8	12
Woodland – Thin 1T/1T	Exist	M	25	L	Wdln22	10	10	13	15
Woodland – Thin 1T/1T	Regen	M	25	L	Wdln22	3	3	8	12
Woodland – Thin 1T/1T	Exist	M	25	O	Wdln22	14	14	14	18
Woodland – Thin 1T/1T	Regen	M	25	O	Wdln22	3	3	8	12
2-Aged – No Thins	Exist	M	5	E	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	M	5	E	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	5	P	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	M	5	P	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	5	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	M	5	M	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	5	L	2Age_1	0	0	11	15
2-Aged – No Thins	Regen	M	5	L	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	5	O	2Age_1	0	0	14	15
2-Aged – No Thins	Regen	M	5	O	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	21	E	2Age_1	0	0	6	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
2-Aged – No Thins	Regen	M	21	E	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	21	P	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	M	21	P	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	21	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	M	21	M	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	21	L	2Age_1	0	0	11	16
2-Aged – No Thins	Regen	M	21	L	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	21	O	2Age_1	0	0	14	15
2-Aged – No Thins	Regen	M	21	O	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	22	P	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	M	22	P	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	22	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	M	22	M	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	22	L	2Age_1	0	0	10	15
2-Aged – No Thins	Regen	M	22	L	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	22	O	2Age_1	0	0	13	15
2-Aged – No Thins	Regen	M	22	O	2Age_1	0	0	6	8
2-Aged – No Thins	Exist	M	52	E	2Age_1	0	0	5	15
2-Aged – No Thins	Regen	M	52	E	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	52	P	2Age_1	0	0	5	15
2-Aged – No Thins	Regen	M	52	P	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	52	M	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	M	52	M	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	52	L	2Age_1	0	0	10	15
2-Aged – No Thins	Regen	M	52	L	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	52	O	2Age_1	0	0	13	15
2-Aged – No Thins	Regen	M	52	O	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	25	E	2Age_1	0	0	5	15
2-Aged – No Thins	Regen	M	25	E	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	25	P	2Age_1	0	0	5	15
2-Aged – No Thins	Regen	M	25	P	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	25	M	2Age_1	0	0	5	15
2-Aged – No Thins	Regen	M	25	M	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	25	L	2Age_1	0	0	10	15
2-Aged – No Thins	Regen	M	25	L	2Age_1	0	0	5	7
2-Aged – No Thins	Exist	M	25	O	2Age_1	0	0	14	15
2-Aged – No Thins	Regen	M	25	O	2Age_1	0	0	5	7
9G – Seed Tree 1T/1T	Exist	P	Pine	M2	9G2	5	5	5	15

MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
9G – Seed Tree 1T/1T	Regen	P	Pine	M2	9G2	6	6	6	9
9G – Seed Tree 1T/1T	Exist	P	Pine	L	9G2	8	8	8	15
9G – Seed Tree 1T/1T	Regen	P	Pine	L	9G2	6	6	6	9
9G – Seed Tree 1T/1T	Exist	P	25I	O	9G2	0	0	15	20
9G – Seed Tree 1T/1T	Regen	P	25I	O	9G2	6	6	6	9
Woodland – Thin 1T/1T	Exist	P	22	E-P	Wdln22	5	5	8	15
Woodland – Thin 1T/1T	Regen	P	22	E-P	Wdln22	5	5	8	10
Woodland – Thin 1T/1T	Exist	P	22	M	Wdln22	7	7	8	15
Woodland – Thin 1T/1T	Regen	P	22	M	Wdln22	5	5	8	10
Woodland – Thin 1T/1T	Exist	P	22	L	Wdln22	10	10	13	15
Woodland – Thin 1T/1T	Regen	P	22	L	Wdln22	5	5	8	10
Woodland – Thin 1T/1T	Exist	P	25H	E	Wdln25	3	3	8	15
Woodland – Thin 1T/1T	Regen	P	25H	E	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	25I	E	Wdln25	3	3	8	15
Woodland – Thin 1T/1T	Regen	P	25I	E	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	25L	E	Wdln25	3	3	8	15
Woodland – Thin 1T/1T	Regen	P	25L	E	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	Pine	P	Wdln25	3	3	8	15
Woodland – Thin 1T/1T	Regen	P	Pine	P	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	Pine	M	Wdln25	3	3	8	15
Woodland – Thin 1T/1T	Regen	P	Pine	M	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	Pine	M2	Wdln25	5	5	8	15
Woodland – Thin 1T/1T	Regen	P	Pine	M2	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	Pine	L	Wdln25	8	8	13	15
Woodland – Thin 1T/1T	Regen	P	Pine	L	Wdln25	3	3	8	10
Woodland – Thin 1T/1T	Exist	P	25I	O	Wdln25	15	15	15	20
Woodland – Thin 1T/1T	Regen	P	25I	O	Wdln25	3	3	8	10
2-Aged – No Thins	Exist	P	5	L	2Age_1	0	0	9	15
2-Aged – No Thins	Regen	P	5	L	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	5	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	P	5	M	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	5	P	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	P	5	P	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	13	E-M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	P	13	E-M	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	13	L	2Age_1	0	0	8	15
2-Aged – No Thins	Regen	P	13	L	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	13	O	2Age_1	0	0	11	15



MA-Name	Type	Dist	Comm	Age	MGT_RX	1 <sup>st</sup> Entry	Last Entry	1 <sup>st</sup> Harvest	Last Harvest
2-Aged – No Thins	Regen	P	13	O	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	21	E-P	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	P	21	E-P	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	21	L	2Age_1	0	0	9	15
2-Aged – No Thins	Regen	P	21	L	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	21	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	P	21	M	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	21	O	2Age_1	0	0	14	15
2-Aged – No Thins	Regen	P	21	O	2Age_1	0	0	7	12
2-Aged – No Thins	Exist	P	22	E-P	2Age_2	0	0	7	15
2-Aged – No Thins	Regen	P	22	E-P	2Age_2	0	0	7	12
2-Aged – No Thins	Exist	P	22	L	2Age_2	0	0	10	15
2-Aged – No Thins	Regen	P	22	L	2Age_2	0	0	7	12
2-Aged – No Thins	Exist	P	22	M	2Age_2	0	0	7	15
2-Aged – No Thins	Regen	P	22	M	2Age_2	0	0	7	12
2-Aged – No Thins	Exist	P	52	E-P	2Age_1	0	0	6	15
2-Aged – No Thins	Regen	P	52	E-P	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	52	L	2Age_1	0	0	9	15
2-Aged – No Thins	Regen	P	52	L	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	52	M	2Age_1	0	0	7	15
2-Aged – No Thins	Regen	P	52	M	2Age_1	0	0	6	12
2-Aged – No Thins	Exist	P	25I	O	2Age_P	0	0	15	16
2-Aged – No Thins	Regen	P	25I	O	2Age_P	0	0	5	12
2-Aged – No Thins	Exist	P	Pine	E-M2	2Age_P	0	0	5	15
2-Aged – No Thins	Regen	P	Pine	E-M2	2Age_P	0	0	5	12
2-Aged – No Thins	Exist	P	Pine	L	2Age_P	0	0	8	15
2-Aged – No Thins	Regen	P	Pine	L	2Age_P	0	0	5	12

Table B-20. Shelterwood timing and proportions

Mgt Action	Type	1 <sup>st</sup> Treat	Proportion	Periods to next	Treat	Proportion
Shelterwood	Exist	SeedE2	0.65	1	OverE2	0.35
Shelterwood	Regen	SeedR2	0.65	1	OverR2	0.35
2-Aged	Exist	SeedE2	0.6	6	OverE2	0.6
2-Aged	Regen	SeedR2	0.6	6	OverR2	0.6

## **Yield Composites**

Each management action contains a set of activities that are applied to the land to produce a set of outputs and conditions. The set of activities, outputs, and conditions associated with a management action is called a yield composite.

Management actions generally include several activities and produce more than one output and/or condition. In addition, many of the activity or output quantities are dependent on each other. For example, a timber management action may include sale preparation and harvest administration costs and produce cubic foot volume and acres of early successional conditions. The amount of sale preparation and harvest administration may be directly related to the number of acres harvested, and the logging cost may be directly related to the amount of timber volume removed. Also, the amount of timber volume removed and early successional conditions produced may be related to the acres harvested. All of these activities, outputs, and relationships can be grouped together in a "yield composite" that is associated with a management action. Using yield composites eliminates the need to repetitively list all the activities and outputs involved in each management action. Furthermore, yield composites reduce the amount of information required in the yield tables, since yields can be defined as relationships between activities, outputs, and conditions.

Yield composites vary from simple to complex. A simple yield composite may contain a list of activities and outputs that obtain their coefficients from a yield table. Simple yield composites are often associated with management actions that do not have schedules. Examples are sale preparation, harvest administration, and acres regenerated where there is a 1:1 relationship between the cost or output and the acres treated or volume produced.

Complex yield composite contain a list of activities and outputs whose yields come from a yield table. Complex yield composites also contain activities and/or outputs whose yields depend on other activities or outputs in the composite. Examples of complex yield composites for this model include successional classes, tracking of thinning acres, tracking of woodland treatments, and uneven0aged management acres.

Two yield composites were build for this model – Unsuit and ActMgt. The Unsuit yield composite contains acreage allocations, successional stages, and total volume. The ActMgt yield composite contains the same components as Unsuit and along with activities and outputs related to land management activities and allocations.

The solution will contain the timing option that best satisfies the objective function and constraint set associated with the model. Constraints may be placed on which management actions are available to an analysis unit. The constraint may specify the minimum, maximum, or a specific number of acres of an analysis unit that may be allocated to a set of management actions.

## **SPECTRUM Constraints**

Several constraints were developed for the SPECTRUM model in response to standards and guidelines and the management requirements in the NFMA regulations (36 CFR 219.27). Constraints were also developed in response to management goals and to improve the model's simulation of actual management of the Forest.

1. Constraints assigning congressionally and administratively designated areas to specific prescriptions,
2. Constraints ensuring that the management requirements are met in each alternative,
3. Timber scheduling constraints, and
4. Operational constraints that constrain timber harvest to a realistic solution.

The following SPECTRUM constraints were applied to all alternatives:

### *1. Long Term Sustained Yield (LTSY) and Nondeclining Yields*

The *long-term sustained yield* (LTSY) constraint is used to ensure that the harvest of timber in the last decade is not greater than the long-term timber production capacity of the Forest. Long-term sustained yield capacity is computed using the acreage scheduled to each regeneration prescription applied in the model.

### *2. Perpetual Timber Harvest Constraint*

This constraint is used to ensure that the remaining timber inventory will allow achievement of nondeclining harvest levels beyond the modeling horizon. To achieve this condition the constraint requires that the Forest contain as much timber inventory volume at the end of the last period as the Forest would have, on the average, under the management intensities selected in the analysis. Without this constraint the SPECTRUM model would have no reason to leave enough inventory at the end of 150 years to sustain timber harvest levels into perpetuity.

### *3. Nondeclining Yield*

This constraint is used to ensure that the harvest of timber in a decade is greater than or equal to the harvest of timber in the previous period. This constraint indirectly limits the model to a lower present net value and reduced flow of timber in the early decades but also provides community economic and social stability through the controlled flow of timber.

### *4. Constraints ensuring that management requirements are met in each alternative.*

This set of constraints is used to limit the model so that the management actions and intensities selected are consistent with the emphasis of an individual alternative. Some of these constraints are specifically defined in the constraint section of the model and others are implemented through the definitions of the management actions, the management action theming, and the definitions of the scheduling options. For example, if there are no schedules defined for a specific prescription, then analysis units that contain that prescription are constrained to only allow min level management. In addition, maximum and minimum levels of early successional conditions are constrained for the different prescriptions and alternatives, as are levels of thinning, amounts of woodland management, loblolly pine

conversion, and uneven-aged management. Table B-21 contains a description of the common constraints that are used for all alternative and alternative specific constraints. For all alternatives except Alternative F, the early succession constraint proportions for the different prescriptions are based on the desired conditions developed by the FWBRE Team. Additional details for these constraints is contained in the Process Record.

### ***Constraints and The Riparian Adjustment***

Some of the constraints used in the SPECTRUM model include the percent early successional objectives for the different management prescriptions that are suitable. These percentages are applied to all the acres within a given Management Prescription allocation. For example, areas with the 8.A.1 prescription have an objective of 4-10 percent in early successional habitats. 10,000 acres within the 8.A.1 management prescription allocation should have between 400 and 1,000 acres in early-succession. However, areas with riparian corridors have been deducted and assigned to Management Prescription 11. As a result, while there are 10,000 acres in the geographic allocation of 8.A.1, the SPECTRUM model only recognizes 8,000 acres being available for 8.A.1. If the desired condition is to have 400 to 1,000 acres of the “landscape” in the 8.A.1 allocation in early-successional SPECTRUM will underestimate this output. Using 4-10 percent, SPECTRUM would take 320 to 800 acres (when 400 to 1,000 acres is the desired result). On average, 19 percent of the forest is in the Riparian Prescription and the following formula was used generate a factor use to make the adjustments in the constraints to account for the riparian acreage deductions:

$$1/1 - (\% \text{ Riparian})$$

This gives a new factor to multiply by the original percentage targets. So, given 19 percent is in riparian, the correction factor becomes

$$1/1 - (0.19) = 1/0.81 = 1.23$$

1.23 times 4% and 10% equals 5% (4.9%) and 12% (12.3%), and the constraints entered into SPECTRUM for acres in 8.A.1 would be 5% and 12% instead of 4% and 10%. Table B-22 contains the riparian adjustments made to the early successional constraints for all alternatives except Alternative F.

Table B-23 contains the breakdown by alternative of the total acres used and the estimation of riparian acres that are contained in each prescription. Riparian area estimation is based on minimum riparian corridor widths (measured from stream channel) of 100 feet for areas with 10 percent slope or less, 125 feet for areas with 11 to 45 percent slope, and 150 feet for areas with greater than 45 percent slope for perennial streams, lakes, ponds, and wetlands for Alternatives A, B, D, E, and G. The riparian acreage for these alternatives also included riparian corridors for intermittent streams (50 feet from stream channel for slopes 0 to 15 percent and 30 feet plus 1.5 times the slope for areas with slope greater than 15 percent). Alternative F riparian acres were those areas that described in the 1985 Forest Plan. The Alternative I riparian acres are based on minimum riparian corridor widths (measured from stream channel) for perennial streams, lakes, ponds, and wetlands of 100 feet for areas with 30 percent slope or less, 125 feet for areas with 31 to 45 percent slope, and 150 feet for areas with greater than 45 percent slope. The riparian acreage also includes riparian corridors for

intermittent streams (50 feet from stream channel for areas with 30 percent slope or less, 75 feet for areas with 31 to 45 percent slope, and 100 feet for areas with greater than 45 percent slope).

*Table B-21. Constraints ranges by Alternative.*

<b>Constraint Description</b>	<b>Alt A</b>	<b>Alt B</b>	<b>Alt D</b>	<b>Alt E</b>	<b>Alt F</b>	<b>Alt G</b>	<b>Alt I</b>
Proportion of 10B areas in early successional condition	12-20%*		12-20%*		10-17%*	12-20%	12-20%
Proportion of total 4G1 area in Unsuitable Min Level Management	25%	25%	25%	25%	18%	25%	25%
Proportion of 4G1 areas in early successional condition	5-12%	5-12%	5-12%	5-12%	4-10%	5-12%	5-12%
Proportion of 6D areas in early successional condition		0-5%		0-5%		0-5%	
Proportion of 7C areas in early successional condition	5-12%			5-12%			
Proportion of 7E2 areas in early successional condition	5-12%*			5-12%*			5-12%*
Proportion of 8A1 areas in early successional condition				5-12%	5-12%		5-12%
Proportion of 8A2 areas in early successional condition		0-5%					
Proportion of 8B2 in Woodlands Management		45%				2%	18%
Proportion of 8B2 areas in early successional condition		12-20%		12-20%		12-20%	12-20%
Proportion of 8C areas in early successional condition		5-12%*					
Proportion of 8D areas in early successional condition					1-4%		
Proportion of 9A3 areas in early successional condition		5-12%		5-12%		5-12%	5-12%
Proportion of 9A4 areas in early successional condition						0-5%	

<b>Constraint Description</b>	<b>Alt A</b>	<b>Alt B</b>	<b>Alt D</b>	<b>Alt E</b>	<b>Alt F</b>	<b>Alt G</b>	<b>Alt I</b>
Proportion of 9E areas in early successional condition		5-12%					
Proportion of 9G2 areas in early successional condition		5-12%				5-12%	5-12%
Proportion of 9G2 areas with Pine treated with 9G2 prescription		> 90%		> 50%		>99%	>90%
Proportion of 9H areas in early successional condition		5-12% *					
Proportion range of total M53 community converted in decades 1, 2, and 3	>45% 20-25% 5-25%	>30% 20-40% 20-30%	>45% 20-25% 20-25%	>25% 20-35% 20-35%	>50% 20-25% 20-25%	>20% 1-25% 1-25%	>45% 20-25% 20-25%
All thinning Allocation (Acres per decade)	20,000 – 50,000	50,000 – 70,000	20,000 – 50,000	15,000 – 50,000	>30,000	20,000 – 50,000	20,000 – 50,000
Uneven-aged Management Allocation (Acres per decade)	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Woodlands Management Allocation in Mountains (Acres per decade)	8,000 – 10,000	8,000 – 10,000	4,000 – 5,000	8,000 – 10,000	2,000 – 3,000	0 -10,000	8,000 – 10,000
Woodlands Management Allocation in Piedmont (Acres per decade)	17,000 – 22,000	17,000 – 22,000	8,500 – 11,000	17,000 – 22,000	4,000 – 6,000	17,000 – 22,000	17,000 – 22,000
Acres of Suitable Prescriptions on Steep slopes across all communities (Lower limit for Min Level Management)							3,384
Acres of Suitable Prescriptions located within 0.25 miles of eligible WSR across all communities (Lower limit for Min Level Management)							7,679

\* Indicates proportions specific to Mountain and Piedmont community groups. Other proportions and ranges are forest wide.

All Constraints are for Periods 1 through 5 unless stated otherwise. Allocation constraints are not period specific

Table B-22. Riparian Adjustments to ESS proportions for all alternatives except F.

Early Successional Constraint	Factor	Riparian Adjustment For All Alts Except F
0% - 4%	1.23	0% - 5%
4% -10%	1.23	5% -12%
10% -17%	1.23	12% -20%

Table B-23. Total acres and riparian acres within each prescription by alternative.

	Alternative A		Alternative B		Alternative D		Alternative E		Alt F	Alternative G		Alternative I	
Rx	Total	RC	Total	RC	Total	RC	Total	RC	Total	Total	RC	Total	RC
1A	2,855	379	2,855	379	2,855	379	2,855	379	2,855	2,855	379	2,855	360
1B	7,638	1,031	7,068	947	2,106	231	5,083	675	2,281	6,293	835	1,982	220
2A1	3,290	481	2,511	367	3,290	481	3,290	481	3,275	3,290	481	3,290	530
2A2	224	35	202	35	202	35	72	14	161	202	35	224	40
2A3	1,030	182	1,030	182	1,030	182	1,157	199	1,030	1,030	182	1,030	182
2B1	1,372	320	2,500	620	1,372	320	2,536	620		1,206	320		
2B2	4,366	1,056	8,790	2,024	6,025	1,422	5,957	1,422					
2B3	204	36	2,071	499	2,032	490	204	36					
4D	3,931	1,536	3,171	796	2,917	815	4,410	1,421	1,557	4,953	1,653	4,399	1,649
4F	1,284	726	2,328	869	4,978	1,345	2,341	869	8,642	5,711	1,806	10,020	2,636
4G1	4,862	1,154	4,862	1,154	4,862	1,154	4,862	1,154	4,862	4,862	1,154	4,862	1,032
5C	2,912	471	2,919	477	2,906	484	2,888	464	2,971	2,888	464	2,948	451
6A										33,444	7,296		
6B			13,046	3,166			16,020	3,098		25,272	3,420		
6C	1,399	597	21,148	3,991	1,386	597	7,241	1,926		1,564	576	1,640	648
6D			5,844	795			14,479	7,372		34,958	5,529		



	Alternative A		Alternative B		Alternative D		Alternative E		Alt F	Alternative G		Alternative I	
Rx	Total	RC	Total	RC	Total	RC	Total	RC	Total	Total	RC	Total	RC
6E										45,361	10,822		
7A												3,044	290
7C	3,485	678					3,485	678					
7D	558	175	584	175	584	175	569	163	727	555	175	605	182
7E1									1,180			12,575	5,974
7E2	71,003	12,528					74,854	13,181				61,938	10,257
8A1							28,252	4,858	25,973			41,544	6,090
8A2			6,963	1,619									
8B2			44,581	9,064			143,416	24,133		769	127	8,320	1,235
8C			7,792	615									
8D									716				
9A3			46,900	9,649						39,002	7,170	11,360	1,651
9A4										39,248	4,602		
9E			16,317	2,813									
9F	547	140	311	92	737	260	521	138		513	137	916	294
9G2			119,474	21,302						55,467	10,171	43,080	6,569
9H			37,821	5,760									
10B	238,048	44,334			322,595	58,859			304,435	51,648	10,058	139,528	21,717
11									424				
12A	12,079	1,530					35,387	3,950				4929	516
12B					1,210	160	1,210	160					
Water	1,761		1,761		1,761		1,761		1,761	1,761		1,761	
Total	362,850	67,390	362,850	67,390	362,850	67,390	362,850	67,390	362,850	362,850	67,390	362,850	62,838
RC – Riparian Corridor in Prescription 11 embedded in total acres for each prescriptions													

### *Constraints Changes for Alternative I in the FEIS*

Additional constraints were added to the Alternative I model in the FEIS to account for areas within suitable management prescriptions that may not be operable due to slope. GIS soil and slope layers were used to estimate the amount of areas with steep slope within suitable prescriptions for each community type and constraints reflecting these areas were added to the Alternative I model.

A second set of constraints were added to reflect the areas of suitable prescriptions within 0.25 miles of rivers that are eligible for Wild and Scenic River status. These constraints were used to model the impacts of possible future designations for these areas.

Both of these sets of constraints set minimum acreages of Min Level Management for the community types represented within these areas in suitable prescriptions. Individual constraints that caused the model to become infeasible at these minimum levels were adjusted.

Constraints for Woodlands management were adjusted in the FEIS model to force woodlands management treatments to occur during the first period

## **Estimated Effects Of Alternatives (Step 6)**

### **Goals and Objectives**

The 1982 National Forest Management Act (NFMA) implementing regulations (36 *CFR* 219.1) state that forest plans must "...provide for multiple-use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner." Net public benefits is defined as the overall value to the Nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not.

Present net value (PNV) is one of the criteria used to determine net public benefits (NPB) in benchmarks and alternatives. It is the difference between the discounted value of all outputs which were assigned a price in the revision and all Forest Service management and investment costs over the analysis period. The PNV converts all costs and benefits over the 200-year planning period to a common point in time.

Other benefits of public land management cannot be measured using dollar values. These non-priced benefits are another criteria used to determine NPB.

Each alternative was determined and analyzed to achieve its goals and objectives in a manner that produced the greatest PNV while meeting all specified costs and objectives for non-priced benefits. Thus, the PNV of each alternative estimated the highest value of priced benefits while accounting for the costs of producing priced benefits, non-priced

benefits, and meeting management requirements. The PNV of each alternative can then be compared.

Two parameters used in PNV analysis:

*Base year dollars* — All monetary values entered into SPECTRUM were in 1996 dollars.

*Discount rate* — A four percent discount rate was used. It approximates the return on long-range investments above the rate of inflation. All costs and benefits were discounted from the midpoint of each decade.

For the analysis of the individual alternatives, the Maximize PNV was used as a model objective. Using Max PNV as objective, SPECTRUM searches for the most “economical” mix of harvesting activities within the constraints, goals and objectives as defined by the Management Prescriptions.

## **Benchmark Analysis**

Benchmark analysis is specified in the NFMA regulations in 36 CFR 219.12(e) as part of the AMS. Selection of those benchmarks to develop is dependent upon the revision topics. Benchmarks assist in defining the range within which alternatives can be constructed. The four benchmarks are analyzed:

- Maximizing the present net value of the timber program.
- Maximizing timber production in the first decade.
- Minimizing costs of the timber program.
- Current Level of Management

The NFMA regulations in 36 CFR 217.27 list management requirements that must be considered in benchmarks. The following basic management requirements were included in the benchmark SPECTRUM models:

- Timber harvest regulations.
- Nondeclining flow and long-term sustained yield.
- The ASQ only generated from tentatively suitable timber lands.
- Water quality and watershed protection.
- Riparian protection - acres in the Riparian Corridor Management Prescriptions are not identified in the benchmark analyses.
- Base level of visual resource protection.

## **Maximum PNV Benchmark**

The maximum present net value benchmark for timber has a PNV (over the plan horizon of 200 years) of \$313,444,704. The LTSY is 19,387 MCF per year. ASQ reaches LTSY in Decade 1 and remains at that level for the entire planning horizon (Table B-24). Treatments in this benchmark during decades 1 through 5 include seed-tree/clearcut and thinning in established and regenerated stands (Table B-25). Table B-26 contains forest-wide successional changes for decades 1 to 5.

*Table B-24. LTSY and ASQ for Decades 1 and 5 under the Maximum PNV Benchmark.*

LTSY	19,387 MCF/Year
ASQ Decade 1	193,874 MCF/Decade
ASQ Decade 5	193,874 MCF/Decade

*Table B-25. Treatments Acres for Decades 1 to 5 under the Maximum PNV Benchmark.*

NAME	1	2	3	4	5
CC-EX	45,002	69,049	71,752	50,922	44,280
CC-Rgn	0	0	0	0	0
SeedE2	0	0	0	0	0
OverE2	0	0	0	0	0
SeedR2	0	0	0	0	0
OverR2	0	0	0	0	0
Uneven-Aged	0	0	0	0	0
ThnEst	21,824	25,585	16,198	15,906	13,653
ThnReg	0	0	0	7,677	34,139
Total Acres	66,825	94,634	87,951	74,505	92,071

*Table B-26. Acres of Successional stages for decades 1 to 5 under the Maximum PNV Benchmark.*

PERIOD	ESS	SSS	MSS	LSS	OSS
1	45,002	69,101	113,318	128,996	2,266
2	69,049	66,002	142,155	48,709	32,769
3	71,752	114,454	105,360	58,947	8,169
4	50,922	141,158	124,526	33,754	8,324
5	44,280	133,244	160,690	12,466	8,003

### **Maximum Timber Benchmark**

The maximum timber benchmark for timber has a PNV (over the plan horizon of 200 years) of \$310,300,448. The LTSY is 20,654 MCF per year. ASQ reaches LTSY in Decade 9 and remains at that level for the remainder of the planning horizon (Table B-27). Treatments in this benchmark during decades 1 though 5 include seed-tree/ clearcut, shelterwood, and thinning in established and regenerated stands (Table B-28). Table B-29 contains forest-wide successional changes for decades 1 to 5.

*Table B-27. LTSY and ASQ for Decades 1 and 5 under the Maximum Timber Benchmark.*

LTSY	20,654 MCF/year
ASQ Decade 1	205,199 MCF/decade
ASQ Decade 5	205,199 MCF/decade

*Table B-28. Treatments Acres for Decades 1 to 5 under the Maximum Timber Benchmark.*

NAME	1	2	3	4	5
CC-EX	52,190	76,745	77,402	69,417	33,850
CC-Rgn	0	0	0	0	0
SeedE2	0	6,852	0	0	127
OverE2	0	0	6,852	0	0
SeedR2	0	0	0	0	0
OverR2	0	0	0	0	0
Uneven-Aged	0	0	0	0	0
ThnEst	12,327	4,580	2,512	2,279	2,592
ThnReg	0	0	0	12,930	38,599
Total Acres	64,517	88,176	86,765	84,626	75,167

*Table B-29. Acres of Successional stages for decades 1 to 5 under the Maximum Timber Benchmark.*

PERIOD	ESS	SSS	MSS	LSS	OSS
1	52,190	69,101	92,996	142,130	2,266
2	83,597	73,190	121,833	47,294	32,769
3	77,402	136,191	90,904	49,209	4,977
4	69,417	161,355	121,579	1,355	4,977
5	33,977	158,803	159,571	469	5,863

### **Minimum Level Benchmark**

The Minimum Level Benchmark is “the minimum level of management which would be needed to maintain and protect the unit as part of the National Forest System together with associated costs and benefits” (36 CFR 219.12(e)(1)(i)). This is essentially the same management emphasis as Alternative C. The minimum level benchmark for timber shows no commercial timber production or an ASQ of zero. The PNV for timber is zero, since there would be no costs incurred (for timber) and no revenues generated. In this benchmark, no early (ESS) conditions are created and sapling (SSS) stages fall below 1

percent of the forest after period 2 (Table B-30). Young forest (MSS) conditions decline and mature (LSS) and old growth (OSS) increase as the forest ages. Ending inventory for increases during decades 1 through 5 and starts to drop off in decade 6 a mortality factors that are part of the yield tables increase. Changes in successional stages over time is also a factor of community type. SSS conditions persist longer in the 5, 21, and 52 communities for both the Piedmont and mountains (Table B-310)

Old growth conditions on the Sumter NF would increase and eventually dominate the landscape. Invasive plant infestation would stabilize but not increase. Although rare communities such as bogs, seeps, and ponds, and basic mesic forests would remain stable or increase, disturbance-dependent rare communities, such as glades, barrens, and associated woodlands, canebrakes, and table mountain pine forests and woodlands, would decline. Management for disturbance-dependent populations of threatened, endangered, or candidate species such as smooth coneflower and Georgia aster, would be at the minimum levels needed to recover the species or prevent federal listing. Habitat for the endangered Carolina heelsplitter, and other threatened and endangered plants would improve somewhat, compared to current management. Habitat for wood stork would likely remain stable. Although few species with viability concerns are associated with early successional forests, many are associated with woodland habitats. Habitat for these species would be restored and maintained at minimum levels needed to ensure that viable populations for these species are well distributed on the Forest.

Since no thinning or regeneration harvest is done under the minimum level benchmark, risk from southern pine beetle is far higher than under any of the alternatives. The entire forest would continue to become older and stand densities would increase until tree mortality limited them. The risk associated with littleleaf disease would also be higher than for any of alternatives analyzed in detail, because the benchmark would not regenerate any piedmont pine stands. Risk of oak decline and the risk of mortality from gypsy moth are also higher under the minimum level benchmark than for any of the alternatives. Again, this is because no thinning or regeneration harvest is done in oak stands. Shortleaf pine, pitch pine, table mountain pine, loblolly pine, Virginia pine, oak and hickory would all become less abundant in the long term. Except for threatened or endangered species, fire adapted and especially fire dependent species would become less abundant.

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*Table B-30. Successional Stages for Periods 1 to 6 under Minimum Level of Management Benchmark.*

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PERIOD	ESS	SSS	MSS	OSS	LSS
1	0	69101	113318	2372	173892
2	0	21000	161419	35457	140807
3	0	404	113650	35457	209172
4	0	357	96605	121441	140280
5	0	0	69101	163798	125784

*Table B-31. Successional Stages by Community for Periods 1 to 5 under Minimum Level of Management Benchmark.*

AES_NAME	layer_1	layer_2	1	2	3	4	5
SSS	M	21	1227	1227	48	48	
SSS	M	22	240	240			
SSS	M	25	4450	1056			
SSS	M	5	5225	5225	123	123	
SSS	M	52	251	251	124	124	
SSS	M	53	579				
SSS	P	13	671	7			
SSS	P	21	858	858	39	39	
SSS	P	22	35	35	35		
SSS	P	25H	9202				
SSS	P	25I	35690	9250			
SSS	P	25L	10408	2586			
SSS	P	5	12	12	12		
SSS	P	52	253	253	23	23	
SSS Period Total			69101	21000	404	357	0
MSS	M	21	1946	1946	3125	1179	1227
MSS	M	22	565	565	240	240	240
MSS	M	25	2832	6226	7282	4450	4450
MSS	M	5	3417	3417	8519	5102	5225
MSS	M	52	3020	3020	3147	127	251
MSS	M	53	6752	7331	7331	1454	579
MSS	P	13	2330	2994	671	671	671
MSS	P	21	17064	17064	819	819	858
MSS	P	22	1532	1532		35	35
MSS	P	25H	6684	15886	10681	10681	9202
MSS	P	25I	36994	63434	51292	51292	35690
MSS	P	25L	27823	35645	20313	20313	10408
MSS	P	5	1013	1013		12	12
MSS	P	52	1346	1346	230	230	253
MSS Period Total			113318	161419	113650	96605	69101
LSS	M	21	12910	11600	11600	13546	1946
LSS	M	22	1016	487	1052	565	565
LSS	M	25	18398			2832	2832
LSS	M	5	10897			3417	3417
LSS	M	52	7302	6616	6616	9636	3020
LSS	M	53				5877	6752
LSS	P	13	25348	24141	26471	26471	2330
LSS	P	21	11884	11826	28890	28890	28890

AES_NAME	layer_1	layer_2	1	2	3	4	5
LSS	P	22	155	155	1687	1532	1532
LSS	P	25H	20456	20456	25661	5205	6684
LSS	P	25I	50378	50378	71770	21392	36994
LSS	P	25L	13710	13710	31628	17918	27823
LSS	P	5	798	798	1811	1013	1013
LSS	P	52	640	640	1986	1986	1986
LSS Period Total			173892	140807	209172	140280	125784
OSS	M	21		1310	1310	1310	12910
OSS	M	22		529	529	1016	1016
OSS	M	25	949	19347	19347	19347	19347
OSS	M	5	1317	12214	12214	12214	12214
OSS	M	52		686	686	686	7302
OSS	P	13		1207	1207	1207	25348
OSS	P	21		58	58	58	58
OSS	P	22				155	155
OSS	P	25H				20456	20456
OSS	P	25I	106	106	106	50484	50484
OSS	P	25L				13710	13710
OSS	P	5				798	798
OSS Period Total			2372	35457	35457	121441	163798

### Current Level Benchmark – Alternative F

This benchmark provides for management using the current plan, adjusted to incorporate changes necessary to meet current management direction. The benchmark estimates the capability of the planning areas to provide for a wide range of goods, services, and other uses from the present land allocation. This benchmark is the same as Alternative F. This benchmark meets all requirements specified in the regulations (36 CFR, Part 219).

The current level management value benchmark for timber has a PNV (over the plan horizon of 200 years) of \$293,820,352. The LTSY is 18,158 MCF per year. ASQ reaches LTSY in Decade 1 and remains at that level for the entire planning horizon (Table B-32). Treatments in this benchmark during decades 1 through 5 include seed-tree/clearcut, shelterwood, uneven-age, and thinning in established and regenerated stands (Table B-33). Table B-34 contains forest-wide successional changes for decades 1 to 5.



*Table B-32. LTSY and ASQ for Decades 1 and 5 under the Current Management Benchmark.*

LTSY	18,158 MCF/year
ASQ Decade 1	181,577 MCF/decade
ASQ Decade 5	181,577 MCF/decade

*Table B-33. Treatments Acres for Decades 1 to 5 under the Current Management Benchmark.*

NAME	1	2	3	4	5
CC-EX	38,071	54,673	54,551	49,315	42,369
CC-Rgn	0	0	0	0	0
SeedE2	6,985	1,054	72	72	65
OverE2	0	6,913	668	0	0
SeedR2	0	0	0	0	0
OverR2	0	0	0	0	0
Uneven-Aged	1,031	1,031	1,031	1,031	1,031
ThnEst	30,000	31,534	27,800	25,496	18,907
ThnReg	0	0	0	6,984	33,108
Total Acres	76,087	95,205	84,122	82,899	95,481

*Table B-34. Acres of Successional stages for decades 1 to 5 under the Current Management Benchmark.*

PERIOD	ESS	SSS	MSS	LSS	OSS	TOTAL
1	45,056	71,173	113,335	125,867	1,357	
2	55,726	66,802	155,638	50,367	28,254	
3	54,622	101,167	110,187	69,611	21,200	
4	49,387	116,639	121,067	45,870	23,824	
5	42,435	121,788	147,956	12,962	31,647	

## Timber Suitability

### “Stage 1” Timber Suitability Analysis

The “Stage 1 Suitability Analysis” is an analysis of lands not suitable for timber production. NFMA regulations (36 CFR 219.14) require that lands not suitable for timber production (Table B-35).

Tentatively suitable acreages vary by alternative due to differences in the areas in Prescription 1B - Recommended Wilderness that are presently Wild and Scenic Rivers (Prescriptions 2A1 and 2A2).

*Table B-35. Acres of Lands Not Suitable for Timber Production.*

<b>Stage 1 Suitability</b>	<b>All Alternatives</b>
<b><u>Total Sumter NF</u></b>	<b>362,850</b>
Wilderness	-2,855
Wild/Scenic River	-3,514
Water	-1,761
Non-forest	-5,441
<b><u>Tentatively Suitable</u></b>	<b>349,279</b>

All of the acres above are approximate. Management prescription 11 is estimated based on stream order, slope, and soil type. Actual area will be based on ground conditions.

### **“Stage 2” Timber Suitability Analysis**

The “Stage 2 Suitability Analysis” is an economic analysis of each Analysis Unit (AU) in SPECTRUM. It is defined in 36 CFR 219.14(b). It is meant to answer two questions 1) Which lands are “above cost”, and 2) Which management intensity is the most economical for each Analysis Unit.

In making this run, all of the “tentatively suited” lands have the range of harvesting options considered for the alternatives available to them. For this analysis, the Management Prescription level identifier for all tentatively suited lands was set to Mgt. Rx 10B, the prescription that provided the most silvicultural options for each AU. This version of the model was run unconstrained with a Max PNV objective function for 15 periods. Table B-36 contains the cumulative PNV for each Analysis Unit. Table B-37 contains a listing of the Management Emphasis and Intensity for each Analysis Unit with Harvest Acres and Harvest Timing.

*Table B-36. Cumulative Present Net Value for Analysis Units at Decade 20 for Stage 2 analysis.*

<b>AU</b>	<b>Description</b>	<b>Rx</b>	<b>Acres</b>	<b>M\$ PNV Decade 20 (Cum)</b>
1	M21E_10B	10B	48	14
2	M21L_10B	10B	11,390	25,783
3	M21L_1A	1A	36	17
4	M21L_2A1	2A1	174	80

<b>AU</b>	<b>Description</b>	<b>Rx</b>	<b>Acres</b>	<b>M\$ PNV Decade 20 (Cum)</b>
5	M21M_10B	10B	1,869	3,367
6	M21M_2A1	2A1	77	0
7	M21O_10B	10B	1,054	2,511
8	M21O_1A	1A	256	47
9	M21P_10B	10B	1,179	1,490
10	M22L_10B	10B	487	434
11	M22M_10B	10B	565	450
12	M22O_10B	10B	529	336
13	M22P_10B	10B	240	191
14	M25E_10B	10B	1,049	62
15	M25E_2A1	2A1	7	0
16	M25L_10B	10B	17,509	983
17	M25L_2A1	2A1	889	0
18	M25M_10B	10B	2,832	834
19	M25O_10B	10B	912	173
20	M25O_2A1	2A1	37	19
21	M25P_10B	10B	3,394	-1
22	M52E_10B	10B	124	84
23	M52L_10B	10B	5,940	8,779
24	M52L_1A	1A	30	0
25	M52L_2A1	2A1	616	0
26	M52L_2A2	2A2	30	0
27	M52M_10B	10B	2,959	4,514
28	M52M_2A1	2A1	61	0
29	M52O_10B	10B	686	1,036
30	M52P_10B	10B	127	214
31	M53M_10B	10B	875	394
32	M53M2_10B	10B	5,877	1,840
33	M53P_10B	10B	579	2
34	M5E_10B	10B	123	43
35	M5L_10B	10B	7,861	5,866
36	M5L_1A	1A	1,771	1,335
37	M5L_2A1	2A1	1,146	864
38	M5L_2A2	2A2	119	90
39	M5M_10B	10B	3,086	6,645
40	M5M_2A1	2A1	280	0
41	M5M_2A2	2A2	51	0
42	M5O_10B	10B	558	465
43	M5O_1A	1A	759	691

<b>AU</b>	<b>Description</b>	<b>Rx</b>	<b>Acres</b>	<b>M\$ PNV Decade 20 (Cum)</b>
44	M5P_10B	10B	5,102	9,990
45	P13E_10B	10B	7	2
46	P13L_10B	10B	24,141	39,279
47	P13M_10B	10B	2,330	4,851
48	P13O_10B	10B	1,207	845
49	P13P_10B	10B	664	756
50	P21E_10B	10B	39	-1
51	P21L_10B	10B	11,826	8,149
52	P21M_10B	10B	17,064	10,989
53	P21O_10B	10B	58	58
54	P21P_10B	10B	819	509
55	P22L_10B	10B	155	50
56	P22M_10B	10B	1,532	1,044
57	P22P_10B	10B	35	35
58	P25HE_10B	10B	2,714	32,114
59	P25HL_10B	10B	20,456	276,357
60	P25HM_10B	10B	1,479	18,991
61	P25HM2_10B	10B	5,205	56,549
62	P25HP_10B	10B	6,488	26,663
63	P25IE_10B	10B	9,250	4,289
64	P25IL_10B	10B	50,378	383,138
65	P25IM_10B	10B	15,602	123,922
66	P25IM2_10B	10B	21,392	209,659
67	P25IO_10B	10B	106	871
68	P25IP_10B	10B	26,440	175,805
69	P25LE_10B	10B	2,586	8,269
70	P25LL_10B	10B	13,710	120,170
71	P25LM_10B	10B	9,905	67,500
72	P25LM2_10B	10B	17,918	178,742
73	P25LP_10B	10B	7,822	24,935
74	P52E_10B	10B	23	19
75	P52L_10B	10B	640	3,052
76	P52M_10B	10B	1,346	5,317
77	P52P_10B	10B	230	672
78	P5L_10B	10B	798	1,266
79	P5M_10B	10B	1,013	945
80	P5P_10B	10B	12	4

*Table B-37. Management Emphasis and Intensity for each Analysis Unit with Harvest Acres and Harvest Timing.*

Unit Name	Mgt Emp	Mgt Int	Orig Acres	Harvest Acres	Exist Entry	Exist Harv	Regen Entry	Regen Harv
1 SW		0T/0T	48	48	0	15	0	6
2 CC		0T/0T	6914	6914	0	12	0	6
2 CC		0T/0T	4476	4476	0	13	0	6
3 MN		MinMgt	36	36	0	30	0	30
4 MN		MinMgt	174	174	0	30	0	30
5 CC		0T/0T	1869	1869	0	8	0	6
6 MN		MinMgt	77	77	0	30	0	30
7 CC		0T/0T	1054	1054	0	15	0	6
8 MN		MinMgt	256	256	0	30	0	30
9 SW		1T/1T	1179	1179	6	15	6	7
10 CC		0T/0T	487	487	0	12	0	6
11 CC		0T/0T	565	565	0	9	0	6
12 CC		0T/0T	529	529	0	14	0	6
13 CC		0T/0T	240	240	0	7	0	8
14 SW		0T/0T	1049	1049	0	15	0	6
15 MN		MinMgt	7	7	0	30	0	30
16 CC		0T/0T	4120	4120	0	12	0	5
16 CC		0T/0T	11404	11404	0	12	0	6
16 SW		0T/0T	1985	1985	0	15	0	7
17 MN		MinMgt	889	889	0	30	0	30
18 SW		1T/1T	2832	2832	6	15	3	5
19 CC		0T/0T	912	912	0	15	0	6
20 MN		MinMgt	37	37	0	30	0	30
21 SW		0T/0T	3394	3394	0	15	0	6
22 SW		1T/1T	124	124	5	15	5	6
23 CC		0T/1T	5940	5940	0	12	5	6
24 MN		MinMgt	30	30	0	30	0	30
25 MN		MinMgt	616	616	0	30	0	30
26 MN		MinMgt	30	30	0	30	0	30
27 CC		1T/1T	2959	2959	6	8	5	6
28 MN		MinMgt	61	61	0	30	0	30
29 CC		0T/1T	686	686	0	15	5	6
30 CC		1T/1T	127	127	4	8	5	6
31 CC		0T/0T	875	875	0	7	0	5
32 CC		0T/0T	5877	5877	0	7	0	5
33 CC		0T/0T	579	579	0	15	0	7
34 SW		1T/1T	123	123	6	15	6	7

Unit Name	Mgt Emp	Mgt Int	Orig Acres	Harvest Acres	Exist Entry	Exist Harv	Regen Entry	Regen Harv
35	CC	0T/0T	7861	7861	0	13	0	6
36	MN	MinMgt	1771	1771	0	30	0	30
37	MN	MinMgt	1146	1146	0	30	0	30
38	MN	MinMgt	119	119	0	30	0	30
39	CC	1T/1T	3086	3086	6	9	6	8
40	MN	MinMgt	280	280	0	30	0	30
41	MN	MinMgt	51	51	0	30	0	30
42	CC	0T/0T	558	558	0	15	0	6
43	MN	MinMgt	759	759	0	30	0	30
44	CC	0T/0T	928	928	0	7	0	8
44	CC	1T/1T	4174	4174	7	9	6	8
45	SW	1T/1T	7	7	6	15	6	7
46	CC	0T/0T	12469	12469	0	11	0	7
46	CC	0T/0T	5662	5662	0	11	0	8
46	CC	0T/0T	6011	6011	0	11	0	12
47	CC	1T/1T	2330	2330	5	8	6	7
48	CC	0T/0T	1207	1207	0	15	0	11
49	CC	0T/0T	664	664	0	7	0	12
50	SW	0T/0T	39	39	0	15	0	7
51	CC	1T/1T	1572	1572	9	13	7	10
51	CC	1T/1T	1089	1089	9	13	7	11
51	CC	1T/1T	9165	9165	9	14	7	12
52	CC	0T/0T	1868	1868	0	10	0	12
52	CC	0T/0T	15196	15196	0	11	0	11
53	CC	0T/0T	58	58	0	15	0	7
54	CC	0T/0T	819	819	0	8	0	12
55	CC	0T/0T	155	155	0	15	0	12
56	CC	0T/0T	1532	1532	0	11	0	11
57	CC	0T/0T	35	35	0	7	0	12
58	CC	0T/0T	501	501	0	6	0	5
58	CC	0T/0T	1588	1588	0	7	0	5
58	CC	1T/1T	625	625	3	15	3	4
59	CC	1T/1T	20456	20456	8	9	3	5
60	CC	0T/0T	1479	1479	0	5	0	5
61	CC	1T/1T	5205	5205	5	7	3	4
62	CC	1T/1T	6488	6488	2	15	3	4
63	CC	0T/0T	9250	9250	0	15	0	6
64	CC	0T/0T	19991	19991	0	8	0	9
64	CC	0T/0T	11194	11194	0	8	0	10
64	CC	1T/1T	19192	19192	8	9	2	5

Unit Name	Mgt Emp	Mgt Int	Orig Acres	Harvest Acres	Exist Entry	Exist Harv	Regen Entry	Regen Harv
65	CC	0T/0T	1983	1983	0	5	0	6
65	CC	0T/0T	5084	5084	0	6	0	5
65	CC	0T/0T	8535	8535	0	6	0	6
66	CC	1T/1T	21392	21392	5	7	2	5
67	CC	0T/0T	106	106	0	15	0	6
68	CC	0T/0T	9992	9992	0	6	0	8
68	CC	0T/0T	8290	8290	0	7	0	5
68	CC	0T/0T	2258	2258	0	7	0	6
68	CC	0T/0T	2634	2634	0	7	0	8
68	CC	0T/0T	3266	3266	0	7	0	12
69	CC	1T/1T	2586	2586	3	15	3	5
70	CC	0T/0T	6451	6451	0	8	0	8
70	CC	0T/0T	7259	7259	0	8	0	9
71	CC	0T/0T	9905	9905	0	7	0	8
72	CC	0T/0T	17918	17918	0	6	0	6
73	CC	1T/1T	7822	7822	3	15	3	5
74	CC	1T/1T	23	23	6	15	6	7
75	CC	1T/1T	640	640	9	10	6	7
76	CC	0T/0T	1346	1346	0	8	0	6
77	CC	0T/0T	230	230	0	7	0	8
78	CC	0T/0T	798	798	0	11	0	6
79	CC	0T/0T	1013	1013	0	11	0	11
80	SW	1T/1T	12	12	5	15	5	7

### "Stage 3" Lands Suitable for Timber Production

Stage 3 analysis (Table B-38) was accomplished during the formulation of alternatives. Three criteria were used during this stage to identify lands as not suited for timber production:

- Based upon a consideration of multiple use objectives for the alternative, the land is proposed for resource uses that preclude timber production, such as Wild and Scenic Rivers.
- Other management objectives for the alternative limit timber production activities to the point where management requirements set forth in *36 CFR 219.27* cannot be met.
- The lands are not cost efficient, over the planning horizon, in meeting Forest objectives, which include timber production.

Table B-38. Acres of Suitable Lands by Alternative..

<b>RX</b>	<b>Prescription Description</b>	Alt. A	Alt. B	Alt. D	Alt. E	Alt. F	Alt. G	Alt. I
	<b>Tentatively Suitable Acres</b>	349,279	349,279	349,279	349,279	349,279	349,279	349,279
<b>1B</b>	Recommended Wilderness	7,636	6,921	1,889	4,553	2,349	5,470	1,971
<b>2A3</b>	Recreational River	977	794.9893	794.9811	892	977	795.086	977
<b>2B1</b>	Eligible Wild River	1,371	1,879	1,051	1,915	0	886	0
<b>2B2</b>	Eligible Scenic River	4,343	6,703	4,580	4,474	0	0	0
<b>2B3</b>	Eligible Recreational River	203.9543	1,572	1,541	168.1672	0	0	0
<b>4D</b>	Botanical Areas	3,884	2,355	2,044	2,959	1,557	3,235	4,379
<b>4F</b>	Scenic Areas	1,243	1,418	3,590	1,431	8,601	3,834	9,979
<b>4G1</b>	Calhoun Experimental Forest (Natural Area)	908	908	908	908	908	908	908
<b>6A</b>	Natural Process Emphasis	0	0	0	0	0	25,630	0
<b>6B</b>	Restore/Maintain Old Growth	0	9,868	0	12,862	0	21,707	0
<b>6C</b>	Old Growth Areas	1,384	17,019	774	5,251	0	969	1,620
<b>6D</b>	Core Areas of Old Growth	0	4,907	0	7,105	0	29,274	0
<b>6E</b>	Old Growth Areas w/ Uneven-Aged Mngmt	0	0	0	0	0	34,470	0
<b>7A</b>	Scenic Byway	0	0	0	0	0	0	2754.38
<b>7D</b>	Concentrated Recreation Area	235	235	235	235	235	235	235
<b>7E1</b>	Dispersed Recreation Areas	0	0	0	0	1,180	0	6,545
<b>9A4</b>	Aquatic Habitat Watersheds	0	0	0	0	0	34,439	0
<b>9F</b>	Rare Communities	406.7272	219.2718	476.7578	382.956	0	375.461	621.761
<b>11</b>	Riparian Corridors	60,699	66,142	66,035	66,062	359	66,042	55,563
<b>12A</b>	Remote Backcountry	10,429	0	0	31,253	0	0	0
<b>12B</b>	Remote Backcountry - Non-Motorized	0	0	1,050	1,050	0	0	4,413
	<b>Total Suitable Acres</b>	<b>255,558</b>	<b>228,336</b>	<b>264,310</b>	<b>207,778</b>	<b>333,112</b>	<b>121,010</b>	<b>259,313</b>



## **ECONOMIC, AND LOCAL GOVERNMENT IMPACT ANALYSES**

The purpose of this portion of Appendix B is to provide interested readers with additional details regarding the social and economic analyses. This section does not provide sufficient information to replicate the analysis. For that level of detail, the companion specialist reports contained in the administrative record should be consulted.

### **The Models**

Economic effects to local counties were estimated using an economic input-output model developed with IMPLAN Professional 2.0 (IMPLAN). IMPLAN (Impact Analysis for Planning) is a software package for personal computers that uses the latest national input-output tables from the Bureau of Economic Analysis. The software was originally developed by the Forest Service and is now maintained by the Minnesota IMPLAN Group, Inc (MIG). Data used for the impact analysis was from secondary data for those counties considered to be in the forests impact areas. County data is used in the model to develop economic impact response coefficients for the analysis area (defined by the county data selected).

Input-output analysis gives estimates of employment and income for an increase in final demand on certain sectors of the economy. For Forest Service timber, for example, we have looked at the saw mill and pulpwood industries where our timber goes as the first processing step in manufacturing. Impacts include all those industries initially impacted as well as those industries linked with supplying inputs to production, as well as workers in those industries who spend wages in their households (known as direct, indirect and induced effects, respectively). Thus, the impact assumes a new demand is made on the economy and estimates what that new increase in final demand will mean in employment and income to that economy. Input-output modeling (an efficiency analysis which tells how income and jobs are distributed throughout and economy for a given economic impact) has nothing to do with benefit-cost (an efficiency analysis which estimates how efficient monies are spent on investment activities).

The assumption used in this modeling process was that the impact area comprised the counties within the forests' designated county boundaries. The data source used in developing the Southern Appalachian Forest models for impact purposes was the most recent data available from MIG (1998).

### **Dependency Analysis**

The IMPLAN model was used to assess the economic dependencies of the Southern Appalachian national forests' planning area. Economic dependency is a way of assessing the strength of regional or local economies. Regional economies generally depend on their exports to sustain most local income and employment. Based on this data, it is reasonable to estimate economic dependency by examining an area's export base. The

export base analysis done for this EIS measured the total contribution of one sector, or industry to the economy. Industries can import and export similar commodities. Those industries having more exports than imports are considered “basic”, and thereby allow “new” money to enter the economy. Basic industries allow an economy to grow.

## **Diversity Analysis**

Using IMPLAN employment and income reports, forest planners illustrated the relative importance of major sectors and industries, such as wood products, and tourism. Employment, industrial output, and total income to workers and proprietors were contrasted to the total for the entire forest economy to gauge the percentage relationship between the two. Using IMPLAN models from two years (1985 and 1996) a change in economic characteristics in illustrated. The Shannon-Weaver Entropy Indexes were also used to show relative diversity of counties, states.

## **Forest Contribution And Economic Impact Analyses**

An impact analysis describes what happens when a change in final sales (e.g. exports and residents) occurs for goods and services in the model region. Changes in final sales are the result of multiplying production data (e.g., head months of grazing or recreation visitor trips) times sales. Economic impacts were estimated for 2010, using the expenditure data for recreation, wildlife and hunting (U.S. Forest Service’s National Visitor Use and Monitoring data,(NVUM), and the Fish & Wildlife Service’s wildlife use data, respectively); stumpage estimates for timber, market prices for minerals, and estimated animal allotment prices for Range. NVUM data were used by Daniel J. Stynes and Eric White, Michigan State University, July 2002 to estimate spending profiles of recreation users. The USDA Forest Service Inventory and Monitoring Institute, Ft. Collins, CO estimated spending profiles from the 1996 U.S. Fish & Wildlife Services wildlife data.

Impacts to local economies are measured in two ways: employment and total income. Employment is expressed in jobs. A job can be seasonal or year-round, full-time or part-time.

The income measure used was total income expressed in 2000 dollars. Total income includes both employee compensation (pay plus benefits) and proprietors income (e.g. self-employed).

## **Data Sources**

The planning area IMPLAN models were used to determine total consequences of dollar, employment, and income changes in selected sectors. Because input-output models are

linear, multipliers or response coefficients need only be calculated once per model and then applied to the direct change in final demand. A Forest Service-developed spreadsheet known as “FEAST” (Forest Economic Analysis Spreadsheet Tool) was used to apply the IMPLAN impact results to each alternative, expressed in units of output. FEAST transformed the dollar impact for a given industry from IMPLAN to the resource output by alternative into a specific employment and dollar output. Specifications for developing IMPLAN response coefficients and levels of dollar activity are stated below.

## **Timber**

*Sales Data* – Sales data was determined by using timber values multiplied by estimated production levels for each alternative.

*Use of the Model* – Hardwood and softwood saw-timber were processed through the sawmill industry. Hardwood and softwood roundwood were assumed to be processed at the pulp mill. In the absence of a pulp mill in the local economy, roundwood was assumed to be exported out of the analysis area. Impacts represent the economic activity occurring in all backward linking sectors associated with the final demand output of the timber industries described above. For the Sumter NF, roundwood processing industries were very minimal. It was assumed roundwood was exported out of the impact area.

IMPLAN showed, that for every \$1 million of total timber production in the forest impact area, a given level of dollar value of logs going into the mill result in this impact. Some of this output may be exported and generate new money for the local economy.

## **Range**

*Sales Data* – The best available data for agriculture is found in the *1997 Census of Agriculture*. From this census, data for farm livestock inventory, tables 14, was used. . . . Animal months of grazing on forest land were provided from the USDA Forest Service “Annual Grazing Report”. This unit of use information was placed in FEAST to link with IMPLAN impact data in dollars to yield an impact for the range resource per unit of grazing (AUM).

## **Other Recreation & Wildlife/Fish**

*Expenditure Data* – Recreation and Wildlife and Hunting trips were derived from the National Visitor Use and Monitoring survey, 2001 (NVUM) that is done for one-quarter of national forests each year. For those forests which have not been surveyed, data from a surveyed Appalachian forest served as proxy data, and adjustments were made by forest personnel based on pre-NVUM work for that forest. The resulting calculations yielded trips for resident and non-resident Day, On National Forest Overnight use, and Off National Forest Overnight Use. These use metrics were entered into FEAST to link with

IMPLAN impact response coefficients to yield an impact for recreation and wildlife resources.

While some analysts may not include resident participation in local economy impacts because there may be substitution opportunities for local residents to spend their discretionary dollar, we decided to include resident expenditures in the local economy with the caveat that these expenditures were “associated” with the impacts not “responsible” for causing the impacts.

## **Federal Expenditures And Employment**

*Expenditure Data* – A Forest budget was estimated for each alternative, and these estimates were used for forest expenditures, some of which had local economic effects. Total forest obligations by budget object code for FY 2000 were obtained from the National Finance Center and used to identify total forest expenditures. The proportion of funds spent by program varied by alternative according to the theme for that alternative. Forest Service employment was estimated by the forest staff based on examination of historical Forest Service obligations.

*Use of the Model* – To obtain an estimate of total impacts from Forest Service spending, salary and non-salary portions of the impact were handled separately. Non-salary expenditures were determined by using the budget object code information noted above. This profile was run through the model for non-salary expenditures per one million dollars, and the results multiplied by total forest non-salary expenditures. FEAST was again used to make the calculations. Local sales to the federal government are treated in the same manner as exports.

Salary impacts result from forest employees spending a portion of their salaries locally. IMPLAN includes a profile of personal consumption expenditures for several income categories; the average compensation for an employee on the Southern Appalachian National Forests fell in the category of \$30,000-\$39,999.

## **Revenue Sharing – 25% Fund Payments**

*Expenditure Data* – Until September 30, 2001, Federal law required that 25% Fund Payments be used for only schools or roads or both. A split of 50 percent for schools and 50 percent for roads was used. One profile of expenditures was developed from within the county forest boundary model for 1) the highway construction sector and 2) local educational institutions. Because counties can choose to continue payments under this formula, traditional payments were analyzed (we assumed 50 percent of payments went to roads and 50 percent to education). Should counties choose fixed payments under the new law, the impacts would not vary by alternative. The impact of the fixed payment was not calculated.

*Use of the Model* – The national expenditure profile for state/local government education (schools) and local model estimates for road construction (roads) are provided within IMPLAN. \$1 million of each profile was used to obtain a response coefficient for these Forest Service payments to impact area counties. Sales to local government are treated in the same manner as exports.

## **Output Levels**

Output levels for each item listed above can be viewed in various Forest FEAST spreadsheets files contained in the process records. These amounts are also located in the corresponding resource sections of the FEIS.

## **FINANCIAL AND ECONOMIC EFFICIENCY ANALYSIS**

Financial efficiency is defined as how well the dollars invested in each alternative produce revenues to the agency. Economic efficiency is defined as how well the dollars invested in each alternative produce benefits to society. Present Net Value (PNV) is used as an indicator of financial and economic efficiency.

The Southern Appalachian forests used a Microsoft Office Excel electronic spreadsheet to calculate PNV for each alternative over a 50-year period. A 4 percent discount rate was used. Decadal and 50 year cumulative present values for program benefits and costs as well as present net values are the product of this spreadsheet. For each decade, an average annual resource value was estimated, multiplied by 10 years, and discounted from the mid-point of each decade.

The financial values for range came from RPA estimates and updated to 2000 dollars; for timber from average 2000 stumpage prices; for minerals from market prices for minerals from the Minerals Management Agency; and for recreation and wildlife from RPA updated to 2000 dollars. All values are in 2000 dollars.

For the recreation and wildlife values, a conversion factor of 1.629 was used to convert from RVDs to “Visits”. This factor was determined by taking the weighted average of hours for a site visit on the Jefferson and NF in NC (from which we had specific NVUM data). The weighted average turned out to be 19.5 hours per site visit. 19.5 was divided by 12 (number of hours in an RVD) to get the value of 1.629 visits = to 1 RVD. This factor was multiplied by the 1989 price of an RVD. For example, Hunting had a 1989 price of \$33.27/RVD. This was increased by a factor of 1.629 to equal \$54.18/Visit. This price was then inflated by the Gross National Price Deflator to 2000 (a factor of 1.2887) to yield \$71.22/Visit.

Table B-39, displays economic values that were used for each resource. Table B-40, displays economic costs that were used for each resource by alternative.

Table B-39. Economic Benefits and Financial Revenue Values

	Sumter NF
<b>Range (\$/AUM)</b>	
Cattle/Horses	NA
<b>Timber *(\$/MCF):</b>	
Saw-Soft	\$1529
Saw-Hard	\$444
Roundwood- Softwood	\$277
Roundwd- Hardwood	\$190
<b>Minerals:</b>	
Dimension Stone (\$/Metric Ton)	NA
Crushed Stone (\$/Metric Ton)	NA
Limestone (\$/Metric Ton)	NA
Clay (\$/Ton)	NA
Petroleum (\$/Barrel)	NA
Natural Gas (\$/cubic meter)	NA
<b>Recreation (\$/Visit):</b>	
Camping, Picnicking, Swim.	\$21.47
Mech. Travel, Viewing Scenery	\$16.57
Winter Sports	\$90.24
Resorts	\$37.27
Wilderness (backpacking)	\$45.67
Other Recreation	\$132.67
<b>Wildlife (\$/Visit):</b>	
Hunting	\$71.22
Fishing	\$141.43
Wildlife Watching	\$84.88

\* - Values for projected volumes from unsuited lands. Values for projected volumes from suited lands came from the SPECTRUM model.

NA: Not Applicable

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*Table B-40 Economic Costs Used For Each Resource By Alternative*

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Resource	Units	Alt. F	Alt. A	Alt. B	Alt. D	Alt. E	Alt. G	Alt. I
Recreation	M \$	\$919	\$1112	\$956	\$993	\$1112	\$919	\$993
Timber	M \$	2640	2191	1716	2244	1822	1162	2059
SWA	M \$	746	778	846	778	746	709	746
Range	M \$	0	0	0	0	0	0	0
Minerals	M \$	115	115	115	115	115	115	115
Wildlife & Fish	M \$	975	975	1170	975	1170	780	1072
Roads & Engineering	M \$	1440	1440	1224	1440	1224	1080	1440
Protection (Fire & For. Health)	M \$	2460	2460	2460	2460	2460	1968	2460
Lands	M \$	244	244	244	244	244	244	244
Plan, Inv. Monitor	M \$	838	838	838	838	838	838	838

The road construction and reconstruction mileages generated are expected to be within an acceptable planning range. The historical data may initially generate mileages on the low end of the scale due to more thinning sales in the near future. The Forest can expect some shifts in yearly mileages due to the actual acres accessed for harvesting.

## **Stakeholder And Demographics Analyses**

In recent years, the amount and level of conflict over natural resource issues has increased substantially. As a result, much attention has been devoted to increasing our understanding of the dynamics of these conflicts, what they mean for stakeholders and natural resource managers, and what can be done to help managers and stakeholders better understand each other and work together to find ways to resolve, conflicts before they occur.

We attempted to learn of the values, attitudes and beliefs of the neighbors to the Southern Appalachian forests through a random telephone survey. This survey was published under the title "Public Survey Report, Public Use and Preferred Objectives for Southern Appalachian National Forests", Cordell, K, et. al., June 2002. Copies are located at [www.srs.fs.fed.us/trends](http://www.srs.fs.fed.us/trends).

## **Transportation Analyses**

### **Road Construction and Reconstruction Mileage Calculations**

The SPECTRUM program used in the planning process to calculate activities generates a different output than in past programs. The road activities for timber are generated in acres of harvest rather than miles of road. The Forest did not have a co-efficient to convert this output into the miles of road construction and reconstruction. The Forest had to develop a co-efficient from recent timber sale data. This co-efficient was used to convert SPECTRUM harvest acres into the projected miles of road construction and reconstruction for projected timber sale activities.

The Forest Engineering section reviewed the open timber sales that were used by timber to evaluate road cost data for SPECTRUM. An analysis of this data was completed to develop a co-efficient to project road mileages from the generated harvest acres from SPECTRUM. The co-efficient developed required 1.0 mile of roadwork per 171 acres of harvest. This mileage was then converted to separate construction and reconstruction miles by use of historical data. The Forest data shows that 2.44% of timber related road miles are for new construction. Tables were developed from the SPECTRUM data on harvest acres (thinning and harvest) for all alternatives based on a 10-year planning period. These tables were used in evaluating the impacts from the timber road program on other resources.



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## APPENDIX C

### EVALUATION OF ROADLESS AREAS

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#### ELLICOTT ROCK I AND II ROADLESS AREAS

Ellicott Rock I Reference #	300 Acres
Ellicott Rock II Reference #	530 Acres

#### Overview

Due to the close proximity of these two areas and the fact that they both were recommended for wilderness designation in the 1985 Forest Plan, they will be discussed in one evaluation.

#### Location and Vicinity

The area is located on the Andrew Pickens Ranger District, Sumter National Forest, and Oconee County, South Carolina. They are located about 40 miles west of Greenville, South Carolina and 100 miles northeast of Atlanta, Georgia. The areas are each adjacent to Ellicott Rock Wilderness. Both areas are encompassed by the Ellicott Rock Extension, which is recommended for designation as wilderness in the 1985 Sumter Forest Plan. Access is via SC State Highway 107 in South Carolina and the paved road leading to the Walhalla State Fish Hatchery.

#### Current Use

The areas are used primarily for dispersed recreation activities. There is no specific recreation use information available for these two areas to know the exact amount of use, but hunting, camping, fishing, and backpacking all take place in or around the areas. There are some hiking trails that traverse both areas and get a moderate amount of use. These areas do not allow motorized uses.

#### Geography, Topography and Appearance of the Area

These roadless areas lie along the southeastern edge of the southern Appalachian Mountains in an area locally referred to as "the foothills." Most of the areas have a natural untrammeled appearance. Most visible evidence still remaining (old woods roads primarily) does not detract from the natural appearance of the areas.

The areas are composed of schists and gneisses rocks that have been strongly metamorphosed, folded and faulted. It is thought to be late Precambrian to early Paleozoic in age.

The larger area is characterized by a diversity of diversity of peaks, ridges, valleys, plateaus, rivers and steep gorges. Topography is mountainous, with elevations ranging from 2,000 to 3,000 feet above sea level. The mountain plateaus and valleys offer distant views to adjoining mountain ridges and peaks. These ancient mountains are rounded from hundreds of millions of years of exposure to sun, wind, rain, ice, snow and major climate changes. Exposed rock cliffs, rock outcrops, bluffs and talus slope are visible in some places, and stony rocky ground and thin soils are common at high elevations.

There is a wide variety of vegetation but hardwoods species predominate and produce spectacular color changes in the fall. Pines are common and predominate in some soils types. Understory species are highly diverse and the vegetative mix varies greatly with elevation, aspects and in riparian areas.

These areas are generally covered in a nearly continuous forest canopy. Plant species include white pine, hemlock, yellow-poplar, oak, shortleaf pine, pitch pine, rhododendron and mountain laurel. Most of the land has been through one or more harvest cycles (taking place until the 1940's) but past treatments are barely evident. The area is primarily mature hardwood and hardwood pine forest stands. The ecological classifications of the areas are the Central Appalachian Broadleaf-Coniferous Forest Meadow Province, Blue Ridge Mountain Section and the Southern Blue Ridge Mountains Subsection (221Dc).

### **Surroundings or Characteristics of the Area**

All of both areas are surrounded by National Forest property. There is evidence of old logging and mining operations throughout the larger area however, these areas have a semi-natural appearance. The proposed Ellicott Rock Extension borders the areas on the north. The Walhalla State Fish Hatchery lies in close proximity to the areas and receives medium to high use but the presence of these facilities does not detract from the wilderness experience.

### **Key Attractions**

The areas adjoin Ellicott Rock Wilderness and are in close proximity to the Chattooga Wild and Scenic River. Also, the Walhalla State Fish Hatchery is close to both roadless areas. Also, King Creek and the East Fork of the Chattooga are close to the areas and are high quality trout streams.

### **Wilderness Capability**

#### **Natural Integrity of the Area**

Most of these two roadless areas have a mountainous, natural landscape. However, the areas do reflect some of the management of the last half-century. The exclusion of fire in many of the

stands that make up this area has allowed an overabundance of undergrowth to develop. All vegetation is native and following natural ecological succession.

### **Natural Appearance of the Area**

Most of the areas have a natural untrammelled appearance. Most visible evidence still remaining (old woods roads primarily) does not detract from the natural appearance of the areas.

### **Opportunities For Experiences Often Unique To Wilderness**

Both areas are adjacent to the existing designated wilderness, Ellicott Rock, which increases the opportunity for solitude. Neither area is bounded by either paved or graveled roadways, which also increase the opportunities for solitude. The areas are well suited for primitive outdoor recreation such as hiking, camping, hunting, fishing and nature study. Due to the steep terrain and dense vegetation, there is some physical challenge to using the areas, when people are off trail. The areas do not offer a strong sense of isolation due to the proximity to the Fish Hatchery, Chattooga River and moderate trail use.

### **Special Features**

The areas are adjacent to the Ellicott Rock Wilderness and have a close proximity to the Chattooga River. The areas don't add any unusual opportunities for outdoor education or scientific study, which aren't already within existing wilderness.

### **Summary of Boundary Conditions, Needs, and Management Requirements**

Ellicott Wilderness borders both of the areas to the north. The remaining boundaries would have to be established on the ground. The areas area currently being managed as recommended wildernesses.

### **Size and Shape**

The sizes and shape of the areas are small at 300 and 530 acres but due to their adjacency to Ellicott Rock Wilderness provide for good manageability.

### **Availability For Wilderness**

#### **Recreation and Tourism**

There are no developed recreation sites within these roadless areas. Two trails cross the area, both with access to the Ellicott Rock Wilderness and the Chattooga Wild and Scenic River.

## **Wildlife Species, Populations, and Management Needs**

Most of the areas provide for late successional stages. There are typical Blue Ridge wildlife populations such as deer, turkey and the occasional bear.

## **Water Availability and Use**

The areas lie within the Chattooga River watershed. Major streams include East Fork, King's Creek and the Chattooga River. Ground disturbing activities are held to a minimum in wilderness.

## **Livestock**

There are no livestock operations or potential for such operations in either of the two areas.

## **Timber Management**

These areas (830 acres) are not classified as suitable for timber production. The areas have been recommended for wilderness in the 1985 Sumter Forest Plan. Timber harvest and the associated production of wood products from these areas are precluded by wilderness designation.

## **Minerals**

Mineral resources of the larger area include small, scattered deposits of gold, silver, lead, mica, feldspar, asbestos, granite marble and clay. Except for some past activity in the late 1900's, there has been relatively little mining in the area. The US Government holds surface and mineral rights for both areas.

## **Cultural/Heritage Resources**

Archeological site files revealed no known prehistoric or historic sites in the areas.

## **Authorized and Potential Land Uses**

No authorized uses exist for this area except for Outfitter/guide use on the Chattooga Wild and Scenic River.

There are no power withdrawals, proposed impoundments or irrigation reservoirs and distribution systems on federal land.

## **Management Considerations**

Fire has not historically been a problem within the area. Fire control techniques can be altered if the area is designated as wilderness.

No private lands would be affected if the area were designated as wilderness.

Wilderness designation will hamper the stocking of some trout in any streams within the wilderness boundary.

## **Wilderness Need**

The concept of wilderness is multifaceted as envisioned by the authors and framers of the 1964 Wilderness Act. As such there are a number of factors to consider in assessing the need for additional wilderness.

Accessibility of this area to other wildernesses as well as population centers is another element when considering need. These areas are about 100 miles northeast of Atlanta, GA and about 40 miles north of Greenville, SC. Within a 250 mile area around these roadless areas there is a population of approximately 23,000,000 people and there are 43 wildernesses (around 395,000 acres).

Outdoor recreation is one of the benefactors of wilderness and is one of the drivers of wilderness demand and wilderness management. According to trend data collected from 1965 to 1994, the trend in recreation visits to National Forest Wilderness has paralleled designations and increased over time (Cordell, 1999). In the Sumter National Forest Market Area, participation rates for visiting wilderness or other primitive, roadless are is about 31.8% of adults (over 12 years old), which equates to about 2.9 million people. Trends in wilderness indicate a continued increase in visitation to wilderness.

In addition to recreation in wilderness, there is a non-user component that values wilderness and is important to understand when analyzing roadless areas, allocations and the need for additional wilderness. Studies have shown that the non-visiting general public values the knowledge that natural environments exist and are protected. This motivation can be considered an existence benefit. The current generation also obtains the off-site benefit of knowing that protection today will provide Wilderness to future generations. Existence and bequest motivations are sometimes referred to as nonuse or passive use benefits. Several studies have shown the importance and value people place on these passive use benefits of wilderness (Cordell, 1999). These values are reflected in the National Survey on Recreation and the Environment (NSRE, 2001) finding that 69.8% of those surveyed agreed or strongly agreed to the question, "How do you feel about designating more federal lands in your state as wilderness?" Over 96 percent agreed or strongly agreed with the statement, "I enjoy knowing that future generations will be able to visit and experience wilderness areas."

Wilderness is valued for preserving representative natural ecosystems, diversity of landscapes and for research. Currently, at the forest scale, the Blue Ridge Section and their respective subsections occurring within the Sumter National Forest are represented by Ellicott Rock Wilderness. At the regional/national scale, all of the forest's designated wildernesses and inventoried roadless areas lie within the Province M221, Central Appalachian Broadleaf Forest-Coniferous Forest Meadow. Cordell (1999) calculated the ratio of wilderness to ecoregion area to determine representation of wilderness. Province M221 contains .6% of the National

Wilderness Preservation System (NWPS) area and 2.3% of the total land area in the Continental United States area, yielding a ratio of .26. A ratio of at least 1 would be adequate representation. This indicates that Province M221 is currently underrepresented in the NWPS and thus underprotected.

# **BEE COVE ROADLESS AREA**

## **Overview**

### **Roadless Area Name and Acres**

Bee Cove Roadless Area is 2,999 Acres.

### **Location and Vicinity**

The area is located on the Andrew Pickens Ranger District, Sumter National Forest, and Oconee County, South Carolina. It is located about 40 miles west of Greenville, South Carolina and 100 miles northwest of Atlanta, Georgia. It is accessible from SC Highways 107, 28 and 11. The area contains a graveled forest development road, FS road.

### **Geography, Topography and Appearance of the Area**

This roadless area lies along the southeastern edge of the southern Appalachian Mountains in an areas locally referred to the “the foothills.” Most of the area has a natural untrammelled appearance. Most visible evidence still remaining (old woods roads primarily) does not detract from the natural appearance of the areas.

The area is composed of schist and gneiss rocks that have been strongly metamorphosed, folded and faulted. It is thought to be late Precambrian to early Paleozoic in age (i.e. 550 million to 350 million years old).

The larger area’s topography is mountainous, with elevations ranging from 1,000 to 3,000 feet above sea level. Very steep terrain (in excess of 80%) is not uncommon. Much of the area has slope over 50%. The area contains a band of steep slopes paralleling SC State Highway 107 and is known as the Brevard Escarpment. This plateau is roughly 1000 feet in elevation above the main drainages in the Keowee drainage. Exposed rock cliffs, rock outcrops, bluffs and talus slope are visible in some places, and stony rocky ground and thin soils are common at high elevations.

There is a wide variety of vegetation but hardwoods species predominate and produce spectacular color changes in the fall. Pines are common and predominate in some soils types. Understory species are highly diverse and the vegetative mix varies greatly with elevation, aspects and in riparian areas. In a survey done by L. L. Gaddy, there were over 250 species of plants in the area. These include oaks and shortleaf pine on the ridges and drier slopes, with an understory of sourwood, mountain laurel and blueberries. On the mesic slopes and in ravines and coves there are oaks, hickories and white and pitch pine. Hemlock, yellow poplar, ass and basswood usually dominate coves. On wet rocks, seeps and around waterfalls there are anemone, horehound and saxifrage. On the dry rock outcrops there are clubmoss, lichens, mosses and saxifrages.

These areas are generally covered in a nearly continuous forest canopy. Most of the land has been through one or more harvest cycles (taking place until the 1940's) but past treatments are barely evident. The ecological classifications of the areas are the Central Appalachian Broadleaf-Coniferous Forest Meadow Province, Blue Ridge Mountain Section and the Southern Blue Ridge Mountains Subsection (221Dc).

### **Current Use**

The areas are used primarily for dispersed recreation activities. There is no specific recreation use information available for these two areas to know the exact amount of use but hunting, camping, fishing, and backpacking all take place in or around the areas.

### **Appearance of the Area**

The area is primarily mature hardwood and hardwood pine forest stands. Extensive logging occurred in the area from the 1930's to about 1945. The best timber was cut, leaving only culls, inaccessible trees or those of unmerchantable size. There is some visual evidence of this past logging (old skid trails and stumps), but most of these remnants are substantially unnoticeable. Chestnut blight ravaged the area in the 1930's and by 1938 nearly all the chestnut was dead.

### **Surroundings or Characteristics of the Area**

Most of the roadless area is surrounded by federal property except a portion of the boundary to the south, which is private property (Lake Cheohee). Most of the area has a semi-natural appearance. Because of the landform, many surrounding improvements are visible, especially in the winter while leaves are off. However, most improvements blend with the landscape and do not constitute eyesores.

### **Key Attractions**

There are several trout streams within the area. The streams are some of the coolest in the state. However, they have low natural reproduction rates due to poor habitat. There are several waterfalls, including Bee Cove Falls a set of triple waterfalls.

### **Wilderness Capability**

#### **Natural Integrity and Appearance of the Area**

Most of the area has a semi-natural appearance. Within the area most of the vegetation is native and following natural successional processes. Steep terrain and inaccessibility have limited intensive management in the majority of the area. The area is minimally affected by outside forces. However, there are some invasive plants in some areas. There is one maintained wildlife opening in the area. There are some introduced species in the wildlife opening. Feral hogs also were indirectly introduced to the area through past agricultural practices.



## **Opportunities For Experiences Often Unique To Wilderness**

Because of the sparsity of trails and steep terrain, the area receives light use. This does not mean there are no opportunities to experience solitude. However, there are traffic sounds to the west along SC State Highway 107, especially in leaf off winter months. The area is well-suited for primitive outdoor recreation in the form of hunting and fishing. There are some old woods roads which will help serve as hiking trails but the steep terrain limits much off trail exploring. This does offer a physical challenge for those who are seeking such experiences.

## **Special Features**

The area has an abundance of trout streams.

## **Size and shape of area**

The size is large enough to possess a core area of at least 2500 acres and the shape is almost circular.

## **Summary of Boundary Conditions, Needs, and Management Requirements**

Within the limitations of existing ownership and improvements (road and wildlife opening), the existing boundary surrounds an area, which could be logically administered for wilderness management. There are currently no boundary markers, except where the area bounds the private property.

## **Availability for Wilderness**

### **Recreation and Tourism**

No developed recreational sites exist in this area. There are some Forest Service recreation sites in the general vicinity of the roadless area. Dispersed recreation in the area includes hiking, backpacking, hunting and fishing and nature study.

### **Wildlife Species, Populations, and Management Needs**

Typical Blue Ridge wildlife populations include deer, turkey, and occasional bear. If the area were designated as wilderness, the wildlife openings would be discontinued.

### **Water Availability and Use**

This area lies in the Keowee watershed (a part of the Savannah River Basin). All streams flow in Lake Jocassee or Lake Keowee. Major drains flow the south and east. Humans minimally influence water quality. Ground disturbing activities are held to a minimum in wilderness.

## **Livestock Operations**

There are no livestock operations or potential for such operations in the areas.

## **Timber Management**

The majority of the area is within the White Rock Scenic Area and is not classified as suitable for timber production. The area was recommended for scenic area status in the 1985 Sumter Forest Plan. About 300 acres of the area fall outside of White Rock Scenic Area and is suitable for timber production. Timber harvest and the associated production of wood products from these areas are precluded by wilderness designation.

## **Minerals**

Potential for commercial mineral operations is low. There have been small operations in the past but not any in the past 50 years. There was gold mining in the past around the late 1800's.

## **Cultural/Heritage Resources**

No surveys but sites are expected.

## **Authorized and Potential Land Uses**

No authorized uses exist for this area.

## **Management Considerations**

Southern pine beetle outbreaks could occur on a more frequent basis as the pine stands continue to age and basal area increases.

Fire has not historically been a problem within the area. Fire occurrence has been relatively low. There are private properties along the south boundary of the area, which can cause impacts. Fire control techniques can be altered if the area is designated as wilderness.

No private lands would be affected if the area were designated as wilderness.

Wilderness designation will hamper the stocking of trout in any streams within the wilderness boundary.

## **Wilderness Need**

The concept of wilderness is multifaceted as envisioned by the authors and framers of the 1964 Wilderness Act. As such there are a number of factors to consider in assessing the need for additional wilderness.

Accessibility of this area to other wildernesses as well as population centers is another element when considering need. These areas are about 100 miles northeast of Atlanta, GA and about 40 miles north of Greenville, SC. Within a 250 mile area around this roadless area there is a population of approximately 23,000,000 people and there are 43 wildernesses (around 395,000 acres).

Outdoor recreation is one of the benefactors of wilderness and is one of the drivers of wilderness demand and wilderness management. According to trend data collected from 1965 to 1994, the trend in recreation visits to National Forest Wilderness has paralleled designations and increased over time (Cordell, 1999). In the Sumter National Forest Market Area, participation rates for visiting wilderness or other primitive, roadless are is about 31.8% of adults (over 12 years old), which equates to about 2.9 million people. Trends in wilderness indicate a continued increase in visitation to wilderness.

In addition to recreation in wilderness, there is a non-user component that values wilderness and is important to understand when analyzing roadless areas, allocations and the need for additional wilderness. Studies have shown that the non-visiting general public values the knowledge that natural environments exist and are protected. This motivation can be considered an existence benefit. The current generation also obtains the off-site benefit of knowing that protection today will provide Wilderness to future generations. Existence and bequest motivations are sometimes referred to as nonuse or passive use benefits. Several studies have shown the importance and value people place on these passive use benefits of wilderness (Cordell, 1999). These values are reflected in the National Survey on Recreation and the Environment (NSRE, 2001) finding that 69.8% of those surveyed agreed or strongly agreed to the question, "How do you feel about designating more federal lands in your state as wilderness?" Over 96 percent agreed or strongly agreed with the statement, "I enjoy knowing that future generations will be able to visit and experience wilderness areas."

Wilderness is valued for preserving representative natural ecosystems, diversity of landscapes and for research. Currently, at the forest scale, the Blue Ridge Section and their respective subsections occurring within the Sumter National Forest are represented by Ellicott Rock Wilderness. At the regional/national scale, all of the forest's designated wildernesses and inventoried roadless areas lie within the Province M221, Central Appalachian Broadleaf Forest-Coniferous Forest Meadow. Cordell (1999) calculated the ratio of wilderness to ecoregion area to determine representation of wilderness. Province M221 contains .6% of the National Wilderness Preservation System (NWPS) area and 2.3% of the total land area in the Continental United States area, yielding a ratio of .26. A ratio of at least 1 would be adequate representation. This indicates that Province M221 is currently underrepresented in the NWPS and thus underprotected.

## **BIG MOUNTAIN ROADLESS AREA**

Reference # 03001

5,090 Acres

Georgia = 2,757 Acres

South Carolina = 2,333 Acres

### **OVERVIEW**

#### **Location, Vicinity, and Access**

The area is located in northeast Georgia on the Tallulah Ranger District, Chattahoochee NF, Rabun County, Georgia, and in northwest South Carolina on the Andrew Pickens Ranger District, Sumter NF, and Oconee County, South Carolina. It is centrally located between Clayton, GA, Highlands, NC, and Walhalla, SC. The Chattooga Wild and Scenic River (CWSR) split the Georgia and South Carolina portions of this proposed roadless area. Access to the area is gained via State Highway 28 and Forest Development Road (FDR) 646, Burrell's Ford Road, in Georgia and State Highway 107 and FDR's 708, 709, and 713 in South Carolina. There are two roads shown as accessing this area, in Georgia FDR 646 and County Road 999 for a total of 1.51 miles. FDR 646 is the western and north boundaries of this proposed area. There is a 0.9 mile trail situated through the southwest and west section of the area that is an unofficial trail used by hikers, equestrian riders, and anglers.

#### **Geography, Topography, and Vegetation**

This proposed roadless area is located in the Southern Blue Ridge Mountains Subsection of the Blue Ridge Mountains Section of the ecological classification system. It is in the Chattooga River Gorge Land-type Association, R8#-M221Dc340. The landform is rugged mountains with the highest point at approximately 2,890 feet on Rand Mountain. There are steep to very steep upper slopes, numerous side ridges, and perennial streams with narrow V-shaped valley bottoms. Rand Mountain and Big Mountain are the two most notable peaks, with the CWSR and Reed Creek making up the two major water sources for the area. The Rock Gorge and Big Bend Falls are two of the other notable topographic features existing in the area.

Soils are generally classified in the Tusquitee-Edneyville-Porters soil group. This grouping of soils is characterized as deep and moderately deep, moderately steep to very steep, well drained loamy soils that formed in loamy sediment or in material weathered predominantly from gneiss and schist on mountain slopes with mesic temperature and udic moisture regimes. Common forest types are White Oak, Red Oak, Hickory (60%), White Pine/Hemlock (11%), Upland Hardwood/White Pine (8%), and Pitch Pine (6%), 10 other forest types are identified within this area. Productivity for this area ranges from a high of 800+ board feet per acre per year, to a low of 100 bdft/acre/year. Sixty-five percent of the acreage (1908 acres) is producing in the 150 to 299 bdft/acre/year rate and 15.3 percent (444 acres) is in the 800+ bdft/acre/year rate. The average annual precipitation is about 78 inches, and the average annual temperature range is between 55 and 60 degrees Fahrenheit.

## **Current Use**

The area is used primarily for dispersed recreational activities. Hunting, camping, fishing, and backpacking all take place in or around the area. The major recreational impacts on this area come from fishing, dispersed camping, and hiking.

## **Appearance of the Area and Characteristics of Surrounding Contiguous Areas**

The area is primarily mature hardwood and hardwood pine forest types. Only 148 acres of the land in this area has had management activities in the last 40 years that may still be evident. The overstory is primarily mature pole timber and sawtimber. There is approximately 8 acres of old growth forest.

This area contains one old house site. The area was logged in the early 1900s and there is evidence of old logging operations throughout the area. Old roads and skid trails are still visually evident in the area.

The area has a semi-natural to natural appearance and is bordered on the west and north by Burrell's Ford Road (FDR 646). Across the road to the north is the proposed Ellicott Rock Extension. Burrell's Ford Road (FDR 646) separates the two proposed roadless areas. The trail in the southwest section of the area receives intermittent use from hikers, equestrian users, and anglers.

## **Key Attractions**

The area is adjacent to and crosses the Chattooga Wild and Scenic River corridor into the Sumter National Forest. It lies just south of the Ellicott Rock wilderness and the proposed Ellicott Rock Extension that is separated by the FDR 646 road from Big Mountain. Hiking to Ellicott Rock wilderness to view the corner of the three states is very popular. Fishing, hunting, hiking, and camping are also very popular in the area.

## **WILDERNESS CAPABILITY**

### **Natural Integrity and Appearance**

The area reflects the management of the last half-century. The exclusion of fire in many of the stands that make up this area has allowed an overabundance of undergrowth to develop. Tree species in the timber stands throughout the area are those that would be expected based on geology, soils, geography, and past management. Elevations range from 1700 ft to 2850 ft. There is a contiguous forest canopy to the river.

## **Opportunity for Solitude, Challenge, and Primitive Recreation**

The Big Mountain roadless area is 5,256 acres in size (2,923 ac in Georgia; 2,333 ac in South Carolina). It is located entirely on National Forest. The area is proposed as a stand-alone wilderness area in the vicinity of the Ellicott Rock Wilderness. A portion of the roadless area is within the Chattooga Wild and Scenic River Corridor. A solitude core area refers to the semi-primitive recreation opportunity spectrum (ROS) setting identified within the roadless inventory. A solitude core area of approximately 1687 acres has been identified.

The segment of the Chattooga WSR in which the area lies is at present closed to rafting or boating. This is a very dangerous white water segment that is not very accessible other than by the river. Hiking on unmaintained trails and dispersed camping is available and occurs throughout the year. Recreational visitation numbers are low for the interior of the area. Hunting season in the fall sees the highest influx of individuals to the interior of the area and then it is very few people.

The highest concentration of visitors occurs along Reed Creek and the Chattooga River for fishing. Reed Creek, which cuts through this area, is outstanding trout water, as well as, the section of the Chattooga River that runs through the proposed wilderness.

## **Special Features**

Proximity to the Chattooga River, trout streams, and the Ellicott Rock Wilderness help make this an interesting area. The area is rugged, on the northern end is Rand Mountain at 2880 ft., on the east side is Rock Gorge on the Chattooga River, on the southeast side is Big Mountain above the Chattooga River at 2820 ft., on the southern end is Little Mountain at 2030 ft., on the southwest side is Oakey Top at 2628 ft., the west side is comprised of Reed Creek or small tributaries with Persimmon Gap a feature at 2000 ft., the north end is anchored by Rand Mountain at 2880 ft., and in the center is Salt Trough Gap where a number of ridgelines come together at 2380 ft. Elevations are typical for the southern Blue Ridge Mountains. There are three sites indicated in the area for aquatic threatened and endangered species in the area.

## **Size, Shape, and Manageability**

The Big Mountain roadless area is elliptical in shape with several fingers extending out from the core area. A smaller area was removed from the proposal due to the proximity of trailhead parking, a campground, and bridge at Burrell's Ford. This removed area is located at the northern end of the proposed wilderness area. Management of the area would be possible with proper signing and patrolling by Wilderness Rangers. Conflicts will occur with the continued use of the road, bridge, trails, river, and campground. One heavily used dispersed campsite would be a continual problem in restricting vehicle use and access.

## **Boundary Conditions, Needs, and Management Requirements**

Roads, trails, and the Chattooga River border most of the area. The southern and northern boundaries would have to be established on the ground since these follow ridgelines. Some of the

boundary could be incorporated into the WSR boundary that is established. An offset from the existing FDR 646 would be needed.

## **AVAILABILITY FOR WILDERNESS**

### **Recreation, including Tourism**

No proposed recreational sites or official trails exist in this area. Many of the dispersed sites contain fire rings and lantern posts. Burrell's Ford Campground and bridge are frequently used drop-off points for hiking into the Ellicott Rock Wilderness, and fishing is frequent in this section of the Chattooga River. In good weather, it is not unusual to see 30-40 cars parked in this area. Hunting is popular. The unofficial Burrell's Ford Trail traverses the west side of the area. If the area is designated as wilderness, most of the amenities and site work to reduce and rehabilitate soil problems completed at the dispersed campsites would need to be removed.

### **Wildlife**

Typical Blue Ridge wildlife populations—migratory songbirds, deer, turkey, bear, and trout inhabit this area. Trout stocking takes place on a very frequent schedule in Reed Creek. There are three sites indicated in the area for aquatic threatened and endangered species in the area. There are no maintained wildlife openings in this area.

### **Water Availability and Use**

Chattooga River, Reed Creek, and various un-named streams flow through this proposed roadless area. There are no special use water wells or spring boxes. Water quality should remain the same if designation occurs or not.

### **Livestock, Timber, and Minerals**

There are 1,889 acres of this area classified as suitable for timber production in the existing plan. The area is primarily mature hardwood and hardwood pine forest types. Sixty percent of the area is made up of White Oak, Red Oak, and Hickory forest types. White Pine/Hemlock stands are the next largest component of this area and comprise only 11% of the forest types. Only two age groups are evident in this proposed roadless area. There are 148 acres in the 10-40 year age groups with most of this in the 21-30 year range. The remainder stretches from 61 to 130 with 25% of the acreage in the 91-100 year age class.

There was gold mining in the past, the late 1800's. There is no current mining activity occurring in the area. The federal government owns the mineral rights within this area. Some rock hounding activities occur in the area with little to no damage occurring.

## **Cultural/Heritage Resources**

Surveys have been done in the area; more sites could be expected based upon similar locations within the southern Blue Ridge.

## **Land Uses**

No authorized uses exist for this area. The tract is completely surrounded by federal land, so no future authorized land based uses will occur. There is some question as to the use of the Chattooga Wild and Scenic River that travels through this proposed roadless area, future special use authorization of river activities may occur.

## **Management Considerations for fire, forest health, recreation**

Loss of the suitable acreage in this area would require a reduction in planned silvicultural activities for the district and forest. Based on the previous Forest and Land Management Plan, there are 1889 acres that were suitable for timber production. The wilderness designation will remove this acreage from that category.

Forest health is a consideration, such as Southern Pine Beetle outbreaks, Gypsy Moth outbreaks, and Hemlock Woolly Adelgid outbreaks, all have occurred in this area over the last five years. Designation of roadless and wilderness could restrict management alternatives to address current and future pest outbreaks in this area. More frequent outbreaks could occur as the forest stands continue to age and the number of stems of all trees increase.

There are between 50 and 100 stream structures on creeks within the boundaries of this proposed area. The Rabun County Chapter of Trout Unlimited has a considerable amount of time, money, and effort expended on the trout fisheries in the area. Wilderness designation could hamper the stocking of trout in any streams within the wilderness boundary.

Present fire control techniques could be altered if this roadless area was designated as wilderness. Fire suppression would be primarily by hand tools. Burned acreages would tend to increase, and fire severity would increase.

## **Wilderness Need**

The concept of wilderness is multifaceted as envisioned by the authors and framers of the 1964 Wilderness Act. As such there are a number of factors to consider in assessing the need for additional wilderness.

Accessibility of this area to other wildernesses as well as population centers is another element when considering need. These areas are about 100 miles northeast of Atlanta, GA and about 40 miles north of Greenville, SC. Within a 250 mile area around this roadless area there is a population of approximately 23,000,000 people and there are 43 wildernesses (around 395,000 acres).



Outdoor recreation is one of the benefactors of wilderness and is one of the drivers of wilderness demand and wilderness management. According to trend data collected from 1965 to 1994, the trend in recreation visits to National Forest Wilderness has paralleled designations and increased over time (Cordell, 1999). In the Sumter National Forest Market Area, participation rates for visiting wilderness or other primitive, roadless are is about 31.8% of adults (over 12 years old), which equates to about 2.9 million people. Trends in wilderness indicate a continued increase in visitation to wilderness.

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## APPENDIX D

# WILD AND SCENIC RIVERS ELIGIBILITY

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### INTRODUCTION

#### *Wild and Scenic Rivers Act*

Congress enacted the Wild and Scenic Rivers Act (WSRA) in 1968 to preserve select river's free-flowing condition, water quality and outstandingly remarkable values. The most important provision of the WSRA is protecting rivers from the harmful effects of water resources projects. The WSRA also directs that each river in the National Wild and Scenic Rivers System (National System) be administered in a manner to protect and enhance a river's outstanding natural and cultural values. It allows existing uses of a river to continue and future uses to be considered, so long as existing or proposed use does not conflict with protecting river values. The WSRA also directs building partnerships among landowners, river users, tribal nations, and all levels of government.

Beyond the immediate protection afforded to the eight rivers in the enabling legislation, the WSRA established a process for building a legacy of protected rivers. Rivers may be identified for study by an act of Congress under Section 5(a), or through federal agency-initiated study under Section 5(d)(1). By the end of 2002, Congress had authorized 138 rivers for study. Section 5(d)(1) directs federal agencies to consider the potential of WSRs in their planning processes, and its application has resulted in numerous individual river designations, and state and area-specific legislation.

Both Sections 5(a) and 5(d)(1) studies require determinations to be made regarding a river's eligibility, classification and suitability. Eligibility and classification represent an inventory of existing conditions. Eligibility is an evaluation of whether a river is free-flowing and possesses one or more outstandingly remarkable values (ORVs). If found eligible, a river is analyzed as to its current level of development (water resources projects, shoreline development, and accessibility) and a recommendation is made that it be placed into one or more of three classes—wild, scenic or recreational.

The final procedural step, suitability, provides the basis for determining whether to recommend a river as part of the National System

Rivers are added to the National System by act of Congress or by the Secretary of the Interior. Secretarial designation requires that a river be a part of a state river protection system and the

state governor to make application to the Secretary. Currently 163 rivers are protected, consisting of over 11,000 total river miles nationwide.

### *FMS Study Process*

Through this plan revision, a comprehensive WSR inventory was conducted to determine eligible rivers. As a result of the following process, 17 rivers were considered, with 8 found eligible and subsequently classified. Specific steps of the process include:

*1. Determine which rivers should be studied for eligibility.* Based on this guidance, seventeen rivers were identified from the Nationwide Rivers Inventory, the South Carolina Rivers Assessment, from internal information/comments and from public comment.

The Land and Resource Management Planning Handbook, Forest Service Handbook 1909.12, Chapter 8, gives direction for identification and evaluation of rivers.

*2. Divide the identified rivers into homogeneous sections for analysis.*

*3. Determine that each section/segment is free flowing.* For a stream to be eligible for designation to the Wild and Scenic Rivers System, it must be free-flowing. A free-flowing river is defined in section 16(b) of the Wild and Scenic Rivers Act as “existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway.”

*4. Develop criteria for determining eligibility,* that is, whether or not a feature is an outstandingly remarkable value within this region or nation. The Sumter National Forest required 2 sets of criteria. One set for the Southern Appalachian Piedmont section (Enoree and Long Cane Ranger Districts) and one for the Southern Appalachian Blue Ridge section (Andrew Pickens Ranger District). The evaluation criteria for each resource were prepared by consulting sections 1(b) and 2(b) of the National Wild and Scenic Rivers Act, FSH 1909.12, Chapter 8, Interagency Guidelines, and Federal Register, Vol. 47, No. 173.

*5. Collect resource information on rivers, by segment.* An interdisciplinary team conducted field surveys on each of the rivers.

*6. Identify river values that may be outstandingly remarkable.*

*7. Determine which rivers contain outstandingly remarkable values.*

## ELIGIBILITY CRITERIA

For a stream to be eligible for designation to the Wild and Scenic Rivers System, it must be free-flowing and possess an “outstandingly remarkable” value(s) from the following list:

- Scenic
- Recreational
- Fisheries/Aquatic
- Wildlife
- Geological
- Botanical/Ecological
- Cultural/Historical

For each resource, rivers are rated as one of the following:

*Class A.* This classification refers to those rivers whose values are of unusual or outstanding quality when compared to other rivers in the Southern Appalachian Piedmont Section or Blue Ridge Mountain Section.

*Class B.* This classification refers to those rivers whose values may be unusual locally, but qualities are typical for rivers throughout the Southern Appalachian Piedmont Section or Blue Ridge Mountain Section.

*Class C.* This classification refers to those rivers with few or no unusual values when compared to other rivers in the Southern Appalachian Piedmont Section or Blue Ridge Mountain Section.

Since there are two physiographic provinces within the Forest, resource values for each river being evaluated are compared with values of other rivers in the same physiographic province.

The determination of whether a river or river segment contains outstandingly remarkable values is a judgment based on the qualities of a river relative to the other rivers in the physiographic province. Listed below are the eligibility criteria established for the Sumter National Forest.

### **Eligibility Criteria By Resource for *Southern Appalachian Piedmont Section***

If a river or segment of river is found to have a *Class A* value for any of the resource values and is free-flowing, it would be eligible. The determination is based on professional judgment of Forest Service specialists.

## **Scenic Values**

The general scenic eligibility criteria are listed below, some of the features that were looked at to help define classes include landform, rock features, vegetative cover, stream aesthetics, manmade features and views.

*Class A.* The landform adjacent to the river is characterized by ridges with slopes above 20% and areas with abrupt topographic changes or rock outcroppings. Gravel and sand bars are present but not dominant. There are a variety of vegetation types in interesting patterns and textures. Forest cover is mostly continuous and is characterized by large trees. There is a high degree of vegetative patterns (trees, shrubs and ground cover) and unusual diversity in plant species. Water appears clear most of the year with a variety of still water and ripples, or even cascades present. Not many manmade structures are apparent from the river. No roads or utility corridors are evident.

*Class B.* There are some steep banks or slopes to river, but generally the landscape is characterized by broad ridges with long gently to strongly sloping side slopes 5 – 20 % and dissected with short drainages. Gravel and sand bars are common sites, both near banks and mid-river. There is some variation in vegetative types. Pine is more predominant. Forested areas contain smaller to medium sized trees. Forest regeneration areas and pasture and farmland are visible though not predominate features. Water appears clear part of the year. Water flow typically is slow moving and meandering with some still areas or ripples. Downed trees cause some of the ripples and still areas. Views of structures (homes and barns), roads and utility corridors are evident through pasture and farmland adjacent to river. Views of these structures are interspersed with forest cover by the forest cover is still predominant.

*Class C.* There are only a few steep banks or slopes. Gradual slopes are more common. Low hills and flat lands with less than 5 % slope are common. There is little variation in vegetative types and patterns. Pine is common throughout the landscape and views through the forest are limited. Pastures and forest regeneration are common. Water often appears muddy. Still areas or ripples are the exception, although downed trees in the river cause some. Views of manmade structures, barns, homes, utility corridors, and roads are common.

## **Recreation Values**

The general recreation eligibility criteria are listed below, some of the features that were looked at to help define classes include swim/picnic/hike, fish/hunt, variety of opportunities, wildlife viewing, whitewater rafting, accessibility, quality/uniqueness of recreation facilities.

*Class A.* Visitors are willing to travel from outside the Southern Appalachian Piedmont Section area or the state to recreate along the river and its corridor. Visitors are willing to travel long distance to use the river resources for recreational purposes. River has been included or featured in national river rafting or river trail publications. River provides unusual opportunities for canoeing and boating. The river contains a variety of rapids, including those with an international rating of Class II or higher. This is potential for access points along the river to

provide a variety of recreational opportunities. The river provides opportunities for swimming and other water sports. Fishing success rate and size of take are unusual for the Southern Appalachian Piedmont Section.

*Class B.* Visitors are willing to travel from other locations in the Southern Appalachian Piedmont Section to recreate along the river and its corridor. The river has been included or featured in statewide river rafting or river trail publications. The river provides opportunities for canoeing and boating. River may contain some rapids, including those with an international rating Class I or II. There are some river access points. River provides opportunities for swimming or other water sports but these opportunities may be limited by low water flows or by water quality and clarity. Visitors do not often travel long distances to visit the river for recreational purposes. Most of the visitors are from the local area. Fishing success rate and size of catch may be above average for the local area, but are common throughout this section.

*Class C.* The river provides opportunities for canoeing and boating. The river does not contain any rapids. Access is limited. Low water flows in the summer limit opportunities for swimming and other water sports. Fishing success rate and size of catch are common for the area.

## **Fisheries/Aquatic Values**

The general fisheries/aquatic eligibility criteria are listed below, some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, habitat quality and water quality.

*Class A.* These rivers contain resident fisheries populations or aquatic communities, which occur only because of the character of the river. The area within the river corridor provides exceptionally high quality habitat for fish or aquatic organisms or national importance or may provides unique habitat or a critical link in habitat conditions for federal proposed, endangered, threatened, or C1 species. Diversity of habitats is an important consideration and could in itself, lead to a determination of outstandingly remarkable. Water quality is higher than most rivers with the Southern Appalachian Piedmont Section. The river is given Outstanding Resource Water rating by SC DHEC.

*Class B.* These rivers contains high quality fisheries or aquatic community habitat, which is uncommon in the local area by, may be common throughout this section. This area within the river corridor may provide unique habitat or a critical link in habitat conditions for State or Forest listed sensitive species.

*Class C.* These rivers contain fisheries or aquatic community habitats that are not unique, rare or critical. These habitats are common throughout the section.

## **Wildlife Values**

The general wildlife eligibility criteria are listed below; some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, habitat quality, and habitat diversity.

*Class A.* These rivers and their riparian areas contain resident wildlife populations that occur only because of the character of the river and/or the riparian vegetation adjacent to the river. The area within the river corridor provides exceptionally high quality habitat for wildlife of national significance or may provide unique habitat or a critical link in habitat conditions for federally proposed, threatened, endangered or candidate (C1 or C2) species, or species with Nature Conservancy rating of G1, G2, or G3.

*Class B.* These rivers and their riparian areas contain high quality wildlife habitat, which is uncommon in the local area, but may be common throughout the Southern Appalachian Piedmont Section. The area within the river corridor may provide unique habitat or a critical link in habitat conditions for State or Forest listed sensitive species. Diversity of habitats is unusual in the area, although that diversity may be common throughout the Southern Appalachian Piedmont Section.

*Class C.* These rivers and their riparian areas contain wildlife habitat, which is common to the Southern Appalachian Piedmont Section and indicates that wildlife and wildlife habitats are not significant, rare or critical.

## **Geologic Values**

The general geologic eligibility criteria are listed below some of the features that were looked at to help define classes include geologic formation and opportunities to study caves.

*Class A.* These rivers may contain an example of a geologic feature, process, or phenomena within the river or within the river corridor that is rare, unusual, one-of-a-kind or unique within the Southern Appalachian Piedmont Section. The features may also represent a significant or rare combination of geologic features.

*Class B.* These rivers may contain geomorphic features and formations that are significant in the local area, but are typical of those commonly found in the Southern Appalachian Piedmont Section.

*Class C.* These rivers may contain geomorphic features and formations that are locally common and offers no significant geologic features.

## **Botanical/Ecological Values**

The general botanical/ecological eligibility criteria are listed below, some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, and habitat quality.

*Class A.* These rivers are surrounded by riparian forests within the river corridor, which are contiguous, with little man-made fragmentation. Geologic features may harbor plant communities in the river corridor, which are rare throughout the section. The area will provide habitat for federally listed proposed, endangered, and threatened species, candidate species (C1 or C2), or species with Nature Conservancy ratings of G1, G2, or G3.

*Class B.* The riparian forest along the river corridor remains largely contiguous, with little man-made fragmentation caused by human activity. Locally significant plant communities or plants rare within the state may be present along the river corridor. There may also be some uncontrolled invasions of exotic weedy species.

*Class C.* These rivers and their riparian areas contain plant species and or communities that are common to the area. Forests may be greatly disturbed by artificial means and/or highly fragmented. Other disturbed and/or artificial communities and uncontrollable invasion of exotics may be present.

## **Heritage/Cultural Values**

The general heritage/cultural eligibility criteria are listed below, some of the features that were looked at to help define classes include National Register or Historic Places eligible present or probable and rural historic landscapes.

*Class A.* Cultural sites within the corridor have unusual characteristics or exceptional research or interpretive values of national significance. These river corridors contain sites of national importance and meet the criteria for listing on the National Register of Historic Places (NRHP) (36 CFR 60). These sites would garner public interest from outside the local area or state.

*Class B.* The river corridor contains cultural sites of state and local significance that meet the criteria for listing on the National Register of Historic Places. Sites may be similar to other sites known throughout the region, but are unique to the local area. Some sites may have been disturbed prior to be archeologically recorded. This also includes known sites that have not been evaluated respective to National Register of Historic Places criteria.

*Class C.* The river corridor contains sites common to the Southern Appalachian Piedmont Section. Sites have been determined ineligible for listing in the National Register of Historic Places. This includes rivers with high probability area for occurrence of heritage resources, but where no surveys have been conducted.



## **Eligibility Criteria By Resource for *Blue Ridge Mountain Section***

If a river or segment of river is found to have a *Class A* value for any of the resource values and is free-flowing, it would be eligible. The determination is based on professional judgment of Forest Service specialists.

### **Scenic Values**

The general scenic eligibility criteria are listed below, some of the features that were looked at to help define classes include landform, rock features, vegetative cover, stream aesthetics, manmade features and views.

*Class A.* Slopes or banks to river are steep, with dissected slopes. Slopes generally exceed 60%. Rock outcroppings and boulders are present and dominate the scenery and are unusual in size, color, or location. The rivers may flow through a gorge with steep narrow walls. There are a variety of vegetation types in interesting patterns and textures. Forest cover is continuous, or if broken, has a high diversity of trees, shrubs, and ground cover as well as an unusual diversity plant species. Large trees are often present. High seasonal color contrasts are commonly found in the corridor. Water flow has a lot variety, and river corridors contain many waterfalls, cascades, rapids, pools and meanders. Water appears clear most of the year. Not many structures are apparent from the river. No roads or utility corridors are evident.

*Class B.* There are some steep banks or slopes to river, by generally the slopes are more moderate (30% to 60%) and generally uniform with some dissection. Rock features are obvious, but do not dominate the landscape. Boulders and other rock outcrops have no unusual characteristics. Some sand or gravel bars may be present. There is some variation in vegetative types. Pine is more common. Forest cover is somewhat continuous, but regeneration areas and pastures and farmlands are visible, though not the predominate features. There is a common variety in trees, shrubs, and ground cover and a common diversity of plant species. Seasonal color within the corridor is common. Some large trees are present, but not predominant. Water appears clear part of the year. Water flow is variable, and corridor contains some waterfalls, cascades, rapids, or pools and meanders. Views of structures (homes and barns), roads and utility corridors are evident through pasture and farmland adjacent to the river. Views of these structures are interspersed with forest cover but the forest cover is still predominant.

*Class C.* The terrain have little variety in slope, and slopes are generally 0% to 30% and not dissected. (Steeper slopes may exist within the corridor, but most slopes do not exceed 30%.) Rock features are not obvious and there are few boulders. Sand bars and gravel beds are common in the corridor. There is little variation in vegetative types (trees, shrubs, and ground cover) and patterns. There is a common diversity of plant species in the area. Large trees are scattered throughout the corridor, but are not common. Pastures and forest regeneration areas are common. Water often appears muddy. River corridors contain little variety in flow characteristics, although some riffles and small rapids may be present. Views of structures, barns, homes, utility corridors and roads are common.

## **Recreation Values**

The general recreation eligibility criteria are listed below, some of the features that were looked at to help define classes include swim/picnic/hike, fish/hunt, variety of opportunities, wildlife viewing, whitewater rafting, accessibility, quality/uniqueness of recreation facilities.

*Class A.* Visitors are willing to travel from outside the geographic section or state to recreate along the river and its corridor. Visitors are willing to travel long distances to use the river resources for recreational purposes. The river has been included or features in national river rafting or river trail publications. The river provides unusual opportunities for canoeing, rafting, or kayaking. River contains a variety of rapids, including those with an international rafting Class of III or higher. Access points along the river provide for a variety of trip lengths that users can tailor to their needs (day trips, ½ day trips, or overnight trips). The river provides opportunities for swimming or other water sports. Fishing success rate and size are unusual for the geographic section.

*Class B.* Visitors are willing to travel from other locations in the section or state to recreate along the river and its corridor. The river has been included or featured in statewide river rafting or river trail publications. The river provides opportunities for canoeing or kayaking. Opportunities for rafting are limited. River contains some rapids, including those with an international rating of Class II or above. There are river access points, but opportunities for flexibility in trip planning are more limited (ie. Length between access points requires a day trip). The river provides opportunities for swimming or other water sports but these opportunities may be limited by low water flows or by water quality and clarity. Fishing success rate and size of catch may be above average for the area.

*Class C.* Visitors do not often travel long distances to visit the river for recreational purposes. Most visitors are from the local area. River provides few opportunities for canoeing, rafting, or kayaking. River contains few rapids. River access is limited. Low water flows in the summer limit opportunities for swimming and other water sports. Fishing success rate and size of catch are common for the local area.

## **Fisheries/Aquatic Values**

The general fisheries/aquatic eligibility criteria are listed below, some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, habitat quality and water quality.

*Class A.* River contains resident fisheries populations or aquatic communities which occur only because of the character of the river. The area within the river corridor provides exceptionally high quality habitat for fish or aquatic organisms of natural importance or may provide unique habitat or a critical link in habitat conditions for federal proposed, endangered, threatened or C1 species. Diversity of habitats is an important consideration and could in itself, lead to a determination of outstandingly remarkable. Water quality is higher than most rivers with the

Blue Ridge Mountains Section. South Carolina DHEC rates the river as Outstanding Resource Water or Natural Trout water.

*Class B.* The river contains high quality fisheries or aquatic community habitats which are uncommon in the local area but may be common throughout the Blue Ridge Mountains Section. The area within the river corridor may provide unique habitat or a critical link in habitat conditions for State or Forest listed sensitive species. The river is listed as a put, grow and take Trout Water by the SC DHEC.

*Class C.* The river contains fisheries or aquatic community habitats that are not unique, rare or critical. These habitats are common throughout the Blue Ridge Mountains Sections.

## **Wildlife Values**

The general wildlife eligibility criteria are listed below; some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, habitat quality, and habitat diversity.

*Class A.* Rivers and their riparian areas include resident wildlife populations that occur only because of the character of the river and/or the riparian vegetation adjacent to the river. The area within the river corridor provides exceptionally high quality habitat for wildlife of national significance or may provide unique habitat or critical link in habitat conditions for federally proposed, threatened, endangered or candidate (C1 or C2) species, or species with Heritage ratings of G1, G2 or G3.

*Class B.* Rivers and their riparian areas contain high quality wildlife habitat, which is uncommon in the local area, but may be common throughout the Blue Mountain Section. The area within the river corridor may provide unique habitat or critical link in habitat conditions for State or Forest listed sensitive species.

*Class C.* Rivers and their riparian areas contain wildlife habitat, which is common to the Blue Ridge Mountain Section and indicates that wildlife and wildlife habitats are not significant, rare or critical.

## **Geologic Values**

The general geologic eligibility criteria are listed below some of the features that were looked at to help define classes include geologic formation and opportunities to study caves.

*Class A.* These rivers may contain examples of a geologic feature, process or phenomena within the river or the area within the river corridor that is rare, unusual, one-of-a-kind or unique with the Blue Ridge Mountain Section. The features may represent a significant or rare combinations to the

*Class B.* These rivers may contain geomorphic features and formations, which may be significant within the state, but are typical of those commonly found in the Blue Ridge Mountains Section.

*Class C.* These rivers contain geomorphic features and formations that are locally common to the Blue Ridge Mountains Section and offer no significant geological features.

## **Botanical/Ecological Values**

The general botanical/ecological eligibility criteria are listed below, some of the features that were looked at to help define classes include species diversity, species uniqueness, habitat uniqueness, and habitat quality.

*Class A.* These rivers are surrounded by riparian forests within the river corridor, which are contiguous, with little man-made fragmentation. Geologic features may harbor plant communities in the river corridor, which are rare throughout the section. Plant communities in the river corridor are rare throughout the section and have little evidence of human disturbance and invasion by exotics. The area will provide exceptional habitat for federally listed proposed, endangered, and threatened species, candidate species (C1 or C2), or species with Nature Conservancy ratings of G1, G2, or G3.

*Class B.* The riparian forest along the river corridor remains largely contiguous, with little man-made fragmentation caused by human activity. Locally significant plant communities or plants rare within the state may be present along the river corridor. There may also be some uncontrolled invasions of exotic weedy species.

*Class C.* Plant species and/or communities are common to the area. Forest may be greatly disturbed by artificial means and/or highly fragmented. Other disturbed and/or artificial communities and uncontrollable invasion of exotics may be present..

## **Heritage/Cultural Values**

The general heritage/cultural eligibility criteria are listed below, some of the features that were looked at to help define classes include National Register or Historic Places eligible present or probable and rural historic landscapes.

*Class A.* Cultural sites within the corridor have unusual characteristics or exceptional research or interpretive values of national significance. These river corridors contain sites of national importance and meet the criteria for listing on the National Register of Historic Places (NRHP) (36 CFR 60). These sites would garner public interest from outside the local area or state.

*Class B.* The river corridor contains cultural sites of state and local significance that meet the criteria for listing on the National Register of Historic Places. Sites may be similar to other sites known throughout the region, but are unique to the local area. Some sites may have been

disturbed prior to be archeologically recorded. This is also includes known sites that have not been evaluated respective to National Register of Historic Places criteria.

*Class C.* The river corridor contains sites common to the Blue Ridge Mountain Section. Sites have been determined ineligible for listing in the National Register of Historic Places. This includes rivers with high probability area for occurrence of heritage resources, but where no surveys have been conducted.

## **Classification Criteria**

The second step is a determination of the classification. The National Wild and Scenic Rivers Act (Section 2 (b)) states that “if included (in the National Wild and Scenic Rivers System, each river) shall be classified, designated, and administered” as a WILD, a SCENIC, or a RECREATIONAL river area. The classification selection is based on the conditions of the river and the adjacent land at the time of the evaluation. A river may be divided into segments by these classifications, based on current conditions.

A classification determination is needed to guide management of the stream and surrounding lands during the period before a Wild and Scenic River’s suitability study is made. In addition to protecting and, to the extent practical, enhancing the outstandingly remarkable values, management and development of a river identified as eligible for designation and its corridor will not be modified to the degree that eligibility or classification will be affected.

The following three river classifications are possible:

*Wild River Areas:* Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

*Scenic River Areas:* Those rivers or sections that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

*Recreational River Areas:* Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

## **Suitability**

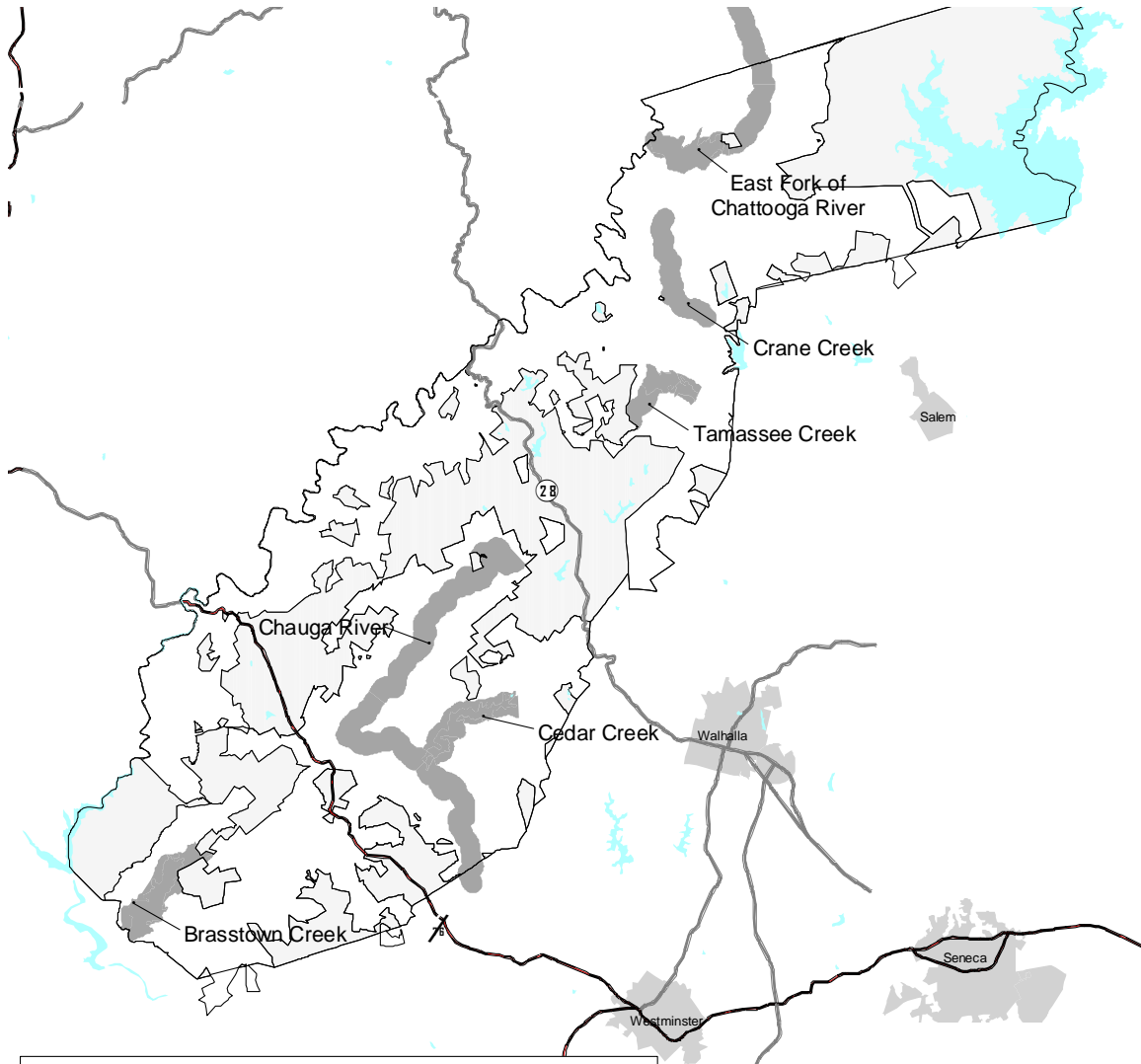
Determination of the suitability of rivers found eligible is deferred. Until such time as suitability is complete, the eligible rivers will be managed as detailed in Chapter 2 of the Revised Land and Resource Management Plan for the Sumter National Forest.

Table B-1 lists the eligible rivers on the Sumter National Forest with their preliminary classification and the outstandingly remarkable values they possess.










*Table B-1. Eligible Rivers on the Sumter National Forest and their Classification and Outstandingly Remarkable Value.*


District	River	Segment	Miles	Outstandingly Remarkable Value(s)	Classification
Long Cane	Turkey	N/A	12.5	Wildlife Fish/Aquatic Botanical/Ecological	Scenic
	Stevens	N/A	13.4	Wildlife Botanical/Ecological	Recreational
Andrew Pickens	Brasstown Creek	N/A	3.9	Botanical/Ecological	Wild
	Cedar Creek	N/A	4.2	Botanical/Ecological	Scenic
	Chauga	I	7.9	Scenic Recreation Geologic Botanical/Ecological	Scenic
		II	4.1	Scenic Recreation Geologic Botanical/Ecological	Wild
		III	4.0	Scenic Recreation Geologic Botanical/Ecological	Scenic
	Crane	N/A	3.1	Fish/Aquatic	Scenic
	East Fork, Chattooga River	I	2.5	Fish/Aquatic	Recreational
		II	2.2	Fish/Aquatic	Wild
		III	.2	Fish/Aquatic Recreation	Recreational
		IV	2.4	Fish/Aquatic Recreation Botanical/Ecological	Wild
	Tamassee Creek	N/A	1.7	Botanical/Ecological	Wild

Eligible Wild and Scenic Rivers  
on the  
Andrew Pickens Ranger District  
Sumter National Forest



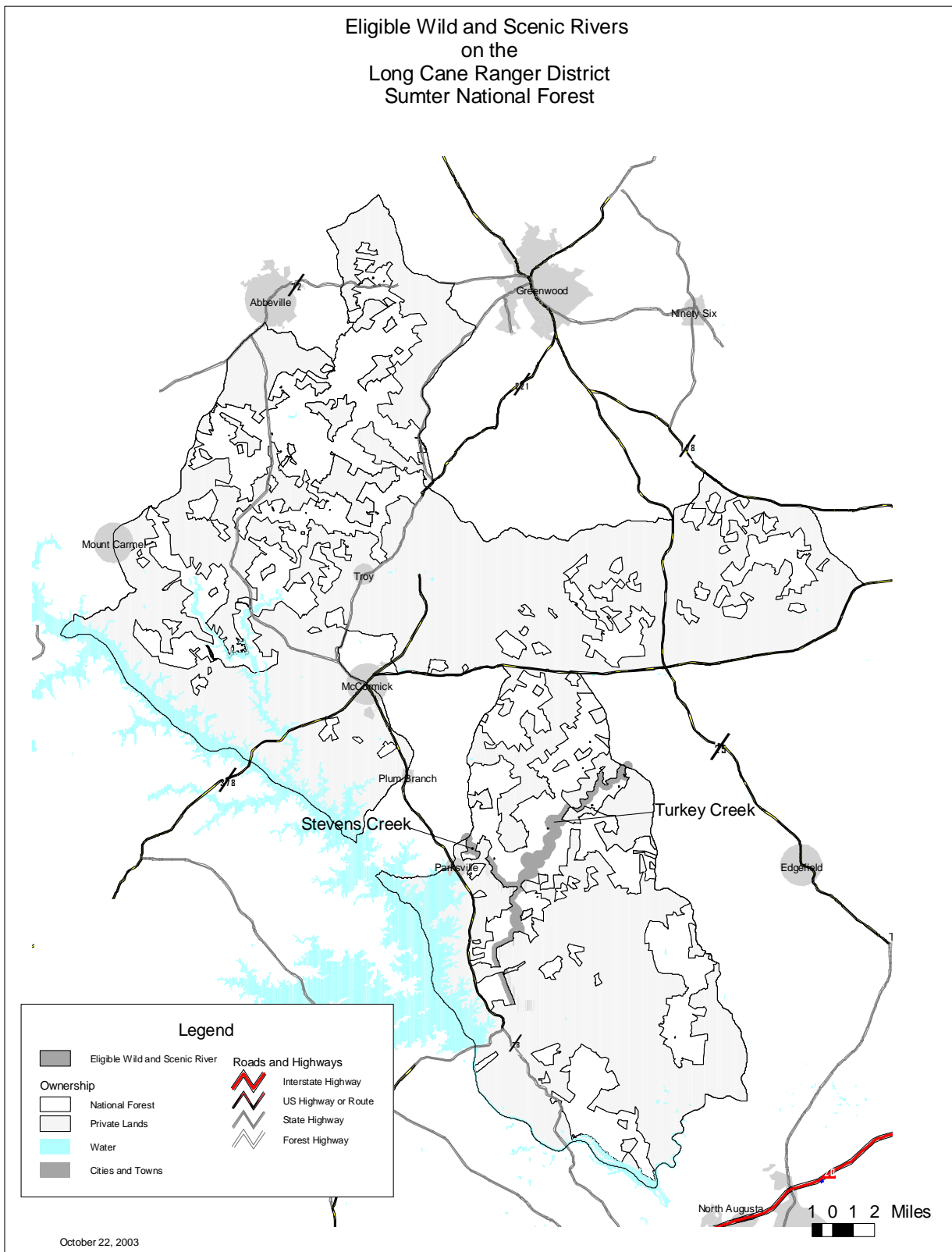
Legend

- |   |                                |   |                     |
|---|--------------------------------|---|---------------------|
|  | Eligible Wild and Scenic River |  | Interstate Highway  |
| <b>Ownership</b>  |                                |  | US Highway or Route |
|  | National Forest                |  | State Highway       |
|  | Private Lands                  |  | Forest Highway      |
|  | Water                          |   |                     |
|  | Cities and Towns               |   |                     |

1 0 1 2 Miles  


October 22, 2003

# Eligible Wild and Scenic Rivers on the Long Cane Ranger District Sumter National Forest





## EVALUATION OF INDIVIDUAL RIVERS

### Brasstown Creek - River Evaluation

	Total River	Eligible Segment	State-owned Segment
Segment Miles	9.2	3.9	1.0
NF & Mixed Ownership Lands	4.4	3.9	0
Private Lands	3.8	0	0
State Lands	1.0	0	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

The river is too small to be navigable. The width ranges from 6 feet to 30 feet.

2. Water quality. SC DHEC ratings.

No SC DHEC rating.

3. Is any segment dammed or been channelized. If so, explain.

Part of the upper portion of the river appears to be channelized to bypass some pastureland. There are no known dams along the river.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

State Highway 48 parallels the river for about 2 to 3 miles and then FDR 751 parallels the river and then dead ends. A primitive access trail then takes hikers through the to the falls areas. There is a primitive camping area at the beginning of the trail.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Typical recreation users include local anglers and other local day users. Most people are local by some come fro other areas to view the waterfalls. SC State Parks publishes a waterfall brochure which may bring users from other areas. There are no known commercial operations along the river.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

There are several agricultural fields along the upper portion of the river. Also, there are several residences in that area as well. There is some private land for sale occasionally in the area.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Generally the vegetation patterns and land use patterns have been stable for many years.

8. What are the general forest types along the river? Are there any unusual forest communities?

Received a Class 2 rating in the SC River Assessment in the Natural Features category. Was rated (by Tom Kohlstatt, SC Heritage Trust Program) with a high score (30 points) for the quality criteria of this category. This criterion refers to the age, maturity, size, diversity and composition of a natural community, or size, vigor & stability of a species.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

The river contains Brasstown Falls, which is a series of four large water features in a row. There is a large shoals waterfall area, a large chute area and finally a large waterfall. In the area there are several large rock and rock outcrops.

## **Outstandingly Remarkable Values**

1. Scenic

The scenery along the river varies. The headwaters of the river parallel SC Highway 48 for some distance as well as FS 752. The river meanders through private land consisting of several agricultural fields. The river is in relatively flat country until reaches a series of three water features, cascades, shoals and waterfalls. The total elevation change for these features is 125 feet with a few miles. After these water features the river is relatively flat again with only minor elevation changes. The slopes for the river are generally moderate (Between 30% and 60%). The vegetation ranges from hay and crops in the upper reaches of the river to mature mixed hardwood evergreen forest with common understory communities. There are large trees in the lower reaches of the river. Seasonal color in the river corridor is common. Water is clear. There are several manmade features that dominate the landscape in the upper reaches of the river. Further down the river more natural conditions prevail. One power line is visible from the corridor and crosses the river in the upper half.

Rating: Class B

## 2. Recreational

The recreation opportunities include many day-use activities as well as some camping. These activities include hiking, picnicking, photography, wildlife viewing, and water play. Fishing is a popular activity. This river is used by the local area residents. The visitors feel a sense of enclosure in the lower reaches of the river but in upper reaches are surrounded by many pastures and farmlands. Generally, the river provides common recreational opportunities for the area.

Rating: Class B

## 3. Geologic

Situated within the Brevard fault zone, generally accepted as the boundary between the Blue Ridge Mountains and the Southern Appalachian Piedmont. The Brevard Fault zone has a complex geology history, significant in that it is newer geologically than much of the adjoining areas due to the faulting and thrusting which occurred there during the late Paleozoic. Exposure of underlying Brevard Belt stratigraphy is second only to the Chauga River in quality. Brasstown Creek represents the historical course of the Chauga River as it flows within the Brevard Zone south of the Chauga River capture.

Rating: Class B

## 4. Wildlife

No PETS wildlife have been documented from this area, but little sampling had occurred. The quality of habitat for variety of wildlife species is high, due to the continuity of older forest cover, variety of rock outcrops and waterfalls spray zone, and abundant hardwood including mesic oak-hickory habitat. This continuous habitat becomes fragmented in private land, where continuous pasture occurs with the river valley.

Rating: Class C

## 5. Fish and Aquatic Communities

There are no known T&E or C1 or sensitive species known to occur here. Fish and aquatic community is average for the area with no outstanding species.

Rating: Class C

## 6. Botanical and Ecological

One of the richest areas for noteworthy plant communities and plant species on the Andrew Pickens, second only to Tamassee Creek. Outstanding rich coves, mesic oak-hickory, and waterfall spray zones communities extend from the upper falls to the end of F. S. property on lower Brasstown Creek. Total number of sensitive species: 11. Total

number of rare plant populations documented: 20. Total number of regionally rare species: 5. Mixture of sub tropical flora with Southern Appalachian endemics. Lower Brasstown is the only site on the district for narrow-leaved glade fern (*Athyrium pycnocarpon*), southern nodding trillium (trillium (*Trillium rugelii*; G3), including some of the largest populations for this species. Habitat fragmentation, and the opportunity for the invasion of exotics, is high due to the abundance of highly disturbed private land along the creek corridor. Little or low quality old growth.

Rating: Class A in parts

## 7. Cultural and Historic

River corridor contains sites of state and local interest that meet criteria for listing in the NRHP. The corridor is a high probability area for prehistoric and early historic Indian Sites.

Rating: Class B

## Broad River - River Evaluation

	River Miles
Segment Miles	37.0
NF Lands	6.2
Private Lands	18.0
Mixed Ownership Lands	12.8

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, the river is navigable. It is the largest river in the eligibility study with the average size of the river is greater than 100 feet and is navigable year-round.

2. Water quality. SC DHEC ratings.

Broad River had a freshwater rating from SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

There is a millrace which siphons the entire river for a hydroelectric plant at Lockhart, SC. This plant supplies electricity for the mill plant which is currently not in operation. However, the water is still being diverted in the millrace. This diversion is located on the northern FS proclamation boundary. The river bed is virtually dry for the length of the millrace.

SC Electric & Gas (SC E & G) operates the Neal Shoals Dam. This dam has been in operations since 1908. Drop over the dam is approximately 40 to 50 feet. Main water flow is from the left side of the channel to the extreme right side of the channel thru the turbines. Excess water flows over the top of the dam. Below the dam the water flow is adequate to maintain a natural-appearing channel.

Parr Shoals dam is located 10.7 miles below the Hwy 34 Bridge. The northern portion of the Parr reservoir comes to the southern part of the FS proclamation boundary.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

There are five access points along the Broad River inside the proclamation boundary. Four are developed sites and one is user developed. The developed sites include, Broad River boat ramp, Wood's Ferry Recreation Area, South Sandy boat ramp, and a boat ramp just below the Hwy 34 Bridge maintain by the State. The one user-developed access point is at the end of Forest Road 304. The only one of these access points with complimentary facilities is Wood's Ferry. Camping and picnicking facilities are available there.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

The rivers main use is from people fishing and duck hunters. Secondary to this is use from canoeists; however this use is very low in number. Most of the users are local residents. The average travel distance is 30 miles or less. No commercial recreation development.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

It received a class 2 rating in the undeveloped category in the SC Rivers Assessment for the segment in the FS proclamation boundaries. Most of the lands adjacent to Broad River are forested, with limited development (pasture, croplands, or homes).

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Some harvesting of timber has occurred along the corridor on private ownership. It is not generally viewed from the river.

8. What are the general forest types along the river? Are there any unusual forest communities?

There are wet riverfront forests and wet mesic bottomland hardwood forests including river birch-sycamore forest, eastern cottonwood-willow forest, sycamore-sweetgum-American elm forest, sweetgum-mixed bottomland oak forest and sugarberry American elm-green ash forest.

National Forest land adjacent to the river is included in management areas 12, 13, and 17 in the Sumter LRMP. Henderson Island is included in the broad river – Henderson island scenic area with an emphasis on managing for non-game wildlife species and the “unusual botanical species found with the hardwood stand.”

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

It has a broad floodplain, few granite rock outcroppings with mountain laurel, few shoals, no waterfalls, some sandbars and one significant island- Henderson Island. Nothing is very unusual geologically or topographically.

## **Outstandingly Remarkable Values**

1. Scenic

Combination of landform and vegetation are unusual in the area due to the low occurrence of pastures, farmlands and buildings adjacent to the river, the land on both sides of the river, both National Forest and private are mainly forested. There are some regeneration areas that are visible from the river. There is little variety in the vegetation types and some variety in size. Overall, the view from the river is generally common in the Southern Appalachia Piedmont. There is some rock features associated with the riverbed, but these are not abundant enough to be uncommon. Water is generally muddy most of the year. Seasonal color is moderate to minimal. There are some manmade features which have visual impacts such as power lines ROW's, transmission line ROW's, state highway bridge and railroad bridges and ROW's.

Rating: Class C

2. Recreational

Visitors generally travel less than 50 miles to visit the river for fishing and other water sports. Fishing is the main recreation use of this portion of the river. The river contains no rapids; it is described as fast flat water with some bouncy paddling in Paddling South Carolina. Water can be floated year round due to the size of stream. No ranking by SCDNR for fishing. Fishing size take and success rate are average for areas. This river received a Class 2 rating for inland fisheries and for recreational fishing in the SC River Assessment.

Rating: Class C

### 3. Geologic

Geology is locally common to the Southern Appalachian Piedmont Section.

Rating: Class C

### 4. Wildlife

There are a few high quality older bottomland and riverfront forest communities. There is no known state or federally listed species occurring along the corridor, but it has not been well surveyed. Within habitat diversity is high, but across habitat diversity is generally low due to fairly continuous forest conditions. Good interior habitat quality for neo-tropical birds and large mammals. River is used as a flyway by bald eagles, but no documented nesting sites are known. Used by a variety of ducks and other waterfowl.

Rating: Class B

### 5. Fish and Aquatic Communities

There is no known T&E or C1 species or sensitive species in the river. The fish and aquatic community is normal for the area with no know outstanding values.

Rating: Class C

### 6. Botanical and Ecological

Moderate quality older bottomland and riverfront forest communities. There are no known state or federally-listed species, and no know rare communities occurring along the corridor, but it hasn't been well survey. Within habitat diversity is high, but across habitat diversity is generally low due to fairly continuous forested conditions. There is generally low evidence of human disturbance, though exotics including Chinese privet, Japanese honeysuckle and microstegium vimineum occur here.

Rating: Class C

### 7. Cultural and Historic

This river corridor contains sites of state and local interest which are on or are potentially eligible for the NRHP. Exceptional sites include Mississippi Period Blair Mound and village, McCollum mound and village. The Powell's Shoals site contains stratified undisturbed early-late archaic period deposits (The mounds are all on private lands). Probably pre-historic fish wiers also occur along the river. Significant historic period sites include the 1820's Lansford Canal and the 1780 Fishdam Ford Battlefield.

Rating: Class B

## Cedar Creek - River Evaluation

	Total River	Eligible Segment
Segment Miles	6.2	4.2
NF and Mixed Ownership Lands	6.2	4.2
Private Lands	0	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Cedar Creek is not considered SC Navigable Water. The average size of the stream is 10 feet wide. The stream is not floatable for canoes or boats.

2. Water quality. SC DHEC ratings.

There is no SC DHEC rating.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

There is 1 access point for located just beyond Cedar Creek Rifle range. The rifle range is located upstream from the proposed study area boundaries. A popular access point is FDR 2658 and FDR 2659 which access Blue Hole, a popular local wading, fishing and sightseeing location. There are no developed FS picnic or camping facilities within the corridor, and there are no private facilities.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

The river is typically used doe wading fishing and sightseeing by local visitors. Visitors come occasionally from larger towns such as Greenville. This corridor is used by hunters and other visitors due to rifle range and due to habitat along corridor. The amount of recreation is relatively low when compared to other rivers in the area. There are no commercial outfitting operations.



6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

There are no major developments along the river. Most of the land in the corridor is NF land. Presbyterian Lake, now a recreation area, is located within the 1/mile study corridor. This pond is stocked with catfish. No power lines or pipelines parallel or cross the river. FDR 744 parallels Cedar Creek on the east, southeast side of the creek. Much of this road is just on the boundary of the study area. But portions of the road enter the corridor. FDR 2658 and FDR 2659 approach Cedar Creek from the terminus of FDR 744, but do not cross the river. One additional road, FDR 239C enters the ¼ mile corridor. None of the roads are visible from Cedar Creek. FDR 726 accesses the rifle range. Parking for the range is on the west side of the river. Visitors park their vehicles and cross a foot bridge to access the range itself. FDR 726 is located upstream from the proposed boundary.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Six regeneration areas are evident on 1991 aerial photography. No regeneration has occurred within the corridor since that time. There is no agriculture within the corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?

Received a Class 2 rating in the SC rating in the SC Rivers Assessment in the Natural Features category. Was rated by Tom Kohlsatt (SC Heritage Trust Program) with a high score (30 score) in the condition criteria. The condition criteria relates to the relative physically condition of a habitat.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

One prominent waterfall is located above Blue Hole. This waterfall flows through a rock gorge and cascade down. Fall is approximately 50 feet tall. Downstream from Blue Hole, river flows over rock terrace.

## **Outstandingly Remarkable Values**

1. Scenic

This river is characterized by mature forested hardwoods and evergreens with common understory of mountain laurel and rhododendron. The forest cover is nearly continuous. The river has moderately steep slopes on the upper reaches of the river and steeper slopes on the lower sections. Large trees are present throughout the river area. There generally aren't long vistas for the majority of the river. The visitor sees mostly foregrounds views throughout the river corridor however there are four regeneration area that impact the

views along the river. The water is clear and seasonal color is common. There are some waterfalls and or water features along this river including Blue Hole.

Rating: Class C

## 2. Recreational

The recreational opportunities along this river include opportunities for day use, such as hiking and picnicking. There are not any opportunities to use the river for rafting, canoeing etc.

Rating: Class C

## 3. Geologic

Occurs within the Brevard fault zone, which is generally accepted at the boundary between the Blue Ridge Mountains and the Southern Appalachian Piedmont. The Brevard fault zone has a complex geological history, significant in that is newer geologically than the adjoining areas due to the faulting and thrusting within occurred there during the late Paleozoic. The Brevard fault is only 1 to 2 kilometers wide, extending from Alabama to the North Carolina-Virginia border.

Cedar Creek has rock folds and deformed rock features, which are unusual for the region. A unique type of amphibolite occurs here, which has acquired the name Cedar Creek Amphibolite.

Rating: Class B

## 4. Wildlife

One PETS animals is known to occur here, but high potential habitats exists for several others. Much of the creek corridor is in older forest providing necessary habitat for bear and Neotropical migrant birds. No roads cross the creek with the lower reaches; fragmentation is low yet diversity of habitats is high.

Rating: Class B

## 5. Fish and Aquatic Communities

There are no known T&E or C1 or sensitive species occurring here. Fish and aquatic community is average for the area with no outstanding species.

Rating: Class C

## 6. Botanical and Ecological

Cedar Creek is home for at least 21 populations and 11 species of rare plants. Most species are considered rare within the state, as the Brevard fault provides unique habitat for both subtropical flora and for Southern Appalachian endemics. Only three species are regionally rare. Cedar Creek has unusually rich sedge diversity, including rich coves, white pine-hemlock-hardwood forest, and mesic oak-hickory and waterfall spray zones. The area around Blue Hole is especially rich. Some old growth occurs on upper creek. Few exotics occur and also little fragmentation along the creek corridor.

Rating: Class A

## 7. Cultural and Historic

River Corridor contain sites common the Southern Appalachians. No exceptional research or cultural values have been identified.

Rating: Class C

## Chauga River - River Evaluation

	Total River	Segment 1	Segment 2	Segment 3
Segment Miles	17.5	7.9	4.1	4.0
NF Lands	15.8	7.6	4.1	4.0
Private Lands	1.4	0	0	0
Mixed Ownership Lands	0.3	0.3	0	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, waterway is considered a navigable stream by SC. Average size of stream is 30'. Water flows year round, but is not always floatable for canoes/kayaks. Flatbottom boats are not used. Water flows can fluctuate rapidly. Pastures and apple orchards on private lands near upper stream reaches, and Village and East Village Creeks contribute sediment and turbidity during storm events.

2. Water quality. SC DHEC ratings.

Chauga is rated as an Outstanding Resource Water by SC DHEC. It rated Class 1 for Water Quality in the SC Rivers Assessment.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

No private facilities. SC DNR river in Segment 1 at Grapevine Branch (FS 746), Land Bridge (County Road), Blackwell Bridge (SC 193), and Cassidy Bridge (SC 290); in Segment 2 at FS 770; and in Segment 3 at Cobb Bridge (County Rd.). Cassidy Bridge Hunt Camp is located within the corridor in Segment 1 on SC 290, just east of the Chauga.

Public access points for canoeing, kayaking and rafting include: Blackwell Bridge (private land) and Cassidy Bridge Hunt in segment 1; and Cobbs Bridge (private land) in Segment 3. There are no public access points for boaters in Segment 2. Cassidy Bridge Hunt camp is used most summer weekends and is full throughout the hunting season. There are 9 dispersed campsites along the Chauga. Those in Segment 1 are located at: Land Bridge, Hell Hole Creek, Grapevine Branch, Blackwell Bridge, and Miller Field. One in Segment 2 is located at Woodall Shoals (Double Branch). Those in Segment 3 are located at: Riley Moore Falls, Chauga Bottoms, and Barton Creek Ford. Camping occurs at dispersed campsites at Woodall Shoals (on Chauga River) and Riley Moore Falls on most weekends throughout the summer months.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

No commercial operations. Local outfitters/guides have evaluated river, but determined there are not enough days floatable to be worth while. River corridor is used by local people for fishing, camping, hiking, and sightseeing. Canoeing/kayaking/rafting/tubing are also uses. Some people who use river travel from adjoining states. Those who travel distances to use the river often come to kayak at higher water flows for the challenge of the class II – IV rapids, and for the relative solitude of the Chauga river experience.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Upstream from the boundary of Segment 1, there are several roads within corridor: Verner Mill Road (CH33) is the northernmost crossing. There are various roads accessing private homes and farmlands/orchards between the confluence of Village and East Village creeks and Land Bridge (SC 196).

#### Segment 1

An old railroad grade crosses the river between Verner Mill Road Bridge and the Land Bridge. Utility lines run to the private homes within the corridor boundaries upstream

from Blackwell Bridge. No other utilities are within corridor or cross the river. Downstream from the Land Bridge, much of the ownership is NF lands. Road crossings and FS roads which approach river are listed: SC 196, FS 737, FS 2295 and FS 2662, FS 725, SC 193, FS 764, FS 736, FS 738 and 738A, FS 739D, FS 747, SC 290 and FS 745.

#### Segment 2

Road crossings and FS roads which approach river are listed: FS 742, FS 743, FS 770, and FS 2516 and 748H.

#### Segment 3

Two wildlife openings, maintained by the SC DNR are located in Chauga Bottoms, just north of Cobbs Bridge. Road crossings and FS roads which approach river are listed: FS 748I, FS 744C, FS 748B, FS 748C and 2606, FS 748D and FH 110.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

A tornado in 1994 crossed the Chauga River in Segment 2 between Spider Valley Creek and Double Branch Road (FDR 742). The Chauga River Corridor between SC 193 and Cobbs Bridge is encompassed by the Chauga River Scenic area. From the beginning of Segment 1 at Land Bridge, to the FS proclamation boundary, there has been no even aged regeneration on NF lands.

8. What are the general forest types along the river? Are there any unusual forest communities?

Received a Class 1 rating in Natural Features in the SC River Assessment. Received a high rating in the condition and quality criteria for the category.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

There is a small island at the Narrows, located south of Cassidy Bridge. Two main waterfalls on the River, Woodall Shoals and Riley Moore Falls. There are several smaller falls on Chauga itself through the gorge section and also along the tributary creeks. There are no active mining claims.

### **Outstandingly Remarkable Values**

1. Scenic

The scenery along the river is characterized by steep forested slopes, often greater than 50%. The steepness of the slopes confines the majority of views to the areas within the immediate foreground of the river. There are few chances to see any distance, occasionally at locations of valleys. The gorge area is particularly rugged with steep rock walls. These are large boulders and rock outcrops present throughout the length of river.

The forest cover is mature mixed hardwoods and evergreens with common understories of mountain laurel and rhododendron. Large trees are seen throughout the area. There are a number of small tributaries which feed into the Chauga River and add interest with such features as waterfalls. The water is clear and has a good flow rate. There are two large waterfalls and several small waterfalls on the river itself. There are very few manmade features which detract from the natural scenery.

The majority of the river had outstandingly remarkable scenic values.

Rating: Class A (All segments)

## 2. Recreational

Opportunities – There is great potential for photography opportunities, wildlife and nature viewing, all of which are dependant on good scenery. The surroundings are extremely scenic. There is potential for dispersed camping.

Currently there is some use of canoes and kayaks. Use is limited by water levels (floatability) and by skill level required. The Chauga is generally considered to be an whitewater alternative to the Chattooga River. The river received a Class 1 rating in the whitewater boating category by the SC Rivers Assessment. Many publications divide the Chauga River into sections. Most sections begin at Blackwell Bridge and run to Cassidy Bridge, next from Cassidy Bridge to Cobb Bridge, and the third to just above the confluence with Lake Tugaloo. All descriptions vary between publications, but the section Blackwell Bridge to Cassidy Bridge contains mostly Class II and III drops and ledges; 15 foot waterfall and 100 foot chute, and Class IV rapid at Chauga Narrows. Rivers drops close to 70 feet in the next river mile. First 5.5 miles drop 159 feet total, or 29 feet per mile. The section from Cassidy Bridge to Cobbs Bridge is known as Chauga Gorge. This section is considered very difficult and is only recommended for very experience paddlers. In this section, the river drops 415 feet or 42 feet per mile. This 9.6 mile section contains Class II – IV rapids.

The Chauga River has been highlighted in various regional and nation publications. Regional publications include various canoeing and kayaking books which provide information on paddling opportunities in South Carolina in the surrounding region. Visitors come for water sports from outside SC, mostly within the SE area. This is some overflow of visitor from the Chattooga River.

Rating: Class A (All segments)

## 3. Geologic

This river occurs within the Brevard fault zone, generally accepted as the boundary between the Blue Ridge Mountains and the Southern Appalachian Piedmont. The Brevard fault zone had a complex geological history, significant in that is newer geologically that much of the surrounding areas due to faulting and thrusting which

occurred there historically. The Brevard fault is on 1 to 2 kilometers wide, extending from Alabama almost to the NC/VA border. The sedimentary rocks originating during the late Precambrian or early Paleozoic followed by folding, metamorphism and a later faulting, produced the gneisses, schistose and phyllitic rocks that make the lithology of the Chauga River gorge the most diverse and distinct within the zone.

The river corridor falls steeply in elevation from 426.7m to 243.8m between Blackwell Creek and the boundary of the Andrew Pickens Ranger district.

Blackwell Creek to Cassidy Bridge known as the Chauga Gorge, begins with a long cove and continues through a dramatic gorge-bound reach, passes through Little Woodall Shoals then at Spider Valley junction, it bends and changes from a southwestern to an eastern direction then into a complex section of cataracts, among steep cliffs, finally drops through two sets of falls. Curiously, the floodplains were once well above the river, as indicated by the polished stones from soil samples in the area.

A well-known geologist, Dr. R. Hatcher, says the geology of the Chauga is unique for three reasons. First the sequence of rocks (stratigraphy) exposed here is not found anywhere else in the Blue Ridge, and hence the name Chauga River Formation. A unique rock type is found here called Knox dolomite (named from Knox county Tennessee) which was transported from the ridge and valley province.

Secondly, the quality of the exposure is unique. Rocks are exposed which occur 6-7 kilometers below ground in most other areas.

Thirdly, 100 years up from Blackwell Bridge, on a tributary come from the west, can be found a 100+ year old Lime Kiln unlike anything found anywhere else in the Blue Ridge.

Rating: Class A (All segments)

#### 4. Wildlife

This river provides a home for at least two PETS animal species, and high quality potential habitat for several others. Diversity of habitats is high, with a mixture of various successional stages of pine, hardwood, and mixed stands. Potential old growth and continuous forest cover exists with the exception of two major road crossings.

Rating: Class B (All segments)

#### 5. Fish and Aquatic Communities

There are no known T&E or C1 or sensitive species in the river. The fish and aquatic community is average for the area. There are some populations of wild trout in the river although it is mainly sustained by stocking of brown and rainbow trout.

Rating: Class B (All segments)

## 6. Botanical and Ecological

This river corridor is home for at least 23 populations and 15 species of rare plants. Of the 15 species, 5 are considered regionally rare. A regionally rare moss called gorge moss (C2; *Plagiomnium carolinianum*) occurs here. The Chauga River provides habitat for a mixture of sub-tropical flora and Southern Appalachian endemics. Plant communities are diverse include rich coves, white pine-hemlock-hardwood forest, mesic oak-hickory, and waterfall spray zone. The corridor provides older forest, which is patchily distributed among 11-30 year old and 30-6- year old age classes, creating some fragmentation which could affect seed dispersal and pollination.

Rating: Class A (All segments)

## 7. Cultural and Historic

Known sites include Pits Grist Mill, Sawmill and Rifle Gun Factory near the Southern Boundary of the study area, the exact location is unknown.

This river corridor contains sites of state and local significance that are potentially eligible for the NRHP. One site on private land is one of a dwindling number of the historic Cherokee settlements. Most such settlement has been destroyed by reservoir construction, agriculture, or development. Another site contains significance cultural resources pertain to the little known ceramics of the Mississippi period in the NW South Carolina. The flood plan of the Chauga River is expected to contain further as yet unidentified significant cultural resources.

Rating: Class A (All segments)

## Crane Creek - River Evaluation

	Total River	Eligible Segment
Segment Miles	3.1	3.1
NF and Mixed Ownership Lands	3.1	3.1
Private Lands	0	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

The river is too small to be navigable. The width averages 4 to 5 feet at Big Bend Road and 10 feet at Tamassee Road. Waterway is not considered floatable by canoe or kayak. Water flows fluctuate rapidly.



2. Water quality. SC DHEC ratings.

Currently no SC DHEC rating. Legislation is pending to classify as Natural Trout water.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

There are no developed access points to Crane Creek, but the stream is accessible at the following road crossings: FDR 709 (Big Bend Road), SC Highway 107, and FDR 710 (Tamassee Creek road). Winding Stairs trail, a historic trail, is located within the river corridor on the east side of SC Hwy. 107. Rose Bud Picnic Area lies within ¼ mile of Crane Creek, but is on the opposite (west) side of SC Highway 197. There are no private facilities within the river corridor, all lands within the corridor are National Forest lands.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Fishing and hiking the Winding Stairs trail are the most common uses of the river and river corridor. There is no commercial operation for canoeing or fishing on the river. Winding Stairs Trail is mainly used by visitors to Cherry Hill Campground. Brown trout fingerlings are periodically stocked in Crane Creek. Fingerlings are typically stocked at FDR 710 crossings. Most recreation users (including anglers) live within Oconee County or surrounding counties. Fishing access is difficult, especially in the upper reaches of the river, so fishing is limited to avid anglers. (Crane Creek received a rating of 3 in the Recreational Fishing category in the SC Rivers Assessment).

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

As described earlier, FDR 709, SC 107 and FDR 710 cross Crane Creek. FDR 2061 is closed to public travel and is the historic Burrell's Ford Road. This road parallels Crane Creek within the river corridor from the headwaters to its intersection with FDR 709. SC Hwy. 107 lies within ¼ mile of Crane Creek for about 1 mile in the vicinity of Rose Bud Picnic Area. There are no power lines or pipelines within the corridor.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Approximately one mile above the confluence with Townes Creek is included within White Rock Scenic Area. Commercial timber harvest is not allowed within the area

except for recreation facility construction, insect and disease control, salvage, or fire control. No timber harvest has occurred within the study corridor since the 1970's or early 1980's. There has not been any change to vegetation patterns outside small pockets of natural mortality.

8. What are the general forest types along the river? Are there any unusual forest communities?

Forested communities occurring along the river corridor include shortleaf pine, mixed mesophytic, xeric, and mesic mixed hardwood, pitch, mesic oak and white oak. No unusual plant communities are known to occur here.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

None known. There is a waterfall in the portion of the stream which parallels Winding Stair trail, but this waterfall is fairly typical of the waterfalls on the Andrew Pickens Ranger District.

## **Outstandingly Remarkable Values**

1. Scenic

The scenery around Crane Creek consists predominately of mature forest vegetation. There is a continuous overstory throughout the length of the creek, except at road crossings. There is vegetation diversity and good seasonal color. There are some waterfalls along this creek, the largest about 12-15 feet. The water is clear most of the year. The scenery is typical of the Blue Ridge Section streams.

Rating: Class C

2. Recreational

Crane Creek is small in size and not navigable. The fishing found on this stream is locally significant because of the naturally reproducing trout populations. There are occasional hikers; Winding Stairs trail parallels the stream for a short distance. There is a opportunity for photography, sightseeing and wildlife viewing, similar to other streams in the Blue Ridge Section

Rating: Class B

3. Geologic

Crane Creek occurs within the Brevard fault zone, which is generally accepted as the boundary between the Blue Ridge Mountains and the Southern Appalachian Piedmont. The Brevard fault zone has a complex geologic history, significance in that it is newer

geologically than the adjoining areas due to faulting and thrusting, which occurred there during the late Paleozoic. The Brevard fault is only 1 to 2 kilometers wide, extending from Alabama to the North Carolina- Virginia border.

Rating: Class B

#### 4. Wildlife

This stream has an abundance of older, interior forest, which provides excellent habitat for several Neotropical bird species. It is part of a larger tract of older, interior forest, which links with the White Rock Scenic Area and Ellicott Rock Wilderness on the northern part of the Andrew Pickens Ranger District.

Crane Creek provides moderate to low quality habitat for white-tailed deer and wild turkey, which require patches of early succession

Rating: Class B

#### 5. Fish and Aquatic Communities

There are no known T&E or C1 species in this stream. Water quality is higher than most streams with the Blue Ridge Mountains Section. Crane Creek sustains some populations of native trout, which are native to the Blue Ridge Mountain. There are also, some populations of brown and rainbow trout, which result from stocking. Because there is a presence of native trout in the headwaters and the water quality is significant, the SC DNR is putting forth legislation to reclassify the stream from freshwater to trout natural.

Rating: Class A

#### 6. Botanical and Ecological

There are no known T&E or C1 species in this corridor. There are no known sensitive species found within the corridor with the exception of Fraser's loosestrife, a regionally rare species, which occurs in the upper reaches of the watershed. Continuity of forest cover is very good.

Rating: Class B

#### 7. Cultural and Historic

There are no recorded sites on Crane Creek. However, the area adjacent to the creek has been surveyed for heritage resources. Some sites are known for nearby areas and the potential for significant or potentially National Register of Historic Places (NRHP) eligible sites are high in the areas adjacent to this creek. Historic mines and minerals prospecting pits and adits (a vertical shaft) are known on the West Fork of Townes Creek. Prehistoric Indian soapstone mining sites and historic mineral prospecting adits and pits are also known on the west side of SC Hwy.107 about ¼ mile west of where Crane Creek

crosses the highway. This historic Winding Stairs trail climbs the ridge between Crane and West Fork Creek. This trail used by Indian and was an early route used by whites in the areas.

Rating: Class C

## East Fork, Chattooga River - River Evaluation

	Total River	Segment 1	Segment 2	Segment 3	Segment 4
Segment Miles	7.4	2.5	2.2	0.2	2.4
NF Lands	0	0	1.9	0	2.4
Private Lands	0	0	0	0	0
Mixed Ownership Lands	0	0	0	0	0
State Lands	0.5	0	0.3	0.2	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

The stream is too small for floating by canoes or kayaks. Floating is also not permitted in this area. Water does flow year round in the stream.

2. Water quality. SC DHEC ratings.

Rated an Outstanding Resource Water from NC line to the confluence with Indian Camp Branch. (Sections 1 and 2). Rated Natural Trout Water from Indian Camp Branch to the confluence with the Chattooga River. (Sections 3 and 4)

3. Is any segment dammed or been channelized. If so, explain.

There is a small dam in Section 3 just below the confluence with Indian Camp Branch which necessary for operation of the trout hatchery located there.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

USFWS Trout Hatchery located in Section 3 at confluence with Indian Camp Branch is expected to be transferred to the State of South Carolina in 1996.

Section 3 contains Chattooga Picnic Area located along the creek adjacent to the hatchery. There is a barrier-free fishing pier and boardwalk located within the picnic area. Bank fishing is also popular along the stream. A trail runs along the river beginning in Section 3 and running though Section 4 from the hatchery to the confluence

with the Chattooga River, which is popular with hikers and anglers. This is a popular access point to enter the wilderness area which is adjacent to the picnic area.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any known commercial operations for canoeing, fishing, etc. on the river?

This river received a Class 1 rating in the Recreational Fishing Category of the SC Rivers Assessment. Brown and rainbow trout are typically caught.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

There is a road that goes to the hatchery, which connects to SC Hwy. 107 that crosses the upper part of the river. This bridge, Sloan's Bridge, divides Sections 1 and 2. Power lines also are present at the hatchery. This power line runs through section 2, but is not conspicuous.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

No.

8. What are the general forest types along the river? Are there any unusual forest communities?

Received a Class 1 rating in the natural features category on the SC Rivers Assessment. Received a high score in the quality and condition criteria for that category.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

No unusual features.

## **Outstandingly Remarkable Values**

1. Scenic

The river is characterized by a continuous mature forested overstory and common understory. The river meanders through Ellicott Rock Wilderness. Slopes along the river range from relatively flat to moderate slopes. There are generally no long vistas. The views are limited to foreground views for visitor, except for a few small valleys. The river runs through the Walhalla Fish Hatchery and is impacted by the developments within this facility, including several buildings, outbuildings and fenced run areas. The river is affected by other manmade features including a wooden foot bridge which

crosses the river to enter the wilderness area. Also, in the upper reaches SC State Highway 107 crosses the river. The water is clear and there are no large waterfalls or water features along the river.

Rating: Class B (All sections)

## 2. Recreational

Segments 1 and 2 of this river provide some recreation opportunities, mainly for fishing and hiking. Segment 1 parallels SC Scenic Highway 107. There is easy access from the road to the stream for fishing this segment. The Foothills Trail parallels Segment 2. Even though the stream is less accessible for fishing in this segment, the trail draws use from the tri-state area.

Rating: Class B for Segments 1 and 2

Segments 3 and 4 of this river receive extensive recreational use. This river is a tributary to the Chattooga Wild and Scenic River. The Fish Hatchery is located about midway along the river in section 3. The hatchery attracts people locally as well as from other areas. The extensive trail system allows hikers to travel from North Carolina and beyond to the Chattooga River and into Georgia. The combination of the Chattooga River, the trail system, the excellent fishing opportunities, the day-use opportunities, and the access to the Ellicott Rock Wilderness makes these sections outstanding, recreationally.

Rating: Class A for Segment 3 and 4

## 3. Geologic

The geology is typical of the Blue Ridge Mountain Section, comprised of Tallulah falls with schist geology.

Rating: Class C (All sections)

## 4. Wildlife

Three PETS animals have been found here. The river corridor provides diverse older forest and an abundance of downed woody debris. Quality and quantity of habitat for wildlife is generally typical for the Blue Ridge, but the older forest is outstanding.

Rating: Class B (All sections)

## 5. Fish and Aquatic Communities

There are no known aquatic T&E species or sensitive species located within the river. This river contains a resident population of wild brown trout due mainly to the diversity of the habitat and high quality of the stream. Due to the nutrient residue from the fish

hatchery, the brown trout population standing crop on Section 4 is the highest in the Southeast.

Rating: Class A (All sections)

## 6. Botanical and Ecological

Continuity of forest cover is very good, though forest composition is fairly typical of that occurring throughout the Blue Ridge, particularly at higher elevations.

Rating: Class C (Sections 1, 2 and 3)

Gaddy calls this area the most diverse and significance natural area in the northern portion of the district. Five species of trillium and over 20 species of carex occur here. Eight rare species and 14 rare populations occur here. Three species (large-flowered trillium (*Trillium grandifolium*), Fort Mountain sedge (*Carex amplisquama*), and pretty sedge (*Carex woodii*), are know nowhere else in South Carolina. Although most of the plant species are rare only within the state, five are considered rare within the region. The only record for *Carex Appalachia* in the Chattooga River watershed occurs here.

Plant communities are rich and include older mixed mesophytic forest, acidic coves and mesic oak-hickory forests. Paul Carlson's old growth study for the Chattooga watershed identifies both Class A and Class B communities occurring along the East Fork within the Ellicott Rock Wilderness Area. The eastern hemlock and white pine near the fish hatchery are very large and may be state records, several approaching four feet in diameter.

Rating: Class A (Segment 4)

## 7. Cultural and Historic

No survey work has been completed in this corridor. This drainage does contain high probability areas for the occurrence of heritage resources.

Rating: Class C (All Sections)

## Enoree River - River Evaluation

	Total River
Segment Miles	36.7
NF Lands	10.9
Private Lands	11.2
Mixed Ownership Lands	14.6

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, the Enoree River is classified as SC Navigable water. Average stream size is 50-70'. Water flows year round and is floatable for canoes and flatbottom boats. Water may be low in the summer, but floating is usually possible.

2. Water quality. SC DHEC ratings.

Rated as a Freshwater by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

None of the segments within the FS proclamation boundaries have been dammed or channelized, and are not affected by any dam or channelization.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

There are five access points for canoeing, fishing, swimming or wading. Two are at the end of Forest Roads 334 and 336A, these are primitive in development. The remaining three all have a defined access point to put in or take out small watercraft. They are located at the end of FS Road 339, Brazzelman's Bridge and Keitt's Bridge. All have small parking areas and information boards. The two are Road 339 and Brazzelman's Bridge has toilet facilities. One user developed access point exists on the western boundary of the Forest. It is Jones Bridge and is on private ownership. There are no facilities.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

It received a Class 1 rating in the Backpacking boating category in the SC Rivers Assessment. Backcountry boating category assessed river which provide opportunities for extended overnight trips (>10 mile segments) and have natural, undeveloped shorelines.



Main use is floating the river either by canoe or raft. Travel distance is generally less than 45 miles. Use is currently low but increasing as access has been recently improved. Information requests for outfitter/guide permits have been received by the district. No commercial operations.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

No major developments along the river. The river is crossed three times by a pipeline and once by a railroad. There are four bridges that cross the river. These are on County Highway 98, State Highway 121/176/72, County Highway 81 and County Highway 45.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Some harvesting of timber but this is not generally seen from the river.

8. What are the general forest types along the river? Are there any unusual forest communities?

Mostly loblolly pine forest or successional loblolly pine-hardwood forest including loblolly pine with Florida sugar maple, sweetgum, red maple, sourwood, white oak, and southern red oak.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

Few unusual geologic or topographic features, including rock outcroppings.

## **Outstandingly Remarkable Values**

1. Scenic

The combinations of landform, vegetation are common for the Southern Appalachian Piedmont. The variety of vegetative species is common for this area. The views from the river are mainly forest lands, with relatively few pastures, farmlands, or buildings. There are some regeneration areas that are seen from the river. Rock and water features are rare or absent, sandbars are common during low water. The landscape is generally rolling with gentle to moderate slopes in the river corridor. Some utility corridors and roads are visible from the river. Water in the river appears muddy most of the year. Fall color is average for this area, not extremely colorful overall, depending on the year.

Rating: Class C

## 2. Recreational

The recreational opportunities along the river are typical for this area, including fishing, canoeing and boating, and similar water-related day-use activities. Visitors to the river generally travel less than 50 miles one way. The Enoree River is listed as a SC River Trial within the Sumter NF boundaries. The river is included in Paddling South Carolina, a guidebook to canoe trails. There are no rapids on the segment within the FS Proclamation boundaries. The river is rated as fast flatwater, and flatwater for this portion to the confluence with the Broad River.

Rating: Class C

## 3. Geologic

Geological features are typical of those found in the Southern Appalachian Piedmont Section.

Rating: Class C

## 4. Wildlife

Quality of habitat for wildlife is good for many game species. A good diversity of habitats occurs due to a variety of age classes and abundant hardwoods within the corridor.

Rating: Class C

## 5. Fish and Aquatic Communities

There are no known T&E or C1 species or sensitive species in the river. The fish and aquatic community is average for the area with no known outstanding species.

Rating: Class C

## 6. Botanical and Ecological

Botanical and ecological values are typical of those found in the Piedmont Southern Appalachian Section. Evidence of human disturbance and fragmentation are high; forest communities are predominately early to mid-successional. Two PETS exist here and two others are known to occur historically.

Rating: Class C

## 7. Cultural and Historic

This river corridor contains known sites common to the central SC Piedmont. Ten sites have been determined potentially eligible for the National Register within the corridor, but none of these appear to be of regional interest. Broad floodplains along the river corridor have not been surveyed. Many are on private land and may contain significant cultural resources, particularly of the Mississippi Period, similar to those found on the nearby Tyger and Broad Rivers.

Rating: Class C

### Fairforest Creek - River Evaluation

	River Miles
Segment Miles	9.6
NF Lands	5.1
Private Lands	3.0
Mixed Ownership Lands	1.5

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Fairforest Creek is classified as SC Navigable water. The average size of the stream is 40' to 50'. Water flows year round, but is low in the summer. There is limited floatability.

2. Water quality. SC DHEC ratings.

No SC DHEC rating.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

There are no developed access points along the river.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

There is recreational fishing use along the river.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

There are two bridges that cross this river. They are at County Highways 49 and 16.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Some harvesting of timber has occurred but is not generally seen from the river corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?

Yes, Riverside Shoal and stream bar complexes and forested canebrakes. Forest communities are not particularly unusual. National Forest lands adjacent to the river are included in Management areas 13 and 17 in the Sumter LRMP.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

There are no unusual geological or topographic features, rock outcrops, waterfalls or islands. Several sand bars are present.

## **Outstandingly Remarkable Values**

1. Scenic

The combination of landform, vegetation and water features are generally common for all rivers in the Southern Appalachian Piedmont. The upper portion of the river within the FS proclamation boundaries flows predominately through private lands. These private lands include forest lands, pasture, and farmlands. Pastures and farmlands are readily visible from the river, from this section. Where the river enters National forest land on both sides, forested lands predominate. Some regeneration is visible from the river, but it does not dominate the view. Seasonal color is moderate to minimal. Water appears fairly clear part of the year. The slopes are gentle in the immediate floodplain. The terrain adjacent to the floodplain is moderately steep to rolling. The manmade features along the river that impact the views include bridges.

Rating: Class C

2. Recreational

The recreational opportunities are limited. There is limited access. The visitors to the river are mainly local people who come to fish.

Rating: Class C

3. Geologic

Geologic features are typical of those commonly found within the Southern Appalachian Piedmont Section.

Rating: Class C

4. Wildlife

Habitats are typical of those found within the Southern Appalachian Piedmont Section. No state or federally-listed species are known to occur here.

Rating: Class C

5. Fish and Aquatic Communities

There are no known T & E or C1 or sensitive species. The fish and aquatic community is average for the area with no outstanding species.

Rating: Class C

6. Botanical and Ecological

Botanical and ecological values are common for the Southern Appalachian Piedmont Section.

Rating: Class C

7. Cultural and Historic

Rating: Class C

## King Creek - River Evaluation

	Total River
Segment Miles	3.2
NF Lands	3.2
Private Lands	0
Mixed Ownership Lands	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

This is not a navigable stream due to its small size. Water flows year round.

2. Water quality. SC DHEC ratings.

Rated Outstanding Resource Water by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

Burrell's Ford Campground is a primitive walk-in campground adjacent to the creek. There is a trail that runs alongside the creek from its confluence with the Chattooga River to the falls.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

The creek is primarily used for fishing and by visitors wishing to view the waterfall.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

A FS road used only for work access crosses the creek at its lower level.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Some regeneration has occurred along the Burrell's Ford Road.

8. What are the general forest types along the river? Are there any unusual forest communities?

Received a Class 2 rating in the Natural Features Category of the SC Rivers Assessment. Rated with a high score (30 points) in the scarcity criteria (relative abundance and associations of species or natural communities)

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

King Creek Falls is located here and is a popular attraction for visitors to the area.

### **Outstandingly Remarkable Values**

1. Scenic

Mature forested hardwoods and evergreens and common understory characterize the river. There is little variety in species or vegetation. The vegetation is generally continuous. Some regeneration occurs along the Burrell's Ford Road, which parallels the river for some length. This vegetation and the road adversely impacts scenery adjacent to the river. Large trees predominate. The slopes are moderately steep and generally uniform with some dissection. King's Creek Falls are locally very popular and also draws people from other than local areas. The water is clear, year-round. There are some manmade features, which impact the scenery along the river, a bridge at the campground and two other bridges.

Rating: Class C

2. Recreational

This river provides hiking and other day-use opportunities such as photography, wildlife viewing, fishing, hunting and sightseeing. Fishing for brown and rainbow trout is popular in the creek. There are no opportunities to canoe, kayak or raft because of the size of the river. Visitor often use the existing trail to see King Creek Falls. These falls are published in publications about waterfalls in the upstate of South Carolina. The recreation opportunities are generally common in this part of the state.

Rating: Class C

3. Geologic

Geology is typical of that commonly found within the Blue Ridge Mountain Section.

Rating: Class C

#### 4. Wildlife

Good quality habitat for wildlife with much older forest and continuous forest cover. Fragmentation occurs from crossing at Burrell's Ford Road.

Rating: Class C

#### 5. Fish and Aquatic Communities

No known aquatic T&E or sensitive species are located within the creek. King Creek serves as a refuge for resident brown trout during the warmer weather due to its cooler temperatures and high water quality. The section of Kink Creek upstream from the falls has historically contained native brook trout. Brook trout may still be present in this stream. Brook trout are not common in streams in South Carolina, but are more commonly found in streams throughout the Blue Ridge Mountain Section.

Rating: Class B

#### 6. Botanical and Ecological

Six PETS populations including five different species and one threatened species called small whorled pogonia, *Isotria medeoloides*, occur along this creek corridor. Plant communities are not exceptional in quality, though this creek corridor. Fragmentation and presence of exotics is low.

Four sites for small whorled pogonia occur along this corridor however, three have been extremely small fewer than 6 individuals for the last ten years. Although 14 individuals were found at one site as late as 1991, only 6 were found in 1995. The stronghold for small whorled pogonia in South Carolina appears to be in Ellicott Rock Wilderness, where over 50 individuals were found in 1995.

One C2 species, *Isotria verticillata*, has been reported from here, as has *Carex manhartii* (G2/3), totally three regionally rare species.

Rating: Class B

#### 7. Cultural and Historic

No survey work has been done in this river corridor. This drainage does contain high probability area for the occurrence of heritage resources.

Rating: Class C



## Limber Pole Creek - River Evaluation

	River Miles
Segment Miles	2.0
NF Lands	1.3
Private Lands	0
Mixed Ownership Lands	0.7

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Waterway is not navigable. Water generally flows year-round, but is not considered floatable for canoes and flatbottom boats.

2. Water quality. SC DHEC ratings.

No SC DHEC rating.

3. Is any segment dammed or been channelized. If so, explain.

No, although adjacent to SC 171 the river is tapped to provide bottle water which is commercially sold by Fountainhead Water Company.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

No developed or private access points along this stream. Access is difficult.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any known commercial operations for canoeing, fishing, etc. on the river?

Received a Class 1 rating in the Recreational Fishing category of the SC Rivers Assessment. Rated high scores in the fishing quality, water character and scenic criteria. Level of use is rated as below average with local demand. "Excellent small rainbows." Vegetation is overgrown along the creek and fishing is difficult. This overgrown vegetation somewhat decreases the fishing pressure due to difficult fishing conditions. Most recreation use is from local residents who fish along the stream.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Fountainhead Water Company is located on Limper Pole Creek and obtains water from tributary to commercially as bottled water. This industry is located just off of SC 171. SC 171 crosses Limber Pole Creek, off of NF lands. There is no other development along the river.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

None known.

8. What are the general forest types along the river? Are there any unusual forest communities?

Mixed oak-hickory, shortleaf pine. No unusual geologic or topographic features along the river.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

None of any significance.

## **Outstandingly Remarkable Values**

1. Scenic

The river has a very enclosed feeling, access is difficult. The mature forested character of the river confines views to the foreground of the visitor. There are large older trees and common communities. There is some seasonal color with the corridor. There are no known waterfalls on the river. The water is clear. SC State Highway 130 crosses the river in two places. A private road crosses the river in one place.

Rating: Class C

2. Recreational

River received limited use from local residents. Some visitors may come from just across the state line in the NC, but travel distance is still limited for those visitors. The river does not offer the general public opportunities for boating. Limber Pole Creek received a Class I rating for recreation fishing based on quality of experience, size of take, scenic quality and water quality.

Rating: Class C

3. Geologic

Geology is primarily granite and is fairly common found with the Blue Ridge Mountain Section.

Rating: Class C

4. Wildlife

Diversity and quality of habitats is high with much older forest. No PETS animals occur here.

Rating: Class C

5. Fish and Aquatic Communities

There are no known T&E or C1 or sensitive species here. There is a reproducing population of rainbow trout in this river. Reproducing populations of rainbow trout are unusual in South Carolina, but not in the Blue Ridge Mountains.

Rating: Class B

6. Botanical and Ecological

Diversity and quality of habitats in this creek are generally high, with an abundance of older forested habitats. One PETS species and one population are known to occur here.

Rating: Class C

7. Cultural and Historic

No survey work has been done in this river corridor. This drainage does not contain high probability area for the occurrence of heritage resources.

Rating: Class C

## Little River - River Evaluation

	River Miles
Segment Miles	6.2
NF Lands	6.2
Private Lands	0
Mixed Ownership Lands	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Little River is classified as SC Navigable water. Pool elevation of Clark Hill reservoir is 330'. Much of the area surrounding Little River is floodplain just above the 330' level, appears there is a lot of potential for flooding in the area.

2. Water quality. SC DHEC ratings.

It rated a Freshwater resource by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

From 0.4 miles north of SC 39 to confluence with Clark Hill Reservoir is not free-flowing due to the effect of Clark Hill Dam. The normal pool elevation of Clark Hill Reservoir is 330'. Little River will be considered free-flowing from 0.4 miles north of SC 39 to the forest proclamation boundary. There is an impoundment for the Calhoun Mill, which still operates on a limited basis. Impoundment is approximately 15' high, with constant water flow. Impoundment itself is north of the FS proclamation boundary, and river is free-flowing on NFS lands as described above.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

Public boat ramp (FS) at SC 81 crossing. Used for boating and fishing access. This access is not in the free-flowing section. SC 19 crossing is a potential, undeveloped access point, but currently has a 10' to 15' drop to the river. A boat access on NF land is planned off FS 536 just south of Calhoun Mill. Some boaters/floaters access on private land on east side of river just below Calhoun Mill dam (north of proclamation boundary). Flooding in 1993 reached the 100 year flood levels. This flooding created a lot of erosion at the Calhoun Mill area, and required extensive restorations.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Typical users are local people knowledgeable about the river. Some people may visit the river from Georgia, but travel radius is limited (typically less than 50 miles one way). Currently, the personnel from the Long Cane RD and from John de la Howe School are planning to construct a trail, which will be located on SC lands at John de la Howe School and on NF land. Some of this trail would be located within the study corridor.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Four roads (FDR 536, 550B, 3051, and 550A) parallel the Little River within the ¼ mile study boundary. FDR 550B and 3051 are located across the river from each other.

However, these roads are most likely not readily viewed from the river due to the topography and vegetation. Roads were built to access wildlife openings and timber harvests.

Calhoun Mill is still operational just north of the proclamation boundary. NF lands with the ¼ mile corridor contain recent (0-10) timber harvests and managed wildlife openings. Private lands within the corridor contain mostly timberlands and pastures. There are no major utility corridors; power lines follow existing road rights of way.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

None known.

8. What are the general forest types along the river? Are there any unusual forest communities?

No unusual forest communities known. The river corridor is currently within MA 13 General Forest Area in the Sumter LRMP

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

None known.

## **Outstandingly Remarkable Values**

1. Scenic

Scenery is typical of landform, vegetation, and water found within Piedmont. No known rock features of significance. Water is generally muddy most of the year, especially after rain events. There is a nearly continuous overstory within the Forest Service ownership. The terrain is typically rolling and short slopes lead to the river. The landscape becomes flatter with the influence of the Clark's Hill Reservoir. The width of the river in the lower portion allows for long vistas. These long views are not typical of Piedmont streams however it has been drastically influenced by the reservoir.

Rating: Class C

2. Recreational

Visitors do not travel long distances. Most visitations are from locals, from Aiken SC or Augusta GA areas. Visitors generally travel 50 miles or less one way to visit river. Edisto River Canoe and Kayak Commission is interested in developing the river into a canoe trail for commercial use, but that idea is not yet developed. Little River does provide opportunities for canoeing or kayaking or with flatbottom boats. Access is

generally from private land or at road crossings for the free-flowing portion of the river. River level fluctuates so it is not easily floatable year round and there are downed trees and debris in the river. However, due to influence of Clark Hill dam, Little River offers more days per year where it is floatable than do many other Piedmont Rivers.

Rating: Class C

3. Geologic

Geologic features are typical of those commonly found within the Southern Appalachian Piedmont Section.

Rating: Class C

4. Wildlife

Diversity and quality of habitats is common for the Southern Appalachian Piedmont Section. No state or federal listed species are known to occur here. Good hunting.

Rating: Class C

5. Fish and Aquatic Communities

There are no known T & E or C1 or sensitive species. The fish and aquatic community is average for the area with no outstanding species.

Rating: Class C

6. Botanical and Ecological

Botanical and ecological values are common for the Southern Appalachian Piedmont Section. Evidence of past human disturbance is high. No known state or federally listed species occur here.

Rating: Class C

7. Cultural and Historic

This river corridor contains cultural sites of state and local significance that are eligible for the NRHP. Mississippi period sites Tyger Village contain significant information pertaining to the Mississippi Period ceramic sequence that is poorly defined for this portion of the state. Important historic period sites include the 18<sup>th</sup> and 19<sup>th</sup> century Otterson's Fort and cemetery and an 18<sup>th</sup> –early 19<sup>th</sup> century blacksmith.

Rating: Class B

## Long Cane Creek - River Evaluation

	River Miles
Segment Miles	29.2
NF Lands	12.6
Private Lands	7.1
Mixed Ownership Lands	9.5

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Long Cane Creek is classified as SC Navigable water. Water flows year round, but levels fluctuate. The river is not always at levels convenient for floating in canoe, kayak, or flat bottom boats.

2. Water quality. SC DHEC ratings.

It rated as a Freshwater Resource by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

The bottom portion is influenced by Clark Hill Dam. The mean water level of Clark Hill lake is 330' mean sea level. Free-flowing portion begins upstream of the Hwy 28 boat access. (There is no good point to define actual end of free-flowing portion, upstream from confluence of Linkay Creek.)

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

There are two developed boat access points on the lower portion of the river. Neither access point is on the free-flowing portion. No picnic or camping facilities are within the corridor, nor are there any private access facilities.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Proximity of river to Greenwood and Abbeville results in steady recreational use of the river. Typical uses include fishing, hiking, horseback riding, and some canoeing, kayaking and flat bottom boating. Visitors are typically local; that is they travel 50 miles or less one way to access the river. Long Cane Horse Trail and Cedar Springs Motorcycle Trail are two developed trails in the local area. Long Cane Horse trail crosses the river in two locations (end of FDR 530, and near SC 31). Cedar Springs Motorcycle Trail enters the ¼ mile corridor between the Seaboard Coast Railroad and SC

133. Motorcycle trail users and horse trails users are willing to travel greater distances, their use is trail related, not necessarily river related. Also, the horse trail currently follows Long Cane Creek for some distance. Horse riders generally prefer that the trail not be located in riparian areas. There are no known commercial operations on Long Cane Creek.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Within the FS proclamation boundary, 9 SC or county roads cross the river. One pipeline, two major power lines, and 1 railroad cross the river. Most of these developments cross the river upstream from the Long Cane Scenic Area. In fact, downstream from the Scenic Area, there are no utility or railroad crossings, and only 3 road crossings. North of the Scenic Area, there are 7 short FDR road segments located within the ¼ mile corridor which approach the river. One of these segments, FDR 505E crosses the river with a wooden bridge. Downstream (south) of the Scenic Area, 9 FDR road segments are within the ¼ mile corridor and approach the river, 2 road segments parallel the river within the corridor.

Private lands along the river contain a variety of uses; homes, pastures, and timberlands. Homes are more common in the upper reaches, near Abbeville and Greenwood. The city of Abbeville has a pumping station located on FDR 505E. This pumping station is no longer in use.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

There are some recent (0-10 years) regeneration areas on NF lands within the corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?

Long Cane Scenic Area contains 10 “spots” of long cane (*Arundinaria gigantea*) and contains the SC Champion Shagbark Hickory.

Most of the river corridor is included in MS 12 and 13 in the existing Sumter LRMP. The Long Cane Scenic area is MA 7, which restricts timber harvest and other activities.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

There are no known unusual geological or topographic features. No significant rock outcrops or waterfalls. There are 3 oxbows located between SC 33 and Long Cane Scenic Area.



## **Outstandingly Remarkable Values**

### **1. Scenic**

Scenery is generally typical of that found along Piedmont streams. Utility corridors and frequent road crossings upstream from Long Cane Scenic area make the scenery on this river typical of the region. Land uses on interspersed private lands render the landscape typical of a Piedmont river, with the exception of the views from the river with the Scenic Area. Water appears clear part of the time, and is typically muddy mainly after large storm events. There is little variety in species, color or textures along the river corridor. The slopes along the river are moderate to gentle. Seasonal color is moderate to minimal most years.

Rating: Class C

### **2. Recreational**

Visitors do not often travel long distances (more than 50 miles) to reach the river, with the possible exception of the horseback riding use, and that use is not river dependent. Long Cane Creek provides opportunities for canoeing and boating, but does not contain rapids. Low water flows in the summer limit opportunities for water sports.

Rating: Class B

### **3. Geologic**

Geology is typical of that commonly found within the Southern Appalachian Piedmont Section.

Rating: Class C

### **4. Wildlife**

No PETS wildlife species are known to occur within the river corridor, but it has been little surveyed. A diversity of habitats occur here due to the variety of age classes and river depths due to the damming upstream.

Rating: Class B

### **5. Fish and Aquatic Communities**

There are no known T & E or C1 or sensitive species. The fish and aquatic community is average for the area with no outstanding species known to occur.

Rating: Class C

## 6. Botanical and Ecological

Two PETS plan populations including three PETS species are known to occur here. High quality older forest bottomland hardwood communities are known to occur here. Fragmentation is high due to the large amount of human disturbance historically.

Rating: Class C

## 7. Cultural and Historic

This corridor contains sites common to the piedmont of South Carolina. Three potentially eligible sites probably do not contain information of regional significance. An Indian mound reported in the corridor in the 19<sup>th</sup> century has not been relocated. Areas in the corridor have a high probability for undiscovered significant sites.

Rating: Class C

## Stevens Creek - River Evaluation

	Total River	Eligible Segment
Segment Miles	24.2	13.5
NF Lands	4.2	2.0
Private Lands	9.8?	1.6?
Mixed Ownership Lands	10.2	9.8

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Stevens Creek is classified as SC Navigable water. Average stream width is 40' to 70'. Water flows year round and is floatable much or the year. Boating and canoeing can be limited in summer due to low water flows. There is evidence of much fluctuation in water levels resulting from rains.

2. Water quality. SC DHEC ratings.

It rated as a Freshwater Resource by SC DHEC. There are 17 documented point sources of pollution with permitted discharges totaling more than 5.6 MGD of effluent to the Stevens Creek sub basin. (*Freshwater Mussel Inventory of the Stevens Creek Sub basin, Long Creek Ranger District, Sumter National Forest, South Carolina*). The town of McCormick plans to construct an additional wastewater disposal into Stevens Creek north of the Forest Proclamation Boundary.

3. Is any segment dammed or been channelized. If so, explain.

Segment 1: There is an impoundment north of the Forest proclamation boundary at Hwy 283. The impoundment has an approximate 40' drop. Stream channel quickly reverts to natural below Hwy 283. There is an impoundment for Price's Mill. The water generally flows freely over this 15' dam. The stream channel quickly reverts to natural below the actual dam.

Segment 2: The Stevens Creek Dam on the Savannah River backs up the water approximately to SC 53. From SC 53 to the confluence with the Savannah River, Stevens Creek is not free flowing due to the influence of the Stevens Creek Dam on the Savannah River. Spillway elevation at Stevens Creek is 187'.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

There is an undeveloped access on private land (N. of FS Proclamation Boundary, at SC 283). Access points highlighted in *Paddling South Carolina* are SC 283, SC 227 (Turkey Creek), SC 23, and Stevens Creek Park at SC 53. Undeveloped access point within the FS proclamation boundary occur at all major road crossings. SC 21 had an undeveloped access point, which is on private land. There are 2 parking areas developed for access on National Forest lands. One area is at the confluence of Turkey and Stevens Creeks.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Recreation use is typical for the Southern Appalachian Piedmont including hiking, biking, wildlife viewing, photography, hunting and fishing. There are no commercial operations for canoeing or fishing.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Segment 2: Two main power lines that originate at Clarks Hill dam enter the corridor and cross the river, one near the confluence of Turkey and Stevens Creeks, the other just north of SC 53. One SC highway, SC 230 parallels Stevens Creek within the corridor for approximately 1-½ miles to its intersection with SC 53.

There is an FAA tower/administrative site just outside the river corridor off of C654. The segment from SC 88 to SC 53 consists mainly of private lands. Some of the private lands in this segment contain pastures and some are in industrial forestlands. There is a housing subdivision with the ¼ mile corridor boundary. These homes are located between the power line from the Clarks Hill dam and the river. However, even in this segment, with the exception of the subdivision and some pastures and farm ponds, most

of the land along the river is forested. As the river approaches SC 230, more homes appear with the corridor, on both sides of the river.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Much of the National Forest lands within Stevens Creek corridor, from SC 183 to just north of SC 88; lie with MA 7, Turkey and Stevens Creek Corridor. Timber management is restricted in this MA, which extends for 300 feet on each side of the river.

8. What are the general forest types along the river? Are there any unusual forest communities?

Bottomland hardwood, mixed mesic forests, and basic forest communities. Bald cypress and mountain laurel are unusual components of the vegetation.

Received a Class 1 rating in the Natural Features category in the SC Rivers Assessment. Rated with a high score in all 4 criteria (scarcity, quality, condition, and scientific value).

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

Several granite rock outcrops, and slate beds, and rocky shoals can be readily observed. From SC 23 to Hwy 88-143, Stevens Creek runs in a straight line which may follow a geologic fault line.

## **Outstandingly Remarkable Values**

1. Scenic

The scenery consists of mainly forested lands, with some interspersed pasture and farmlands. There is more contiguous overstory in the upper reaches of the river where the Forest Service had more ownership. Further down the river where ownership patterns are interspersed the overstory is patchier. There are some steep, short slopes to the river to add interest and some rock outcrops scattered along the river. The occurrence of bald cypress (*taxodium distichum*) adds to the visual variety. However the majority of the vegetation is common throughout the area. Water appears clear part of the year. Seasonal color is moderate in the fall. There are several bridges and crossings that impact the visual quality of the river.

Rating: Class B

2. Recreational

Visitors are often willing to travel approximately 50 miles on way to the river. Most visitors come from Augusta, GA or neighboring communities. The presence of the

Turkey Creek Trail created an additional draw. River receives a lot of use in the spring and fall from fishing, canoeing, swimming, and hiking.

Upper portion (above S-88-143) is considered fast flatwater. From S-88-143 to Hwy 53, the water is considered flatwater. Limited floating opportunities in summer and early fall due to the low water levels. It received a Class 1 rating in the Whitewater Category in the SC Rivers Assessment for the segment from Hwy 283 to SR 21. It received a Class 1 rating in the flatwater category for the segment from SR 21 to Stevens Creek Park (near SC 53). It received a Class 2 rating in the Recreational Fishing Category of the SC Rivers Assessment.

Rating: Class B

### 3. Geologic

Stevens Creek Heritage Reserve has been noted for its unusual geology. Also, the occurrence of unusual calciphilic plants here suggests something unusual in the geology. However, nothing unusual is noted on geology maps available for the Piedmont. Rock outcrops were observed with the corridor.

Rating: Class B

### 4. Wildlife

Segment 1: Quality of habitat is good for many game species. A good variety of habitats occur related to the variety of age classes and abundant hardwoods within the corridor. Steep rocky bluffs and numerous rock outcroppings provides habitat for Webster's salamander (*Plethodon websteri*), a G3 species, which inhabits Stevens and Turkey Creeks in South Carolina. Older forests occurring along this creek providing a habitat component not commonly found anywhere else on the Piedmont.

Rating: Class A

Segment 2: Quality of habitat in this section is more broken due to more intensive forestry practices and agricultural uses on the adjacent private lands within the corridor.

Rating: Class B

### 5. Fish and Aquatic Communities

Several species of mussels occur within this watershed. The Turkey Creek subbasin with the Stevens Creek itself has a high diversity of mussels by Stevens Creek itself has a relatively poor diversity of mussels. The squawfoot mussel is found here and could be considered a sensitive species. The discharge of wastewater effluents into Stevens Creek has possibly affected the water quality in this subbasin.

Rating: Class C

## 6. Botanical and Ecological

Segment 1: Basic forest communities occurring along this river are unusual, as is the presence of older bottomland forests, which include bald cypress, a species typical of the coastal plain, and mountain laurel, a species typical of the mountains. One federally threatened plant, Florida gooseberry (*Ribes echinellum*) occurs in the corridor and at one location in Florida, and that is all. One C2, G2 species, shoal's spider lily (*Hymenocallis coronaria*), occurs among rocks with the river just below the SC Hwy 21 bridge. Faded trillium (*Trillium discolor*), rated G2, occurs abundantly here as well on several other drainages across the district.

Two exotic species, Japanese privet (*Ligustrum sinense*) and *Microstegium vimineum* occur here in abundance as well as in every other bottomland hardwood community in the piedmont. Several plant communities have been noted as unusual by the SC Heritage program. The presence of plants unusual for the piedmont gives it an exceptional rating.

Rating: Class A

Segment 2: This section does not contain the Florida gooseberry nor any known locations of Shoal's Spider lily. Bald cypress does occur in this segment, without the associated mountain laurel as occur in portions of Segment 1. This segment also contains an abundance of exotic species such as the Japanese privet.

Rating: Class B

## 7. Cultural and Historic

Segment 1: This corridor contains Price's Mill, which is on the National Register of Historic Places and six eligible or potentially eligible sites. These sites are common piedmont South Carolina types. However, a larger than expected number of early archaic and paleoindian artifacts have been found along Steven's Creek and the Stevens Creek drainage was a focus of late archaic cultures. These finds made Stevens Creek an area of scientific interest. The corridor may contain as yet unreported state or regionally significant prehistoric sites.

Rating: Class B

Segment 2: Mims point is located just downstream from the free-flowing portion of Section II. Mims point is a multi-component of national significance. However, Mims point is located at the confluence of Stevens and Savannah River. This portion of the stream is impounded by the Stevens Creek Dam and is not free-flowing.

Rating: Class B

## Tamassee Creek - River Evaluation

	Total River	Segment 1	Segment 2
Segment Miles	3.7	0.9	1.7
NF Lands	3.7	0.9	1.7
Private Lands	0	0	0
Mixed Ownership Lands	0	0	0

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Tamassee Creek is not a SC Navigable Water. The stream averages 8 feet to 10 feet wide. It is not generally considered floatable for canoes and kayaks. This water flow fluctuates rapidly. In addition, stream courses range over a wide alluvial bottom, and changes course fairly frequently.

2. Water quality. SC DHEC ratings.

No SC DHEC rating.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

A portion of the Foothills Trail crosses Tamassee Creek, near Lee Falls. Foothills Trail is the only public access point in the upper portion of the river. FDR 715A crosses Tamassee Creek closer to the FS Proclamation boundary. SC 107 is within ¼ mile of the stream, but there is no defined access to Tamassee Creek from the highway, except the Foothills Trail. FDR 715A provides access for fishing and hunting use. Fishing and hunting and hiking are the main uses within the study corridor. There are no developed access points, picnic or camping facilities along Tamassee Creek, nor are there any private facilities.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Hiking, hunting, recreational gold-panning and fishing are the main uses along the river. Recreation use is moderate along this river. There are no commercial outfitting operations. Recreational gold-panning is allowed in Tamassee Creek.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

There are no major developments with the river segments included in this study. Downstream from the FS proclamation boundary, the stream is bordered predominately by agricultural lands and pastures. As mentioned previously, FDR 715A crosses the river. FDR 715A has a low water bridge across the creek. An unimproved road used for administrative purposes to access and maintain a series of 4 wildlife openings (Norton Fields) leaves FDR 715A, just on the east side of the stream. This road is gated to public use. One of the wildlife openings included a Northern Red Oak and White Oak progeny test.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

There has been some regeneration harvesting within the study corridor in the last ten years. There is not any recent regeneration in the corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?

It received a Class 2 rating in the Natural Features category in the SC Rivers Assessment. It received a high score in quality and condition and a low score in scarcity.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

Lee Falls is the predominate waterfall along the river. Lee Falls is designated as a special management area in the Forest Plan and activities are restricted to maintain the scenic quality of the around the falls.

## **Outstandingly Remarkable Values**

1. Scenic

This river is characterized by mature forested hardwood and evergreens and common understories of mountain laurel and rhododendron in the upper reaches of the river. Slopes are very steep and access is difficult. Further down the river, as the slopes become much gentler, the views turn from forested overstory to farmland and pastures. There are large older trees in the upper reaches. The views are confined to mostly foreground views in this area. Longer vistas only are possible when the viewer is in the lower stretches where the slopes become gentler and some overstory is absent. There is a variety of vegetation types with the corridor. Seasonal color is common. The water is clear in the upper reaches. There are some manmade features such as bridges and crossings. Also, there are many cultural influences like rural homes and farms, etc.



Rating: Class C

2. Recreational

This river has some potential for day-use activities in the upper reaches near Lee Falls. Fishing is popular along this river but these are common opportunities. Overall, the river offers opportunities that are common throughout this area.

Rating: Class C

3. Geologic

Occurs within the Brevard fault zone, generally accepted as the boundary between the Blue Ridge Mountains and the Southern Appalachian Piedmont. The Brevard fault zone had a complex geological history, significant in that it is newer geologically than much of the adjoining area due to the faulting and thrusting which occurred there during the late Paleozoic. The Brevard fault is only 1 to 2 kilometers wide, extending from Alabama almost to the North Carolina Virginia border.

Rating: Class B

4. Wildlife

No PETS animals are known to occur here, though the area had probably not been well sampled. Diversity of habitats is high due to a variety of age classes and the presence of wildlife openings. Quality of habitats for wildlife is high in some sections.

Rating: Class B

5. Fish and Aquatic Communities

There are no known T&E or C1 or sensitive species here. The fish and aquatic community is average for there are with no known outstanding species.

Rating: Class C

6. Botanical and Ecological

Tamassee Creek has possible the largest number of listed plants on the Andrew Pickens, primarily in and around the Lee Falls where it crosses the Brevard Belt exposing carbonate rock and talus slopes. Tamassee Falls is rich in fern species, providing a home for five list ferns, including the largest population of walking fern (*Asplenium resiliens*) on the district and possibly in the state. The only population of fernleaf phacelia (*phacelia bipinnatifida*) in the state is found here. Thirteen PETS plant species and 21

populations are known to occur along the drainage. Quality of habitats and continuity of forest cover is high in Section 1. The rich cove communities occurring in this section are rare within the Blue Ridge. The canopy approaching the falls has black walnut, white walnut (C2), basswood, hemlock, northern red oak, and very large tulip poplars.

Rating: Class A for Section 1

The plant communities occurring adjacent to the creek, as it flows out of Lee Falls, are highly disturbed having undergone farming historically, and management as wildlife openings in the more recent past. Several exotic species occur here. Intermingled with some rare species which have manages to survive the intensive land use immediately adjacent to the creek.

Rating: Class B for Section 2

#### 7. Cultural and Historic

There are sites eligible for the National Register of Historic Places. Just downstream from the proclamation boundary, near SC 375, is the Historic Cherokee Village of Tamasee, a type of site that has not been reported anywhere else. General Andrew Pickens settle here and took over the site from the Cherokee and continued farming in the bottoms near the creek. The creek's floodplain has a high probability for additional prehistoric and historic Indian sites.

Rating: Class B

### Turkey Creek - River Evaluation

	Total River
Segment Miles	12.5
NF Lands	6.7
Private Lands	0.1
Mixed Ownership Lands	6.7

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Turkey Creek is classified as SC Navigable water. Average size of the stream is 40' to 60' feet. Water flow is adequate for canoes and flat bottom boats, but flow is limited in summer and early fall.

2. Water quality. SC DHEC ratings.

It is rated as a Freshwater Resource by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

None

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or there any private facilities?

There are developed canoe access points (no ramps, but paved parking lots) at SC 283, County Road 68 (Key Bridge), and at the confluence with Stevens Creek. A bridge crosses the river at the FS proclamation boundary (SC 35) by access is difficult, and water levels are generally too low for boating/canoeing from this far upstream. There is no picnic or camping facilities either on National Forest lands or on private lands along the river.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Fishing, swimming, and boating (canoeing) are the main recreational uses along the river. Typically, visitors are local people, or travel from Aiken, North Augusta, or Augusta area. Visitors also come to float the river from Columbia. Fishing and swimming use tend to be more local. Use has been increasing in the last few years. Some of this increased use is due to the improved parking and canoe access facilities along Turkey and Stevens creeks. There are no known commercial outfitters on this river. The Turkey Creek Trail parallels the river from the confluence with Stevens Creek to just north of the pipeline, which crosses the river. From this point, the trail leaves the river corridor and heads to SC 283. There is also a growing amount of mountain bike use, which originates at the Key Bridge parking lot. Bikers then cross the original Key Bridge and tie in with the Turkey Creek Trail.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

It received a Class 2 rating in the undeveloped category in the SC Rivers Assessment.

From the FS proclamation boundary at SC 35 to the bridge at County Road 283, the lands within the corridor consist mainly of forested lands, both on private and on National Forest. There is some pasture adjacent to the river near SC 35. A county road and FS 611A enter the river corridor for short segments in this section, and another short road goes from CR 283 toward the river. Some are not visible from the river. The section of Turkey Creek from 283 to Key Bridge contains mostly forested lands within the corridor. At CR 283, the Edgefield Work center is located just within the ¼ mile study corridor. A large regeneration area is located on private lands just downstream from SC 283, but there is a forested buffer to decrease the impact from the river. A pipeline crosses the

river toward the middle of the segment. FS roads L285-B and L286-1 parallel the river but it is not visible from the river and does not approach it. FS 8006 enters the river corridor from SC 68 and approaches the pipeline. The segment from SC 68 (Key Bridge) to the confluence with Stevens Creek is similar to the previous segments. Price's Bottoms is a large field that was established when the FS acquired the land. The Forest Service in conjunction with SC DNR maintains the bottoms as a wildlife opening. This opening is visible from the river, but there is a forested buffer to the river. Several regeneration areas exist on National Forest land along this segment. Six roads (L296-1, 618, 617B, 623, 629B and 629D) enter the corridor for short distances with this segment. None of these roads parallel the river.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

No recent regeneration or other changes in the corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?  
Bottomland hardwood forests, oak-hickory forests, pine-oak forests, and mixed mesic forests are common here. Basic forests are unusual, and the presence of bald cypress and mountain laurel are unusual.
9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

Rock outcrops and rocky shoals are found and are unusual; no waterfalls or islands are found.

## **Outstandingly Remarkable Values**

1. Scenic

The combinations of landform and vegetation are unusual in the local area and in the Southern Appalachian Piedmont, due to the presence and amount of bald cypress within the river corridor. Pastoral landscapes are interspersed along the river but forested views dominate. There are some older trees throughout the area. Forest regeneration areas are typically visible from the river. Water in the river appears clear part of the year. There are some rocks in the river. Seasonal color is moderate to minimal. Rolling to moderately steep slopes surrounds the river.

Rating: Class B

2. Recreational

Visitors travel from within the Southern Appalachian Piedmont and from the adjacent state (GA) to recreation along the river. River provides a wide range of recreation

opportunities, fishing, boating, swimming, and hiking and mountain biking are common within the corridor due to the Turkey Creek Trail. There are no rapids in the river; the river would most likely be rated as fast flat water. The river is not known to note in any state or regional publications.

Rating: Class B

### 3. Geologic

Granite rock outcrops and slate beds are somewhat unusual within the Southern Appalachian Piedmont. Calciphilic flora suggests something unusual in the geology, but nothing shows up on geology maps available for the area.

Rating: Class B

### 4. Wildlife

Steep rocky bluffs and numerous rock outcroppings provide habitat for Webster's salamander (*Plethodon websteri*), a species rated G3 by the Nature Conservancy. Several sitings for Webster's salamander have been located throughout Turkey Creek and Steven's Creek. This is an unusual element for the Piedmont region. Large trees of a variety of species provide another element not commonly found in the Piedmont.

Rating: Class A

### 5. Fish and Aquatic Communities

Carolina heelsplitter (*Lasmigona decoratal*, endangered), Brook floater (*Alasmidonta varicose*, C2), and Yellow lampmussel (*Lampsilis cariosa*, C2) were located within Turkey Creek in April 1995. (Alderman, 1995). In the report "Freshwater Mussel Inventory of the Stevens Creek sub basin, Long Cane Ranger District, Sumter National Forest, South Carolina," John Alderman state that Turkey Creek should be considered the most important creek ecosystem in the Savannah River Basin (SC and GA) for freshwater mussel. Verbal conversations with Alderman indicate that the habitat available in Turkey Creek exceeds the quality of the habitat where the mussels occur in rivers in North Carolina.

Rating: Class A

### 6. Botanical and Ecological

Two state listed species occur here, including upland swampprivet (*Forestiera ligustrina*) and tuberous gromwell (*Lithospermum tuberosum*). Faded trillium (*Trillium discolor*), a regionally rare species rated G2, is common here as well as on several other drainages across the district. Bald cypress, which occurs here, is normally restricted to the coastal

plain. The floodplain on the lower section of Turkey Creek contains numerous very large trees including cherrybark oak, cottonwood, and slippery elm.

Rating: Class A

#### 7. Cultural and Historic

This corridor contain four recorded potentially NRHP eligible sites. These sites are common piedmont South Carolina types and are not of regional or national significance. There is high potential for undiscovered NRHP eligible sites.

Rating: Class C

### Tyger River - River Evaluation

	River Miles
Segment Miles	30.2
NF Lands	10.3
Private Lands	9.7
Mixed Ownership Lands	10.2

1. Is the waterway navigable? What is the average size of the stream? Does the water flow year round? Is it floatable for canoes? Flat-bottom boats? What is the rate of flow, and how much does it vary year round?

Yes, Tyger River is classified as SC Navigable water. The average size of the stream is 50' to 100'. Water flows year round, and is mostly floatable with canoes and flat bottom boats year round.

2. Water quality. SC DHEC ratings.

Rated a Freshwater resource by SC DHEC.

3. Is any segment dammed or been channelized. If so, explain.

No.

4. List public access points for canoeing, fishing, swimming, or wading. Are there any developed FS access points, picnic or camping facilities, or any private facilities?

There are four access points along the river. Two are on private ownership and are associated with a bridge. The other two are Rose Hill Boat Ramp and Beatty's Bridge Boat Ramp. No facilities other than the ramps and a small parking area are available. The two on private are located at Cedar Bluff Bridge, County Highway 49, and Gordon's Bridge, County Highway 54. Both are undeveloped.

5. What type of recreation use does the river typically receive? Who are the typical users (how far do they travel to use the river)? How much recreation use is there along and on the river? Are there any know commercial operations for canoeing, fishing, etc. on the river?

Recreation use is by canoe or raft in floating the river. Use is low with people traveling less than 45 miles to use the river. No commercial operations.

6. Are there any major developments along the river (industry, homes)? Do any roads, power lines, or pipelines run parallel to or cross the river?

Received a Class 2 rating in the Undeveloped Category for the SC Rivers Assessment.

No major developments exist along the river. A powerline, a railroad and a pipeline cross it. There are five bridges at County Highway 49, County Highway 16, State Highway 176, State Highway 72/121 and County Highway 54.

7. Have there been any recent (since last aerial photos) changes in the vegetation patterns along the rivers and riverbanks? (Regeneration, agriculture, development).

Some harvesting of timber has occurred but is not generally seen from the river corridor.

8. What are the general forest types along the river? Are there any unusual forest communities?

Loblolly pine and mixed pine-hardwood are predominate in the uplands. Hardwoods occurring with the loblolly pine include southern red oak, white oak, Florida sugar maple, sourwood, and sweetgum in the uplands. Sycamore, box elder, eastern cottonwood, hop hornbeam, and ironwood occur in the bottomlands. A few basic forest or mixed mesic forest communities occur adjacent to the Tyger River and are unusual. Mountain laurel may be found on isolated rock outcrops.

National forest lands along the river are included in Management Areas 5, 13, and 17 in the Sumter LRMP. Management Area 5 contains the Calhoun Experimental Forest. Research in the Calhoun Forest is directed toward littleleaf disease, southern pine beetle infestation, and deficient site conditions. Timber management is allowed, but is restricted.

9. Are there any unusual geologic or topographic features along the river? Rock outcroppings? Waterfalls? Islands?

A few rock outcrops may be found, but no waterfalls or islands. Topographic features are common.

## **Outstandingly Remarkable Values**

### **1. Scenic**

Mostly forest lands (NF and private ownership) can be viewed from the river. There are some pasture and farmlands, which can be viewed from the river, and some homes, particularly near major road crossings. Water in river appears muddy most of the year. Landform and vegetation within the corridor are typical of Southern Appalachian Piedmont Rivers. The slopes associated with this river are typically less than 15% in the last thirty miles that pass through the National Forest. The seasonal color is moderate to minimal. There are several manmade features, which detract for the scenery including power lines, transmission lines, and bridges. The scenery is common for this area.

Rating: Class C

### **2. Recreational**

The recreational opportunities that are available include fishing, canoeing/boating and other water-related day use activities. There are access points along this river that facilitate these activities. Most visitations to the river are from local individuals. Rated as last flatwater in Paddling South Carolina. The Tyger River is featured as a SC River Trail.

Rating: Class C

### **3. Geologic**

Geologic features are typical of those commonly found within the Southern Appalachian Piedmont Section.

Rating: Class C

### **4. Wildlife**

Diversity and quality of habitats is common for the Southern Appalachian Piedmont Section. No state or federal listed species are known to occur here. Good hunting.

Rating: Class C

### **5. Fish and Aquatic Communities**

There are no known T & E or C1 or sensitive species. The fish and aquatic community is average for the area with no outstanding species.

Rating: Class C



6. Botanical and Ecological

Botanical and ecological values are common for the Southern Appalachian Piedmont Section. Evidence of past human disturbance is high. No known state or federally listed species occur here.

Rating: Class C

7. Cultural and Historic

This river corridor contains cultural sites of state and local significance that are eligible for the NRHP. Mississippi period sites Tyger Village contain significant information pertaining to the Mississippi Period ceramic sequence that is poorly defined for this portion of the state. Important historic period sites include the 18<sup>th</sup> and 19<sup>th</sup> century Otterson's Fort and cemetery and an 18<sup>th</sup> –early 19<sup>th</sup> century blacksmith.

Rating: Class B

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# APPENDIX E

## BIOLOGICAL ASSESSMENT/BIOLOGICAL EVALUATION

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**Final Biological Assessment**  
Proposed Revised Land and Resource Management Plan  
Sumter National Forest  
South Carolina  
October, 2003

### I. INTRODUCTION

This Biological Assessment (BA) addresses the potential effects on federally threatened, endangered, or proposed species and their habitats, of the Revised Land and Resource Management Plan for the Sumter National Forest (Revised Plan).

Threatened, endangered, and proposed species are designated by the U.S. Fish and Wildlife Service (USFWS) and are managed under the authority of the Endangered Species Act (PL 93-205, as amended) and the National Forest Management Act (PL 94-588). The Endangered Species Act requires federal agencies to ensure that all actions which they "authorize, fund, or carry out" are not likely to jeopardize the continued existence of any threatened, endangered, or proposed species or their habitat. Agencies are further required to develop and carry out conservation programs for these species.

The direction in the Revised Plan is general and does not preclude or replace the requirement for site specific, project-level consideration of threatened, endangered, or proposed species and further consultation with U.S. Fish and Wildlife Service, under Section 7 of the Endangered Species Act, as needed.

The Sumter National Forest includes approximately 360,000 acres of National Forest System lands in the Southern Appalachian Blue Ridge and piedmont of South Carolina. The forest is divided into three ranger districts located in 11 counties. The Andrew Pickens district is located in western Oconee County; the Enoree district is located in Chester, Fairfield, Laurens, Newberry, and Union Counties; and the Long Cane district is located in Abbeville, Edgefield, Greenwood, McCormick, and Saluda Counties.

### II. CONSULTATION HISTORY

Consultation between the National Forest (Forest Service) and the U.S. Fish and Wildlife Service (USFWS) on proposals which may affect listed species or their habitat is required under the Endangered Species Act (ESA), the implementing regulations for the ESA at 40 CFR 402, and Forest Service Manual direction at 2670. The Forest Service and the USFWS are also required to consult on actions designed to further the conservation of threatened and endangered species.

Personnel from the Sumter National Forest and the USFWS commonly consult informally on projects likely to affect listed species. Personnel from the Sumter National Forest met with various individuals including USFWS at meetings to further the conservation of the red-cockaded woodpecker (January, 2003), mussels (March, 2003), and smooth coneflower (March, 2003). Personnel from the Sumter

National Forest frequently request updated county lists from the USFWS for threatened, endangered, and proposed species occurring in counties in South Carolina. The most updated list obtained from the USFWS for use in this biological assessment was dated March 2003.

A Memorandum of Understanding (MOU) between the Forest Service and the USFWS designed to increase the level of coordination between the two agencies in providing for threatened and endangered species occurring on the 5 National Forests in the Southern Appalachians undergoing plan revision, was developed in 2002. This MOU resulted in the formation of several interagency teams which discussed Forest Plan desired conditions, objectives, and standards necessary to conserve species and prevent adverse affects in a sequence of conference calls occurring in summer, 2002.

The Sumter National Forest and the USFWS corresponded electronically on 7/10/2002 and 8/14/2002 to discuss conservation measures for the federally endangered Carolina Heelsplitter on the Sumter National Forest. The Sumter National Forest and the USFWS met on April 16, 2003 to discuss direction for threatened, endangered, and proposed species in the Revised Plan, and by phone thereafter.

This BA considered analysis in the BA for the Management of the Red-Cockaded Woodpecker in the Southern Region (1996), and information from species recovery plans, when available.

### **III. PROPOSED MANAGEMENT ACTIONS**

The Revised Plan is a strategic document providing land allocations, goals, objectives, desired conditions, and standards to be met on the Sumter National Forest for the next 10 to 15 years. Future projects carry out the direction in this Revised Plan. A site-specific environmental analysis is conducted, when required, on these projects as they are proposed.

Goals in the Revised Plan which provide for threatened, endangered, or proposed species and their habitats include Goal 7, which directs the forest to maintain and restore natural communities and habitats in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired non-native plants, fish, and wildlife species within the planning area, Goal 9, which directs the forest to contribute to the conservation and recovery of federally listed threatened and endangered species and contribute to avoid federal listing of other species under the Endangered Species Act, and Goal 11, to protect and restore rare communities found on National Forest lands. Goal 19, encouraging the use of prescribed fire and mechanical fuels treatment for maintaining and restoring fire-adapted ecosystems on the Forest, will benefit threatened, endangered, or proposed species associated with fire-maintained ecosystems such as smooth coneflower. Forestwide objectives specifically address threatened or endangered plants known to occur on the Sumter National Forest, including smooth coneflower, Florida gooseberry, and small whorled pogonia. Forestwide standards address management recommendations for bald eagle and wood stork, and conflicts with recreational uses and non-native invasive plants which may be negatively affecting federally-listed species or species where viability is a concern. Desired conditions and standards for Management Area 1 emphasize maintaining, increasing, or recovering the federally endangered Carolina heelsplitter.

Project areas will be inventoried for all species likely to occur on the Sumter National Forest in accordance with procedures outlined in the Region 8 supplement to the Forest Service Manual 2672, which will provide another facet of protection. Monitoring for all threatened, endangered, and proposed species is addressed in Chapter 5 of the Revised Plan, and task sheets included in Appendix E.

### **IV. SPECIES CONSIDERED AND EVALUATED**

The following (Table 1) is the list of threatened, endangered, or proposed species identified in counties containing Sumter National Forest land, including the counties of Oconee, Chester, Fairfield, Laurens, Newberry, Union, Abbeville, Edgefield, Greenwood, McCormick, and Saluda in South Carolina, and their likelihood of occurrence on the Sumter National Forest.

**Table 1. Proposed, Endangered, Threatened, or Proposed Species known from counties containing Sumter National Forest land, including Habitat and Likelihood of Occurrence on the National Forest**

Species	Likelihood of Occurrence	Habitat
BALD EAGLE	Yes	Nests in large living trees near water. Known from Savannah River and Broad River within the boundaries of the Sumter National Forest.
<i>Haliaeetus leucocephalus</i>		
WOOD STORK	Yes	Feeds in freshwater ponds, impoundments, or other wetlands infrequently on piedmont districts of the Sumter National Forest.
<i>Mycteria americana</i>		
RED-COCKADED WOODPECKER	No	Nests in mature pine with open understories. Primarily a coastal plain species extirpated from the piedmont of South Carolina.
<i>Picoides borealis</i>		
CAROLINA HEELSPLITTER	Yes	Known historically from Catawba, Pee Dee, and Saluda drainages in SC; occurs in Turkey and Upper Savannah 5 <sup>th</sup> order watersheds on Long Cane district of the Sumter National Forest.
<i>Lasmigona decorata</i>		
POOL SPRITE	No	Known from ephemeral pools in extensive granite outcrops in Lancaster and York Counties in South Carolina; nearest location as much as 50 miles from the Sumter National Forest in Georgia; good examples of habitat not found on the Forest.
<i>Amphianthus pusillus</i>		
SMOOTH CONEFLOWER	Yes	Occurs in Oconee County on the Andrew Pickens Ranger district in roadside or other open habitats along the Brevard Geologic Belt.
<i>Echinacea laevigata</i>		
SMALL WHORLED POGONIA	Yes	Known from mixed mesic forests at elevations above 1000 feet on the Andrew Pickens Ranger district in Oconee County.
<i>Isotria medeoloides</i>		
PIEDMONT BISHOP WEED	No	Occurs in ephemeral ponds (Carolina Bays) in the coastal plain, outside the range of the Sumter National Forest.
<i>Ptilimnium nodosum</i>		
FLORIDA GOOSEBERRY	Yes	Occurs in basic mesic hardwood forests along Stevens Creek in the Long Cane Ranger district.
<i>Ribes echinellum</i>		
PERSISTENT TRILLIUM	Yes	Known from mixed mesic forests in the Tugaloo River Composite 5 <sup>th</sup> order watershed adjacent to the Sumter National Forest; not known from the Forest but likely habitat occurs there.
<i>Trillium persistens</i>		
RELICT TRILLIUM	Yes	Known from basic mesic hardwood forests in the Savannah River drainage adjacent to the Sumter National Forest; not found on the Forest but likely habitat occurs there.
<i>Trillium reliquum</i>		

## V. Evaluated Species Information/ Environmental Baseline for the Species Evaluated in the BA

### ***Bald Eagle***

The bald eagle ranges over most of the North American continent, from as far north as Alaska and Canada, down to Mexico. Experts believe that in 1782 when the bald eagle was adopted as our national bird, their numbers may have ranged from 25,000 to 75,000 nesting pairs in the lower 48 states. Since that time the species has suffered from habitat destruction and degradation, illegal shooting, and most notably from contamination of its food source by the pesticide DDT. In the early 1960's, only 417 nesting pairs were found in the lower 48 states. In 1999, more than 5,748 nesting pairs of bald eagles were recorded for the same area, resulting primarily from the banning of DDT in the United States in 1972 aided by additional protection afforded under the Endangered Species Act (USDI, Fish & Wildlife Service, 1999).

Bald eagles have few natural enemies but usually prefer an environment of quiet isolation from areas of human activity (i.e. boat traffic, pedestrians, or buildings), especially for nesting. Their breeding areas are generally close to (within 4 km) coastal areas, bays, rivers, lakes, or other bodies of water that reflect general availability of primary food sources including fish, waterfowl, rodents, reptiles, amphibians, seabirds, and carrion (Andrew and Mosher 1982, Green 1985, Campbell et al. 1990). Although nesting territory size is variable, it typically may encompass about 2.59 square kilometers (Abbott, 1978). Most nest sites are found in the midst of large wooded areas adjacent to marshes, on farmland, or in logged-over areas where scattered seed trees remain (Andrew and Mosher, 1982). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years. Bald eagles mate for life and are believed to live 30 years or more in the wild. Breeding bald eagles in Virginia appear to be permanent residents, whereas the young disperse extensively northward and southward. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised (USDI, Fish & Wildlife Service, 1995).

Winter home ranges for eagles can be very large, especially for non-breeding birds. They generally winter throughout the breeding range but are more frequent along the coast. These birds commonly roost communally.

The primary threats to the bald eagle include loss of nesting, foraging, and roosting habitat especially along shorelines, disturbance by humans, biocide contamination, decreasing food supply, and illegal shooting (Byrd and Johnstone, 1991, Buehler, D.A., et al, 1991). Bald eagles also have died from lead poisoning as a result of feeding on waterfowl that had inadvertently ingested lead shot. In 1991, the U.S. Fish and Wildlife Service completed a program to phase out lead shot for waterfowl hunting.

During the winter of 2002/2003, the population of bald eagles in South Carolina was recorded at 181 nesting pairs which fledged 224 young (letter from Tom Murphy, SCDNR, to Robin Roecker dated July 3, 2003). Three bald eagle nests are known from the Sumter National Forest, one near the Savannah River on the Long Cane district, and two nests on the Broad River on the Enoree district.

### **Wood Stork**

The United States breeding population of wood storks is listed as an endangered species. This species may have formerly bred in all the coastal Southeastern United States from Texas to South Carolina. Currently, they breed throughout Florida, Georgia, and coastal South Carolina. Post-breeding storks from Florida, Georgia, and South Carolina occasionally disperse as far north as North Carolina and as far west as Mississippi and Alabama. Storks sighted in Arkansas, Louisiana, Texas, and points farther west may have dispersed from colonies in Mexico. The amount of overlap and/or population interchange is unknown (U. S. Fish and Wildlife Service 1996).

The estimated total population of nesting storks throughout the southeastern United States declined from 15,000 to 20,000 pairs during the 1930's to a low of between 4,500 and 5,700 pairs for most years between 1977 and 1980. Since 1983, the U.S. population has ranged between 5,500 and 6,500 pairs. Factors contributing to the decline include loss of feeding habitat, water level manipulations affecting drainage, predation and/or lack of nest tree regeneration, and human disturbance (U. S. Fish and Wildlife Service 1996).

Wood storks use a variety of freshwater and estuarine wetlands for nesting, feeding, and roosting. Freshwater colony sites must remain inundated throughout the nesting cycle to protect against predation and abandonment. Foraging sites occur in shallow, open water where prey concentrations are high enough to ensure successful feeding. Good feeding conditions usually occur where the water column is uncluttered by dense patches of aquatic vegetation. Typical foraging sites throughout the species range include freshwater marshes and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments and depressions in cypress heads and swamp sloughs. Almost any shallow wetland depression where fish become concentrated, either

through local reproduction or the consequences of area drying may be used as feeding habitat (U. S. Fish and Wildlife Service 1996).

Portions of the piedmont on the Sumter National Forest are used as late summer foraging areas by post-breeding storks that disperse from the nesting areas (Gary Peters and Donna Ray, personal comment). There are no known nesting or roost sites on the Sumter National Forest. The closest nesting colony is in Georgia just south of the Savannah River Site at least 100 miles to the southeast. On the Sumter, wood storks forage in small wetlands, including beaver ponds and small streams. Use of most feeding areas is short-term and the use of any individual area varies from year-to-year depending on water levels and the availability of forage fish. The use of these sites as foraging areas is dependent on having appropriate water levels during late summer, which is dictated by weather conditions.

### ***Red-cockaded Woodpecker***

The red-cockaded woodpecker (*Picoides borealis*) is a federally listed endangered species endemic to open, mature and old-growth pine ecosystems in the southeastern United States. Currently, there are an estimated 12,500 red-cockaded woodpeckers living in roughly 5,000 family groups across twelve states. This is less than three percent of estimated abundance at the time of European settlement (USFWS, 2003). The red-cockaded woodpecker (RCW) was listed as endangered in 1970 (35 Federal Register 16047) and received federal protection under the Endangered Species Act of 1973. The precipitous decline in population size that led to the species' listing was caused by an almost complete loss of habitat. Fire-maintained old-growth pine savannas and woodlands that once dominated the southeast, no longer exist except in a few, isolated, small patches. Longleaf pine (*Pinus palustris*) ecosystems, of primary importance to red-cockaded woodpeckers, are now among the most endangered ecosystems on earth. Older shortleaf (*P. echinata*), loblolly (*P. taeda*), and slash pine (*P. elliottii*) ecosystems, important to RCW's outside the range of longleaf, also have suffered severe declines (USFWS, 2000).

Red-cockaded woodpeckers once inhabited the Sumter National Forest, but have not been observed there for over 20 years (personal observations, Forest Service personnel). The Sumter National Forest was not included in the recovery strategy for the Red-cockaded woodpecker on National Forest lands in the Southern Region (Record of Decision, FEIS for the Management of the Red-cockaded Woodpecker in the Southern Region, 1995). The Sumter National Forest was not included in the piedmont recovery unit identified in the Recovery Plan for the Red-cockaded Woodpecker, Second Revision (2003). The nearest populations of RCW's to the Forest occur at Savannah River Site (approximately 30 miles from the Long Cane district) and Fort Jackson (approximately 40 miles from the Enoree district).

### ***Carolina Heelsplitter***

The Carolina heelsplitter was federally listed as endangered on June 30, 1977 (U.S. Fish and Wildlife Service, 1996). The species was historically known from several locations within the Catawba and Pee Dee River systems in North Carolina, and the Pee Dee and Savannah River systems and possibly the Saluda River system in South Carolina (US Federal Register, 2002). More recent inventories indicate the species has been eliminated from the majority of its historical range, and that only six populations are known to exist (US Federal Register, 2002). Two of these populations occur on the Long Cane Ranger district of the Sumter National Forest (US Federal Register, 2002; U.S. Fish and Wildlife Service, 1996).

The presence of the Carolina Heelsplitter was first detected in three major channels of the Turkey Creek watershed in 1995 (Alderman, 1995), and a reproducing population was detected in Cuffeytown Creek in 1998 (Alderman, 1998). Based on the results of the 1998 survey, Alderman concluded that the SC populations are viable but in very low abundance (Alderman, 1998). The species is very difficult to detect and distinguish from other mussel species. In 2001 - 2002, Alderman documented Carolina heelsplitters from a new creek in the Turkey Creek watershed, Sleepy Creek (Alderman, 2002), as well as from Cuffytown, Mountain, and Little Stevens Creeks.

Critical habitat, designated in July, 2002, includes stream reaches within the two units on the Long Cane district of the Sumter National Forest, which contain the Turkey Creek/Mountain Creek/Beaverdam Creek

population, and the Cuffytown Creek population (US Federal Register, 2002). These reaches correspond to streams occurring within the Turkey creek watershed and the Upper Stevens creek watershed, respectively. In a more recent habitat inventories, John Alderman found the Carolina heelsplitter most often in association with soils derived from fine grained metamorphic or metavolcanic rocks and entrenched old stream terraces, where exposed bedrock is commonly seen (Alderman, 2002).

The greatest threats to the Carolina Heelsplitter include pollutants in wastewater discharges, habitat loss and alteration associated with impoundments, channelization, and dredging operations, channel and stream bank scouring associated with increased storm-water runoff, and the runoff of silt, fertilizers, pesticides, and other pollutants from various land disturbance activities with inadequate to poorly maintained erosion and storm water control (US Federal Register, 2002; Alderman, 1998). Based on various riparian zone functions, compiled from as many as 1500 sources of literature, maintenance of a significantly-sized wooded riparian corridor is critically important to the survival of the Carolina heelsplitter (Alderman, 2002).

### ***Pool Sprite***

Pool sprite is a small, federally threatened aquatic winter annual plant restricted to eroded depressions or (rarely) quarry pools formed on flat-to-doming granite outcrops in Alabama, South Carolina, and Georgia (Recovery Plan for Three Granite Outcrop Plants, p.5). The species is not known from the Sumter National Forest and is not likely to occur there due to the lack of extensive granite outcrops occurring on the Forest and therefore lack of suitable habitat. Small granite outcrops are known from the Forest, but habitat for the pool sprite is of low quality.

The species appears to be intolerant of competition, inhabiting microsites which are nutrient poor with very shallow soils. Pool sprite is known from extensive granitic outcrops located within 50 miles of the Sumter National Forest, including Heggie's Rock Preserve (owned by the Nature Conservancy) in Georgia and Forty Acre Rock Heritage Preserve in South Carolina. The species typically flowers in February and March and continues to flower until the microhabitat is desiccated by spring droughts (sometime from March to May), killing the plants (Recovery Plan for Three Granite Outcrop Plants, p.7). Seeds remain dormant either on or within the soils through summer and germination begins in late autumn and peaks in winter.

### ***Smooth Coneflower***

Smooth coneflower, a federally endangered species, is a plant of roadsides, open woods, barrens and glades, utility rights-of-way, or other sunny situations, usually in association with calcium- or magnesium-rich soils underlain by mafic rock (Gaddy, 1991). Smooth coneflower is known to occur in Georgia, South Carolina, North Carolina, and Virginia, and has been reported historically from Pennsylvania, Maryland, Alabama, and Arkansas. Based on information summarized in the Recovery Plan (April 1995) of 24 surviving populations, 7 populations occur on National Forest land (South Carolina, Georgia, Virginia), 9 occur on private land, and the remaining 8 occur under various federal or state ownerships (US Fish and Wildlife Service 1995). The recovery objective for classification from endangered to threatened is: 12 geographically distinct, self-sustaining (stable or increasing for 10 years or more) populations.

On the Andrew Pickens district of the Sumter National Forest, smooth coneflower occurs along several road rights-of-ways which can be grouped into the following sub-populations, based on the most recent data:

Location	Estimated population	Subpopulations	Date of inventory
1). Rich Mountain	350 plants	2 subpopulations	2000
2). Pine Mountain	> 650 plants	several subpopulations	2000
3). Rifle Range	88 plants	possibly several subpopulations	2002
4). Cedar Creek	44 plants	possibly several subpopulations	2002
5). Barton Creek	198 plants		2000
6). Unity Church	2 plants		2002
7). Hwy.76	5 plants on NFS land 9 on road ROW		2002
8). Long Nose	2 plants		2002

Historically, much of the species' habitat was xeric woodlands, savannas, or grasslands that were maintained in an open condition by fires caused by lightning or Native American burning (Davis et al. 2002). On the Sumter National Forest, all sites for smooth coneflower occur along roadsides, at least in part. Habitat management, including canopy opening and prescribed burning, has been ongoing on at least 3 of the sites for several years, resulting in stable populations. The Rich Mountain, Barton Creek, and Pine Mountain sites have been thinned, and have been prescribed burned at least every three years since their discovery. Canopy opening and frequent prescribed burning were recently initiated at Rifle Range and Long Nose sites, and similar management is being planned in conjunction with population enhancement, as necessary, at Unity Church and Hwy. 76 sites.

### ***Small Whorled Pogonia***

The small whorled pogonia (*Isotria medeoloides*) was listed by the U. S. Fish and Wildlife Service (USFWS) as endangered in 1982 and revised to threatened status in 1992 based on discovery of new sites, achievement of protection for many of the sites, and additional life history and population information. This information and much of the following is taken from the Revised Recovery Plan (U.S. Fish and Wildlife Service 1992) written for the species.

*Isotria medeoloides* (Pursh.) Raf. is a federally listed orchid known from 16 states, including Virginia, West Virginia, North and South Carolina, Georgia and Tennessee (NatureServe 2001). This species occurs in three primary population centers, consisting of New England, the southern extreme of the Appalachian Blue Ridge at the juncture of North and South Carolina, Georgia, and Tennessee, and the coastal plain and piedmont region of Virginia, with outliers in Delaware and New Jersey. Disjunct populations occur in 6 sites in Pennsylvania, Ohio, Michigan, Illinois, and Ontario (U.S. Fish and Wildlife Service 1992). In the Southern Appalachian planning region, the only small whorled pogonia sites occurring on National Forest lands are located on the Chattahoochee and Sumter National Forests in Georgia and South Carolina, respectively. The locations on these National Forests are especially important because they are the only sites of the orchid known in the 2 states.

The Sumter National Forest has 4 sites, although 8 were known historically (Gaddy, 1985). Numbers of individuals at each site range from 1 to 45, according to Forest monitoring data dating back to 1985. Colony sizes and stem counts of the species fluctuate widely year- to- year, which makes viability assessment difficult and is also noted in the 1992 Recovery Plan.

This species is found primarily in second and third-growth deciduous and mixed-deciduous/coniferous forests. Ages of the older trees on the sites vary from as young as 30- years- old in South Carolina to 80- years-old in Virginia. The forest habitat in which this orchid is found is not rare, yet only a small percentage of the habitat has colonies of small whorled pogonia. Site characteristics are highly variable, but are usually mesic, with sparse to moderate ground cover and a relatively open understory. Old logging roads or streams are often nearby. Many sites show signs of past agricultural use (USFWS 1992, pers.obs).



The primary threat to the small whorled pogonia throughout its range is habitat destruction by residential and commercial development. Collection of plants, recreational use, herbivory, and inadvertent damage from research activities are also cited as harming populations. Whereas heavy timbering and clear-cutting are considered threats, selective timbering may not be harmful to a population (U.S. Fish and Wildlife Service 1992).

### ***Piedmont Bishop Weed***

Piedmont bishopweed, or harperella, was designated a federally endangered plant species in September, 1988. Based on information in the recovery plan (1991), the species consists of 13 populations in seven southeastern states. Four of seven historic populations were confirmed in 1989 (Recovery Plan, p.15), from Aiken, Barnwell, and Saluda County. No populations are known from National Forest land.

In Maryland, West Virginia, North Carolina, Alabama, and Arkansas, the species occurs in seasonally flooded rock streams (Recovery Plan, p.1). All seven of the South Carolina populations occur in coastal plain ponds (Carolina bays). This habitat type is not likely to occur on the Sumter National Forest. Based on the species' distribution, habitat might occur on the Long Cane Ranger district, but inventories have never discovered.

### ***Florida Gooseberry***

Florida gooseberry was designated a federally threatened plant species in August, 1985. Florida gooseberry was known from only one population in Florida for several years (FDR 29338, July, 1985). A second population was located in McCormick County, SC, in 1957, a site which eventually received protection as a SC Heritage Preserve. Disjunct sub-populations were located in proximity to the second site in McCormick County, including six-subcolonies which were found on the Sumter National Forest, Long Cane Ranger district, in 1987. The Long Cane district sub-population is located on mesic hardwood forests adjacent to Stevens Creek, and consists of six sub-colonies (Forest Monitoring Data, 1998).

Habitat for the species in South Carolina is deciduous, basic mixed hardwood forests, dominated primarily by oaks and hickories (TNC, 1987), with sweetgum, hophornbeam, and species indicative of calcium-rich soils such as Florida sugar maple and basswood. The soil pH at the South Carolina site is 6.7 to 7.4 (TNC, 1987). The plant appears to be threatened most by habitat alteration associated with development, logging, or severe fire (USFWS, 1978). Competition with invasive exotic plants, such as Japanese honeysuckle, have threatened the South Carolina site (TNC, 1987; Forest Monitoring Data, 1998). Deer browsing was observed to have significantly reduced the size of Florida gooseberry stems on the Sumter National Forest in 2003 (Roecker and Foster, personnel observations).

Although there is no recovery plan for the species, biological, ecological, and distributional information on the species are summarized in an element stewardship abstract (TNC, 1987) and a species status report (USFWS, 1978).

### ***Persistent Trillium***

The persistent trillium was listed as federally endangered in 1978. Known populations are restricted to the Tallulah-Tugaloo River system in Rabun, Habersham, and Stephens Counties, Georgia, and Oconee County, South Carolina. The trillium appears to be restricted to gorges and steep ravines (USFWS 1984). Habitat is variable, with plants occurring primarily in mixed pine-hemlock forests where they are often associated with *Rhododendron maximum*, or in mixed oak-beech forests (Patrick et al 1995). The persistent trillium population in South Carolina is located on private land (USFWS 1984). One of the Georgia populations is located on the Chattahoochee National Forest. The Chattahoochee site is mesic with the presence of rhododendron (*Rhododendron maximum*) and dog-hobble (*Leucothoe axillaris*). Prior to the construction of dams and reservoirs that would have flooded former habitat, the population may have been more extensive along the riverbanks (NatureServe, 2001). No persistent trillium plants have been found on the Sumter National Forest, despite numerous searches and the presence of likely habitat.

### ***Relict Trillium***

Relict trillium is a federally endangered species of basic mesic hardwood forests occurring on soils that contain a high level of organic matter and medium to high levels of calcium. The largest and most vigorous populations are located in the lower piedmont/fall line sandhills province, in drainages of both the Savannah and Chattahoochee Rivers of Georgia and South Carolina. Relict trillium is known to occur from 21 populations (U.S. Fish and Wildlife Service, 1990) in Alabama, Georgia, and South Carolina, but none of the populations occur on National Forest land. Primary threats to the species are loss of habitat resulting from urban development, and in some cases, competition with invasive exotic species, logging, species conversion, or fire (TNC, 1990).

Although no populations are known from National Forest Land in Alabama, South Carolina, or Georgia, habitat is known to exist there.

## **VI. Effects of the Proposed Revised Land and Resource Management Plan for the Sumter National Forest**

### ***Bald Eagle***

Timber harvesting, road building, or mining activities have the potential to impact the bald eagle or its habitat should it occur near streams, lakes, or other wetlands. Human disturbance from roads, trails, and campgrounds can also adversely affect the use of an area for nesting or roosting by eagles.

The Revised Plan includes a standard establishing 1500-foot protection zones around bald eagle nests and communal roost sites. Vegetation management that would affect forest canopy within these zones is prohibited, and other activities that may disturb eagles are prohibited within these zones during periods of use. The Riparian Prescription, with its emphasis on low levels of disturbance and maintenance of mature forest, provides direction for management of shorelines where bald eagles may forage. This direction also would be the same across all alternatives. No additional specific provisions related to foraging habitat are included; due to the variety of circumstances that may be involved, these issues would be addressed during site-specific analysis.

Because this management direction addresses critical needs for habitat and protection of roosts and nests from human disturbance, the Revised Plan is not likely to adversely affect the bald eagle, and should provide conditions beneficial to this species. Additional site-specific analysis would be done on all projects with the potential for affecting this species.

### ***Wood Stork***

Factors contributing to the decline of wood storks include loss of feeding habitat, water level manipulations affecting drainage, predation and/or lack of nest tree regeneration, and human disturbance (U. S. Fish and Wildlife Service 1996).

The wood stock foraging areas would be managed in all alternatives under the Riparian corridor prescription under all alternatives. The riparian corridor standards insure that these sites would be managed to retain, restore, and/or enhance the inherent ecological processes and function of the associated aquatic, riparian, and upland components within the corridor. The wetland rare communities, where they occur, would be managed under all alternatives for protection, maintenance, and where possible, restoration.

The Revised Plan contains a specific standard that will insure that water levels in artificial impoundments used by foraging wood storks would be managed to provide favorable water levels for this species. This standard, along with the riparian corridor and rare community standards discussed above would ensure

that vegetative and hydrologic conditions of existing and potential wood stork foraging areas will be protected under all alternatives.

Human disturbance also can negatively impact wood stork populations. This is primarily an issue with nesting areas but to a lesser degree also is a concern for foraging areas. For existing and potential foraging areas, the riparian corridor and wetland rare community standards should protect the vegetation around these sites and maintain a vegetative screen from human activity.

### **Red-cockaded Woodpecker**

No RCW's are known to nest or forage on the Sumter National Forest, or are likely to occur there there are no direct effects of the Revised Plan on RCW's.

Forestwide objectives encouraging pine savannas and woodlands in all alternatives are likely to provide foraging habitat for the red-cockaded woodpecker on the forest, particularly on the piedmont, which could in the future result in beneficial effects. The red-cockaded woodpecker management area in the 1985 Sumter Forest Plan (Management Area 26), is assigned a "woodland and grassland/savanna habitat" prescription, suggesting the area will continue to be managed in a way which promotes foraging habitat for the red-cockaded woodpecker and associated species. Historically, the trees used by the birds for nesting were likely shortleaf pine, which has a much longer life span than loblolly pine, which currently dominates the majority of sites on the piedmont. A Forestwide objective promoting the restoration of shortleaf pine on 2,000 – 10,000 acres on the piedmont will also provide future habitat for the species. Loblolly pines on the Sumter piedmont would not likely live to the 100 to 120 years typically preferred for nest tree establishment.

Two small red-cockaded woodpecker populations occur within 50 miles of the Forest on land owned by the Department of Energy (Savannah River Site) and The Department of Defense (Fort Jackson). The RCW Recovery plan, second revision, lists the population at Savannah River Site, located approximately 30 miles from the Long Cane district, as a secondary core population (Recovery Plan, p.157) in the South Atlantic Coastal Plain Recovery unit. The population at Fort Jackson, located approximately 50 miles from the Forest, is not identified in the list of primary core, secondary core, or essential support populations. They seldom move more than 2 miles to forage. Juveniles might disperse to these areas from distant pop's, but without suitable potential cavity trees, they would not persist. Therefore, the Revised Plan is unlikely to have any cumulative effects on RCW.

### ***Carolina Heelsplitter***

Activities on the Forest which could indirectly affect Carolina heelsplitter, include those that influence large woody debris in streams, stream bank stability and morphology, stream microclimate and chemistry, and sedimentation or erosion. These activities could include those associated with recreation, vegetation management, mining, and road building or reconstruction. Critical habitat for the Carolina Heelsplitter will be conserved through the implementation of various goals, objectives, standards, and desired future conditions in the Revised Plan, including standards and desired future conditions associated with the riparian corridor prescription, those associated with Management Area 1, and recommendations associated with designation of Turkey/Stevens Creek as a Botanical/Zoological Area. Management Area 1 contains a standard that creates a secondary riparian management zone outside the riparian corridor along both perennial and intermittent streams prohibited in watersheds containing the Carolina Heelsplitter within which 70% cover will be maintained, construction of any new OHV trails or roads, or the issuance of any commercial mining permits are prohibited. Forestwide Goal #5, to cooperate with landowners and partners to address watershed needs, has the potential to further assist in the recovery of Carolina Heelsplitter. The Revised plan is likely to directly and indirectly benefit the Carolina Heelsplitter, and will not result in the destruction or adverse modification of critical habitat for the species.

The majority of the Turkey and Upper Stevens Creek watersheds are comprised of private land; additionally, the National Forest ownership patterns are very fragmented with private ownership throughout. It is unlikely the ownership pattern or land uses on private land will change. Since habitat for

threatened and endangered species receive little legal protection on private land, and since the “take” of aquatic species is difficult to prove, public land plays an important role in the conservation of aquatic species. The low numbers exhibited by this species suggest that it will continue to be vulnerable in the years to come. The cumulative effects of implementing the Revised Plan will result in benefits to the Carolina Heelsplitter and benefits to critical habitat for the species.

### ***Pool Sprite***

No populations of pool sprite occur on the Sumter National Forest or are likely to occur there due to the lack of suitable habitat including extensive granitic outcrops or domes containing ephemeral pools. The nearest locations are located in the Georgia, and in York and Lancaster Counties in South Carolina. This species has been searched for extensively (Recovery Plan, p.19). Therefore no direct effects of the Revised Plan are anticipated.

The greatest threat to pool sprite is the destruction of flat to doming granitic outcrop habitat (Recovery Plan, p.8). Rock outcrops, including granite domes and flatrocks, are included as a rare community, and therefore will be managed and conserved according to the rare community prescription in the event they are encountered during project-level planning. Therefore, there will be no or only indirect effects to pool sprite of the Revised Plan.

Over 50 locations for pool sprite occur in Georgia, with additional populations occurring in South Carolina (3) and Alabama (4). Many of the populations suffer from recreational use and quarrying. Efforts in the Revised Plan to identify and conserve these rare granitic outcrop communities are likely to cumulatively benefit pool sprite and associated species on the Sumter National Forest in South Carolina, if future inventories were to locate them.

### ***Smooth Coneflower***

The Revised Plan includes the general goal of contributing towards the recovery of federally-listed threatened and endangered species, and an objective for maintaining (viable) populations on the Forest. Management tools needed to achieve this condition would primarily be frequent or summer prescribed fire, but may also include mid-story or overstory removal, and manual or herbicide treatment of competing woody species (see probable activities, Revised Plan, Appendix F). Goal 19, encouraging the use of prescribed fire and mechanical fuels treatment for maintaining and restoring fire-adapted ecosystems on the Forest, will benefit the smooth coneflower. Site-specific planning of these activities would be used to ensure that adverse effects to individuals would not occur. This planning would ensure population locations would be avoided when herbicides or heavy equipment is used. Individuals could be negatively affected as a result of summer burning, but this effect is unlikely due to the restrictions placed on burning that protect soil organic matter, minimize soil exposure, and thereby protect root systems. Smooth coneflower is a perennial plant adapted to flourish in fire-maintained communities, and would be expected to re-sprout following burning. Therefore, in the long-term, effects from these treatments are expected to be substantially positive.

Additional objectives included in the proposed Revised Forest Plan would increase abundance of woodland, savanna, and grasslands and glades, barrens, and associated woodlands rare communities which provide optimal habitat for this species. On the Sumter National Forest, the geological conditions that favor smooth cone-flowers are thought to occur only along the Brevard Geologic Belt. Sumter National Forest lands occurring along the Brevard Geologic Belt, are assigned primarily to the 8.A.1. prescription, a mix of successional forest habitats, in which many management tools such as thinning, prescribed fire, and mid-story control are allowed. The Revised Plan would indirectly benefit smooth coneflower by promoting woodland and savanna habitat identified as a forestwide objective and contained in the desired future condition statement for prescription 8.A.1. Standards associated with rare communities, such as the glade, barren, and associated woodland rare community complex, would ensure that any rare communities providing habitat for smooth coneflower and other associated species, are conserved, maintained, and restored. Coneflower individuals will continue to be conserved at the project level, and the USFWS will be consulted at the project level as needed when projects have the

likelihood of affecting smooth coneflowers or associated habitat. Therefore, there are likely to be few or only beneficial indirect effects of the Revised Plan to smooth coneflower.

The distribution of this plant, occurring along roadsides and utility rights-of-way, and management requirements, namely the application of prescribed fire, suggest that this species will continue to be extremely vulnerable to extirpation on private land in the future. Cumulatively, therefore, persistence of the species in the area of the national forest, as well as across its range, will be greatly enhanced from efforts on the national forest to maintain and expand smooth coneflower populations.

### ***Small Whorled Pogonia***

The Recovery Plan for small whorled pogonia (U.S. Fish and Wildlife Service 1992) lists several implementation tasks for recovery of the species. Those listed for federal agencies consist primarily of protection through existing laws and coordination with other governmental agencies and conservation organizations. The Forests in Georgia, South Carolina and Virginia have been implementing these tasks as well as conducting inventories for new locations of this orchid.

In South Carolina and Georgia, there is a concern that under-and midstory vegetation may be shading plants and possibly causing a decline in individual colonies. The structural diversity of mixed mesic forests, which provide habitat for small whorled pogonia will be promoted through a forestwide objective in the Revised Plan which will encourage the creation of gaps thereby benefitting habitat for the species. Vegetative removal studies have been conducted in Maine in 1993 and 1996, with possible positive response of the *Isotria* to the increased light at the forest floor (Dibble et al 1997). Vegetative removal studies began in New Hampshire in 1998, but will take at least 5 years to determine any effects of the removal (Sperduto, pers. comm). Vegetation removal was conducted on two of the *Isotria* sites in South Carolina in 2001, and one site responded favorably (Forest Monitoring data, 2001). The Recovery Plan identifies the need for further research into effects of vegetation removal in small whorled pogonia sites, and thus there is an opportunity for the National Forests to experiment with such removal. Any risks of habitat manipulation through vegetation manipulation would likely be outweighed by potential benefits to the species (D. Harris, pers. comm.). The largest population for small whorled pogonia on the Sumter National Forest occurs in the Ellicott Rock Wilderness which renders active management for the species, if needed, somewhat difficult but not impossible to implement. Populations for all federally listed species will be conserved based on a Forest-wide goal. A Forest-wide objective includes the maintenance of all populations for small whorled pogonia and the habitat to support them, and a Forestwide standard includes the control of exotic species where they are adversely affecting federally listed species. The proposed revised Forest Plan is likely to have no negative direct effects on small whorled pogonia in the short-term, and is likely to indirectly benefit habitat for the species in the long-term.

A number of the small whorled pogonia sites occur on state and Federal lands, affording the species protection from development. According to the Recovery Plan (U.S. Fish and Wildlife Service 1992), 47 percent of known sites have some level of habitat protection. Private land sites in other states are being protected through agreements and conservation easements between the landowner and the state (U.S. Fish and Wildlife Service 1992). However, private landowners are not required to protect federally listed plants, and thus public land is critical in protecting and aiding in recovery of the species.

According to the Recovery Plan, monitoring results of protected populations followed for years have shown a decline in viability, and many extant colonies may not be viable. Causes for the declines are not known, but the loss of habitat functionality may be a factor. Until causes of declines are known, viability of the small whorled pogonia could be at risk throughout its range. Meanwhile, populations of *Isotria medeoloides* will be protected through enforcement of the Endangered Species Act and efforts made to strengthen protective regulations at the state and local levels (U.S. Fish and Wildlife Service 1992).

The Revised Plan is likely to have no or only beneficial cumulative effects to small whorled pogonia or associated mixed mesic forest habitat.

### ***Piedmont Bishop Weed***

All alternatives include the general goal of contributing towards the recovery of federally-listed threatened and endangered species. Since no populations for piedmont bishop-weed are known from the Forest, and the Forest is just outside the range for habitat (Carolina Bays), the species is not expected to occur and no direct effects to the species are anticipated.

Ephemeral ponds, if encountered, would be managed under the rare community prescription (9F). Inventories for rare communities will be conducted in conjunction with projects likely to adversely affect them based on a forestwide standard. Streamsides will be managed under the riparian corridor prescription. There are likely to be no indirect effects of all alternatives to habitat for piedmont bishopweed.

The South Carolina populations are very small population sizes and are threatened by habitat disturbance (Recovery Plan, p.1,15). As of 1991, none of the sites were protected. Piedmont bishopweed will always be rare given the limited distribution of this plant. Since no populations are known from the Forest, the habitat is unlikely to occur here, and if habitat occurred, it would be managed as a rare community, the proposed revised Forest Plan is likely to have no cumulative effects to piedmont bishop weed or its habitat.

### ***Florida Gooseberry***

The known Florida gooseberry population occurs in the Stevens Creek riparian corridor, which protects it both through the riparian corridor prescription (11) and as a botanical/zoological area (4D). Basic mesic forest habitats in which the species occurs will receive additional protection under the rare community prescription. Populations for federally listed and viability concern species will be conserved, where they occur, based on a forestwide goal. Few direct or indirect effects to Florida gooseberry or its habitat are anticipated as a result of implementation of the Revised Plan.

Threats to the species on the Sumter National Forest include competition with invasive exotic plants, and deer browsing. Actions such as invasive exotic plant removal and the possible installation of barriers to deer browsing will be addressed at the site-specific project level as needed.

The restricted distribution of this plant suggests that it will always be rare. The only other known sites for Florida gooseberry in South Carolina is in secure ownership on a South Carolina Natural Heritage preserve occurring adjacent to the site on the Sumter National Forest, but they occur within a very small radius of each other in a single watershed. Forest-wide standards and management prescription allocations will ensure that there will be a small positive cumulative effect of the implementation of the revised Forest Plan on this species.

### ***Persistent Trillium***

At this time there are no habitat management activities recommended for persistent trillium. The Recovery Plan (USFWS 1984) mentions the need for research into light regime and soil moisture requirements to determine appropriate habitat management techniques. Kral (1983) believes prescribed fire would damage *T. persistens*, and the Chattahoochee NF site of the trillium does not appear to be a fire maintained community. Kral estimates that thinning the overstory would also damage this trillium and removing the overstory would destroy persistent trillium plants.

Several recovery tasks are discussed in the Recovery Plan for persistent trillium (USFWS 1984). Among these are the need to search for additional populations and protection of existing sites through existing laws and regulations. The Forests in Georgia and South Carolina are implementing both tasks. Despite several searches for persistent trillium on the Sumter NF over the years, no populations have been found. The structural diversity of mixed mesic forests, which provide habitat for persistent trillium, will be promoted through a forestwide objective in the Revised Plan which will encourage the creation of gaps (p.2-8) thereby benefiting habitat for the species.

Since no persistent trillium is known from the Sumter NF and because of the protective measures described above, direct, indirect, and cumulative effects to the plant and its' habitat are likely to be negligible.

### ***Relict Trillium***

No relict trillium is known to occur on the Sumter National Forest despite numerous searches so direct effects to the species are unlikely. The Forest will continue to be addressed in biological assessments in conjunction with projects as needed. If located on the Forest, all locations for federally listed plants are completely protected from any direct or indirect effects of project activities.

All high quality basic mesic forest communities, habitat for relict trillium, would be managed under the 9F (rare community) prescription under all alternatives. Several standards for rare communities ensure their maintenance and restoration across the landscape. Rare communities would be protected from detrimental effects caused by management actions across all alternatives. Rare communities would be inventoried in proposed project areas when projects are being proposed which have the potential to adversely affect them.

Since federally listed plants receive little or no legal protection on private land, this species may be vulnerable to extirpation. Since no populations are known to occur on National Forest land, the direct and cumulative effects of National Forest planning alternatives on this plant are likely to be negligible.

## **VI. Determination of Effect and Rationale**

Based on this analysis, the following determinations can be made.

### ***For federally threatened and endangered species:***

**BALD EAGLE** - Through the implementation of riparian corridor and wetland rare community standards, and standards restricting activities around nest sites, implementation of the Revised Plan is **NOT LIKELY TO ADVERSELY AFFECT** the **BALD EAGLE**.

**WOOD STORK** - Through the implementation of riparian corridor and wetland rare community standards, and foraging areas standard discussed above, and the lack of roosting sites, implementation of the Revised Plan will have **NO EFFECT** on the **WOOD STORK**.

**RED-COCKADED WOODPECKER** - Implementation of the Revised Land and Resource Management Plan for the Sumter National Forest in South Carolina will have **NO EFFECT** on the **RED-COCKADED WOODPECKER**. This determination is based on the absence of known cavity trees and suitable habitat on the forest, and distance (at least 30 miles) from any known cavity trees or populations.

**CAROLINA HEELSPLITTER** - Implementation of the Revised Land and Resource Management Plan, including goals, objectives, standards, and desired conditions associated with both the riparian prescription and Management Area 1, will be **NOT LIKELY TO ADVERSELY AFFECT** the **CAROLINA HEELSPLITTER**, and will not result in the destruction or adverse modification of critical habitat.

**POOLSPRITE** - Due to lack of suitable habitat or known occurrences on the Forest, and provisions for the conservation of rare communities including granitic outcrops in the Forest Plan, implementation of the proposed revised Forest Plan will have **NO EFFECT** on **POOLSPRITE**.

**SMOOTH CONEFLOWER** – As a result of the forestwide population objectives, and provisions for woodland and rare community conservation and restoration in the Revised Plan, the Revised Plan is **NOT LIKELY TO ADVERSELY AFFECT** the **SMOOTH CONEFLOWER**.

**SMALL WHORLED POGONIA** – Due to forestwide population objectives, and objectives which increase the structural diversity in mixed mesic forests, the Revised Plan is **NOT LIKELY TO ADVERSELY AFFECT** the **SMALL WHORLED POGONIA**.

**PIEDMONT BISHOP WEED** - Due to lack of suitable habitat or known occurrences on the Forest, and provisions for the conservation of rare communities including ephemeral ponds, implementation of the Revised Plan will have **NO EFFECT** on **PIEDMONT BISHOP WEED**.

**FLORIDA GOOSEBERRY** - Due to forestwide population objectives, and provisions for basic mesic forest rare communities, the Revised Plan is **NOT LIKELY TO ADVERSELY AFFECT** the **FLORIDA GOOSEBERRY**.

**PERSISTENT TRILLIUM** - Due to lack of known or probable occurrence on the Forest, and objectives to increase the structural diversity of mixed mesic forests, the Revised Plan will have **NO EFFECT** on **PERSISTENT TRILLIUM**.

**RELICT TRILLIUM** - Due to lack of known or probable occurrences on the Forest, and provisions for conservation of basic mesic forest rare communities, the proposed revised forest plan is likely to have **NO EFFECT** on **RELICT TRILLIUM**.

## **VII. SIGNATURE BLOCK**

BIOLOGICAL ASSESSMENT PREPARED BY:

<u>/s/Robin Roecker</u>	<u>October 15, 2003</u>
Forest Botanist/Ecologist	Date

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**Biological Evaluation**  
Revised Land and Resource Management Plan  
Sumter National Forest  
South Carolina  
**October, 2003**

## **I. INTRODUCTION**

This Biological Evaluation (BE) is prepared in compliance with policy outlined at FSM 2670. This policy is designed to avoid impacts that may cause a trend toward listing of a species under the Endangered Species Act, or loss of species viability. A comprehensive analysis of effects of plan revision alternatives on habitat, and the implication of these effects to species viability, is included in the Environmental Impact Statement (EIS) prepared with the revised plan. This Biological Evaluation relies heavily on that analysis, but also incorporates additional species-specific considerations where warranted. This BE addresses expected effects under the preferred alternative (Alternative I) only. Relative effects of alternatives on Sensitive Species and other species of potential viability concern can be found in the EIS.

In support of the EIS analysis, a database was prepared through a Participating Agreement with Natureserve, previously the science information branch of The Nature Conservancy. This database provides information on the status and habitat relationships of Sensitive Species. Information in this database was referenced during preparation of this BE, and is incorporated here by reference.

The direction in the Revised Plan is general and does not preclude or replace the requirement for site specific, project-level consideration of sensitive species as required under Forest Service Manual direction. Projects will be evaluated for the need to inventory project areas for these species in accordance with the Region 8 supplement to the Forest Service Manual @2672. This project level consideration provides another facet of protection for these species in addition to plan direction. Analysis of effects in this BE includes the expectation that these project-level processes will be appropriately followed during plan implementation.

The Sumter National Forest includes approximately 360,000 acres of National Forest System lands in the Southern Appalachian Blue Ridge and piedmont of South Carolina. The forest is divided into three ranger districts located in 11 counties. The Andrew Pickens district is located in western Oconee County; the Enoree district is located in Chester, Fairfield, Laurens, Newberry, and Union Counties; and the Long Cane district is located in Abbeville, Edgefield, Greenwood, McCormick, and Saluda Counties.

## **II. PROPOSED MANAGEMENT ACTIONS**

The Revised Plan is a strategic document providing land allocations, goals, objectives, desired conditions, and standards to be met on the Sumter National Forest for the next 10 to 15 years. Future projects carry out the direction in this Revised Plan. A site-specific environmental analysis is conducted, when required, on these projects as they are proposed.

Goals in the Revised Plan which provide for sensitive species and their habitats include Goal 7, which directs the forest to maintain and restore natural communities and habitats in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired non-native plants, fish, and wildlife species within the planning area, Goal 9, which directs the forest to contribute to the conservation and recovery of federally listed threatened and endangered species and contribute to avoid federal listing of other species under the Endangered Species Act, and Goal 11, to protect and restore rare communities found on National Forest lands. Goal 19, encouraging the use of prescribed fire and mechanical fuels treatment for maintaining and restoring fire-adapted ecosystems on the Forest (p.2-23), will benefit sensitive species associated with fire-maintained ecosystems such as fraser's loosestrife (*Lysimachia fraseri*). Management prescriptions which emphasize habitat for sensitive species include botanical/zoological areas (4D), rare communities (9F), riparian corridors (11), woodland and grassland/savanna habitats (8B2), and hardwood restoration (9G).

Project areas will be inventoried for all species likely to occur on the Sumter National Forest in accordance with procedures outlined in the Region 8 supplement to the Forest Service Manual 2672, which will provide another facet of protection.

### III. SPECIES CONSIDERED AND EVALUATED

Sensitive species are managed under the authority of the National Forest Management Act, requiring that National Forests manage for "viable populations of all native and desirable non-native species" both across the range of the species and within the planning area. Sensitive species designation occurs on a periodic basis, through the recommendation of the Forest Biologists who consult with local State Heritage Programs, the Nature Conservancy and local species experts. The Regional Forester administratively designates sensitive species and last updated the list for the Southern Region in 2001.

The following (Table 1) is the list of Regional Forester sensitive species considered in this evaluation, based on probable occurrence on the Sumter National Forest.

**Table 1. Regional Forester Sensitive Species on the Sumter National Forest, which potentially occur on the Sumter National Forest including Habitat, Primary Habitat Group (as identified through the viability analysis process), and Range, where P=piedmont and M=mountains**

SPECIES	HABITAT	Primary Habitat Groups	Range
WEBSTER'S SALAMANDER ( <i>Plethodon websteri</i> )	Moist mesic hardwood slopes with rocky outcrops; Greenwood, Edgefield, and McCormick Counties	Mature Mesic Hardwood-Forests	P
SOUTHERN APPALACHIAN SALAMANDER ( <i>Plethodon teyahalee</i> )	High elevation, wooded hardwood slopes and forests.	Mature Mesic Hardwood-Forests	M
BROOK FLOATER ( <i>Alasmodonta varicosa</i> )	Small streams with gravel bottoms; known from Chattooga, Turkey and Upper Stevens Creek watersheds.	Aquatic; Chattooga, Turkey, Upper Stevens Creek watersheds	P,M
OCONEE STREAM CRAYFISH ( <i>Cambarus chaugaensis</i> )	Fast-moving, rocky 3 <sup>rd</sup> and 4 <sup>th</sup> order streams in tributaries of the upper Savannah River; known most recently from the Chauga River; Noted historically in Ramsey Creek, West Village Creek, Crane Creek, Cedar Creek, and a stream between Long Creek and the Chattooga River (1972 data).	3 <sup>rd</sup> and 4 <sup>th</sup> Order Streams in Chattooga, Chauga watersheds	M
CAROLINA DARTER ( <i>Etheostoma collis</i> )	Localized populations occur in lower and middle piedmont streams with slow to moderate current. Known from Saluda and Broad River watersheds.	Aquatic; Saluda and Broad River watersheds	P
RAYED PINK FATMUCKET ( <i>Lampsilis splendida</i> )	Primarily a coastal plain species; one occurrence in Middle Saluda River Composite watershed.	Aquatic; Middle Saluda River Composite-	P
ROBUST REDHORSE ( <i>Moxostoma robustum</i> )	Known from the Savannah River near the fall line. Recently introduced into the Broad River	Aquatic; Lower Savannah and Broad River Watersheds	P
BACHMAN'S SPARROW ( <i>Aimophila aestivalis</i> )	Occurs on piedmont districts in stands with open canopies and grassy understories.	Early Succession; Woodlands, Savannas, Grasslands	P
MIGRANT LOGGERHEAD SHRIKE ( <i>Lanius ludovicianus migrans</i> )	Breeds in open areas dominated by grasses interspersed with shrubs, trees, or bare ground. Prefers agricultural landscapes (pastures) in both piedmont and coastal plain	Pastures/Agricultural Landscapes; Woodlands, Savannas, Grasslands	P
DIANA FRITILLARY ( <i>Speyeria diana</i> )	Violets are larval host plant; open areas for nectar sources in summer; mountains.	Mature Mesic Hardwood Forests; Woodlands, Savannas, Grasslands+	M
RAFINESQUE'S BIG-EARED BAT ( <i>Corynorhinus rafinesquii</i> )	Restricted to the mountains, sandhills, and coastal plain Physiographic regions. May be found in hollow trees or behind loose bark near streams, caves, mines, or human-made structures.	Mines; -Late Successional Riparian	M
EASTERN SMALL-FOOTED MYOTIS ( <i>Myotis leibii</i> )	At southern terminus or range on AP; known from Moody Creek near Lake Cherokee. May commonly roost in hemlock trees near streams in summer.	Mines; -Late Successional Riparian	M
INDIGO BUSH ( <i>Amorpha schwerini</i> )	Pine-Oak heaths and oak-hickory communities in the piedmont of South Carolina.	Mature Oak Forests	P
FORT MOUNTAIN SEDGE	Found in mountain rich coves, at Tamassee Knob,	Basic Mesic Forests	M

( <i>Carex communis</i> var. <i>amplisquama</i> )	East Fork of the Chattooga, and White Rock Cove on the Andrew Pickens		
RADFORD'S SEDGE ( <i>Carex radfordii</i> )	Occurs in basic and mature mesic hardwood forests on the Andrew Pickens	Mature Mesic Hardwood	M
A LIVERWORT ( <i>Cheilolejeunea evansii</i> )	Bark of trees in moist escarpment gorge or gorge-like habitats, with best development in relatively open microsites within shaded gorges	Late Successional Riparian	M
SPREADING POGONIA ( <i>Cleistes bifaria</i> )	Dry ridgetops under pines	Woodlands, Savannas, and Grasslands	M
WHORLED HORSEBALM ( <i>Collinsonia verticillata</i> )	Found in basic mesic forests along the Brevard Geologic Belt in South Carolina.	Basic Mesic Forests	M
MOUNTAIN WITCH ALDER ( <i>Fothergilla major</i> )	Known from oak-hickory forests in mountains; may occur on monadnocks or north-facing slopes in piedmont.	Mature Oak Hickory Forests	M
SHOAL'S SPIDER LILY ( <i>Hymenocallis coronaria</i> )	Rocky river shoals; sandhills and piedmont.	River Channels-	P
BUTTERNUT ( <i>Juglans cinerea</i> )	Basic mesic forests along the Brevard Geologic Belt usually at old homesites.	Basic Mesic Forests-	M
FRASER'S LOOSESTRIFE ( <i>Lysimachia fraseri</i> )	Open stands or rights-of-ways with grassy understories; mountains	Woodlands, Savannas, Grasslands	M
SWEET PINESAP ( <i>Monotropsis odorata</i> )	Shortleaf pine-oak heaths in the southern Appalachians and piedmont.	Mature Oak Forests	P,M
GORGE LEAFY LIVERWORT ( <i>Plagiochila caduciloba</i> )	Found on damp, shaded, vertical rock faces along streams in mountain gorges; Southern Appalachian endemic.	Rock Outcrops and Cliffs	M
SHARPS LEAFY LIVERWORT ( <i>Plagiochila sharpii</i> )	Found on damp, shaded, vertical rock faces along streams in mountain gorges; Southern Appalachian endemic.	Late Successional Riparian	M
CAROLINA PLAGIOMNIUM ( <i>Plagiomnium carolinianum</i> )	Damp, shaded, vertical rock faces along streams in mountain gorges; known from Long Creek and Opossum Creek on the Andrew Pickens.	Rock Outcrops and Cliffs	M
OGLETHORPE OAK ( <i>Quercus oglethorpensis</i> )	Upland wetland depressions and streamside forests in the Carolina Slate belt.	Bogs, Fens, Seeps, Seasonal Ponds	P
LIVERWORT ( <i>Radula sullivantii</i> )	Wet shaded rocks and crevices.	Spray cliffs	M
HARTWIG'S LOCUST ( <i>Robinia viscosa</i> var. <i>hartwegii</i> )	Pine-oak heaths and roadsides in the mountains; one location known near Village Creek on the Andrew Pickens.	Woodlands, Savannas, Grasslands	M
SUN-FACING CONEFLOWER ( <i>Rudbeckia heliopsisidis</i> )	Open forests with herbaceous understories; known from roadsides in the vicinity of Lake Cherokee on the Andrew Pickens.	Woodlands, Savannas, Grasslands	M
SOUTHERN OCONEE BELLS ( <i>Shortia galacifolia</i> var. <i>galacifolia</i> )	Large colonies in mixed mesic forests near Lake Jocassee; introduced on the Andrew Pickens	Mature Hemlock Forests	M
GEORGIA ASTER ( <i>Symphyotrichum georgianus</i> )	Open stands or rights-of-ways with grassy understories; lower elevations in piedmont and mountains.	Woodlands, Savannas, and Grasslands	P,M
ASHLEAF GOLDENBANNER ( <i>Thermopsis mollis</i> var. <i>fraxinifolia</i> )	Pine-oak heaths and roadsides in the mountains	Woodlands, Savannas, Grasslands	M
LANCELEAF TRILLIUM ( <i>Trillium lancifolium</i> )	Basic mesic forests in piedmont	Basic Mesic Forests	P
NODDING TRILLIUM ( <i>Trillium rugellii</i> )	Rich wooded slopes over mafic or calcareous rocks	Basic Mesic Forests	P,M
JEWELLED TRILLIUM ( <i>Trillium simile</i> )	Basic mesic forests in mountains	Basic Mesic Forests	M
PIEDMONT STRAWBERRY ( <i>Waldsteinia lobata</i> )	Mixed mesic hardwood forests known from lower elevations in the mountains	Mature Mesic Hardwood Forests	M

#### IV. SPECIES EVALUATION AND DETERMINATIONS

In this section Sensitive Species are addressed individually in terms of 1)status, distribution, and trend, 2) habitat relationships and likely limiting factors, 3)potential effects of management 4)determinations of effect and supporting rationale.

Status, distribution, and trend information is based on a variety of sources that represent the best information currently available. It is expected that the quality of this information will be maintained or improved during plan implementation, in compliance with FSM 2670.45(4), through inventory and monitoring programs.

Habitat relationships of Sensitive Species were defined during species viability evaluation for the EIS. Each terrestrial Sensitive Species was linked to habitat elements and each aquatic species was linked to watersheds and key environmental factors. This biological evaluation is based on these habitat relationships. Risks from these habitat relationships are assessed along with other non-habitat factors to identify what are believed to be the most critical factors limiting populations. The EIS includes analysis of management effects to habitats important to Sensitive Species. Each of the terrestrial habitat elements was analyzed for current and future distribution and abundance, the general likelihood that they would be limiting to associated species, and effects of management. Similarly, each watershed was analyzed for potential effects relative to key environmental factors. The details of these analyses are not repeated here, but results are relevant to each Sensitive Species addressed. Overall effects to habitats are disclosed, as are the general likelihood that activities conducted as part of plan implementation will directly impact individuals. The role of national forest management activities in cumulative effects to the species is also addressed.

Determinations represent the overall expected effect of plan implementation on each Sensitive Species. Unlike the viability evaluations in the EIS, which focus on risk from overall habitat outcomes across landscapes and watersheds, determinations in this document reflect the effect of national forest management actions only. As a result, analysis from the EIS may not indicate that many habitats are potentially limiting and resulting in risk to the species in spite of positive effects of national forest management. This situation is in most cases due to factors beyond the control of the agency, including the extensive modification of habitats across the larger landscapes within which the national forest occurs, the infeasibility of quickly restoring all of the habitats on national forest land, and invasive and epidemic insects and diseases for which no effective controls exist. However, because ecological sustainability and species viability were one of the primary drivers used to define plan goals, objectives, and standards, it is expected that plan effects to most Sensitive Species will be beneficial.

### **Webster's salamander (*Plethodon websteri*)**

#### **Distribution, Status and Trend**

Webster's salamander is state endangered, and was ranked F2 in the viability analysis on the piedmont districts (very rare, with 6-20 known occurrences on the Forest). It is known physiographically from the fall line/piedmont transition areas of east central Alabama and west central Georgia, with disjunct populations occurring in south central Mississippi, southern Alabama, and southwestern South Carolina. In South Carolina, Webster's salamander occurs in the Savannah River drainage, and is known from Turkey, Upper Stevens, and Lower Stevens Creek watersheds on the Long Cane.

The State BCD database (2001) showed 46 occurrences for Webster's salamander in South Carolina, and 25 occurrences on National Forest land. During 2002-2003, Gibbons et.al.(2003) resampled 8 sites on the Forest originally sampled by Semlitsch and West in 1982-1982, and located 252 *P. westeri* at these sites over a two-year period, with a capture rate of 8.5 salamanders/person hour.

#### **Habitat Relationships and Limiting Factors**

Optimal habitat for Webster's salamander is mesic, mixed hardwood forests on north-facing slopes with rock outcrops on or near the surface. On the Long Cane district, it is usually found in proximity to streams or other water bodies in hardwood stands, but can be found in mixed pine/hardwood. Webster's salamander is a terrestrial salamander living under moist debris, with logs in various stages of decay and a well-developed leaf or humus layer. A canopy maintained over known sites provides the necessary moisture regime within a forested interior.

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Webster's salamander were mature mesic hardwood forests and downed wood on the piedmont districts.

### **Potential Management Effects**

Management Area 1, within which the majority of Webster's salamanders are known to occur, contains a standard whereby canopy cover and ground litter is maintained within 50 feet of known sites for Webster's salamander, and low intensity fires only are allowed within these areas. Many known sites for Webster's salamander will fall within the riparian corridor prescription, or fall within the secondary riparian management zone identified within Management Area 1, within which a 70 percent canopy cover is maintained. Direct and indirect effects of the Revised Plan, to the species are unlikely. Habitats, such as mature mesic hardwood forests and downed wood, will be maintained or improved for passively through successional progression, particularly within riparian corridors and secondary riparian management zones within Management Area 1.

Known sites and habitats for Webster's salamander have been conserved by the US Forest Service since the 1980's, when it was identified on the Forest. However, only 9% of Upper Stevens Creek and 15% of Turkey Creek watersheds are in National Forest ownership. It is likely that the cumulative effects of Revised Plan implementation will benefit the species on National Forest land, through protective measures for habitats as described above. However, impacts to habitats on private land are likely to be threatened by habitat destruction associated with development in the future.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, as a result, primarily, of management area 1 and riparian corridor desired conditions and standards.

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

#### **Distribution, Status and Trend**

Southern Appalachian salamander (*Plethodon teyahalee*) is distributed across a small range within four southeastern states. Its status as a distinct species is questioned (NatureServe 2003). For the viability analysis, it was given a Forest Rank of F1 on the Andrew Pickens (extremely rare on the forest unit, generally from 1-5 occurrences). Highest densities are found in mature mesic hardwood forests up to 1550 m in elevation, which make up at least one-fifth of the total Sumter National Forest acreage. Therefore, overall habitat availability is not likely to be limiting. Populations are currently believed to be stable (NatureServe 2003). Currently, no occurrences for the Southern Appalachian salamander are confirmed from the forest (SREL, personal communication).

#### **Habitat Relationships and Limiting Factors**

The species is unthreatened on a range-wide basis, although effects of forest clearing at landscape scales were of historic concern. Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Southern Appalachian salamander were mature mesic hardwood forests and downed wood on the Andrew Pickens.

### **Potential Management Effects**

For Alternative I, Revised Plan direction provides for maintenance or increases in acreage of late-successional mesic hardwood forest, and in late successional forest acreage with snag and downed wood recruitment. Wilderness, wild and scenic river, and riparian corridor prescriptions provide an



abundance of this habitat. Management activities that open canopies in mesic hardwood forest or disturb the litter layer may adversely affect this species. However, on a forestwide scale, habitat acreage is expected to remain stable or increase. It is likely that the cumulative effects of Revised Plan implementation will benefit the species on National Forest land, through protective measures for habitats as described above. However, impacts to habitats on private land are likely to be threatened by habitat destruction associated with development in the future.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to the abundance of this habitat on the Forest, particularly in wilderness, wild and scenic river, and riparian corridor prescriptions.

### **Brook Floater (*Alasmidonta varicosa*)**

### **Distribution, Status and Trend**

Although still extant in most of the drainages where it once occurred, significant declines and loss of sites has been noted in Massachusetts, New York, Pennsylvania, New Jersey, and North Carolina. Present distribution is spotty, including the Potomac drainage in Virginia, small populations in North and South Carolina, several populations farther north in New York and elsewhere, and numerous large populations in Maine (Natureserve, 2003).

### **Habitat Relationships and Limiting Factors**

Threats to the species may include chemical runoff from agricultural land and possibly turbidity caused by excessive silt in the water, such as may result from urbanization, or habitat destruction through inundation by dams is a potential threat (Natureserve, 2003). Occurs in Chattooga, Turkey, and Upper Stevens Creek watersheds on the Sumter National Forest. Based on the watershed analysis conducted for the Forest (Hansen, 2002), the overall condition of these three watersheds is rated average. Land use in each of the watershed is primarily forested.

### **Potential Management Effects**

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with aquatic resources across all alternatives. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trends towards federal listing.

The Sumter National Forest has an ownership pattern that is highly fragmented by private land. All three watersheds are comprised primarily of private land (Chattooga is 86% private, Turkey Creek is 75% private, and Upper Stevens is 93% private). This fragmented ownership pattern can limit landscape level efforts required to conserve wide-ranging species, such as those associated with aquatic habitats. This species is potentially at risk in these watersheds; however, the Forest Service may influence conditions in the watersheds to keep it well distributed through existing partnership watershed associations. Therefore, the likelihood of maintaining viability is moderate. During the next 10 to 50 years, human populations are likely to expand, affecting urbanization, roads and associated traffic, and use of the forest by humans. As a result of implementation of the Revised Plan, National Forest activities will have no cumulative effects to aquatic species, by following guidelines ensuring the conservation of riparian and aquatic habitats.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due primarily to desired conditions and standards associated with the riparian corridor prescription.

#### **Oconee Stream Crayfish (*Cambarus chaugaensis*)**

##### **Distribution, Status and Trend**

Oconee stream crayfish inhabits the Chattooga River basin of Oconee County, South Carolina, and Rabun County, Georgia, and possibly may occur in the bordering counties of North Carolina (Eversole et.al., 2002). During an inventory for crayfish in streams of the Chattooga and Chauga river basins, Eversole et.al. found Oconee stream crayfish in 23% of those sampled streams with crayfish (Eversole et.al., 2002).

##### **Habitat Relationships and Limiting Factors**

Eversole et.al. found Oconee stream crayfish most often in larger streams or tributaries of larger streams with rocky substrates, within areas with large stones and boulders in faster flowing portions of the stream (Eversole et.al., 2000). The species is considered rare because of its' restricted distribution, endemic to a two county area (Natureserve, 2003). Based on the watershed analysis conducted for the Forest (Hansen, 2002), the overall condition of the Chattooga and Chauga watersheds is rated average and land use is primarily forested.

##### **Potential Management Effects**

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with aquatic resources across all alternatives. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trends towards federal listing.

The Sumter National Forest has an ownership pattern that is highly fragmented by private land. Both Chauga and Chattooga watersheds are comprised primarily of private land (59% in private, and 86% in private, respectively). This fragmented ownership pattern can limit landscape level efforts required to conserve wide-ranging species, such as those associated with aquatic habitats. This species is potentially at risk in these watersheds; however, the Forest Service may influence conditions in the watersheds to keep it well distributed through existing partnership watershed associations. Therefore, the likelihood of maintaining viability is moderate. During the next 10 to 50 years, human populations are likely to expand, affecting urbanization, roads and associated traffic, and use of the forest by humans. As a result of implementation of the Revised Plan, National Forest activities will have no cumulative effects to aquatic species, by following guidelines ensuring the conservation of riparian and aquatic habitats.

##### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor prescription.

#### **Carolina Darter (*Etheostoma collis*)**

##### **Distribution, Status and Trend**

The species is known from a few dozen localities in Virginia, North Carolina, and South Carolina and is uncommon but probably more widespread than now apparent, due to inadequate survey efforts (Natureserve, 2003). Localized populations occur in lower and middle Piedmont streams from the

Roanoke River system in Virginia to the Santee River system in South Carolina. The range also includes the Saluda and Broad rivers, tributaries of the Congaree River, Santee drainage, South Carolina, on or above the Fall Line (Natureserve, 2003).

### **Habitat Relationships and Limiting Factors**

Threats to the species may include chemical runoff from agricultural land and possibly turbidity caused by excessive silt in the water, such as may result from urbanization, or habitat destruction through inundation by dams is a potential threat (Natureserve, 2003). Based on the watershed analysis conducted for the Forest (Hansen, 2002), a high percentage of both the Upper and Lower Broad River composite watersheds is in agricultural production.

### **Potential Management Effects**

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with aquatic resources across all alternatives. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trends towards federal listing.

The Sumter National Forest has an ownership pattern that is highly fragmented by private land. Both Lower and Upper Broad Composite watersheds are comprised primarily of private land (93% in private, and 84% in private, respectively). This fragmented ownership pattern can limit landscape level efforts required to conserve wide-ranging species, such as those associated with aquatic habitats. This species is potentially at risk within the Broad River system. Opportunities for the Forest Service to affect viability outcomes for this species are limited. Therefore, species viability in these watersheds may be at risk. During the next 10 to 50 years, human populations are likely to expand, affecting urbanization, roads and associated traffic, and use of the forest by humans. As a result of implementation of the Revised Plan, National Forest activities will have no cumulative effects to aquatic species, by following guidelines ensuring the conservation of riparian and aquatic habitats.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor prescription.

### **Rayed Pink Fatmucket (*Lampsilis splendida*)**

### **Distribution, Status and Trend**

According to Natureserve (2003), this species is known from the Altamaha River system north to the Cooper-Santee River System in South Carolina. It is currently considered stable in the Altamaha River system, Georgia (Keferl pers. comm. 2000), but rare elsewhere.

### **Habitat Relationships and Limiting Factors**

The species occurs in aquatic systems with little or no current, and sand to soft mud substrate, and is particularly common in sloughs, oxbows, lakes, mouths of streams and backwater areas of the coastal plain. It is known only from the Saluda River watershed, which comprises a very small portion of the Sumter National Forest (<1% National Forest land) in the headwaters of Halfway Swamp Creek. Based on the watershed analysis conducted for the Forest (Hansen, 2002), a high percentage of the Middle Saluda composite watershed is in agricultural production. Threats to the species may include chemical runoff from agricultural land and possibly turbidity caused by excessive silt in the water, such as may result from urbanization, or habitat destruction through inundation by dams is a potential threat (Natureserve, 2003).

## Potential Management Effects

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with aquatic resources across all alternatives. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trends towards federal listing.

The Sumter National Forest has an ownership pattern that is highly fragmented by private land. The Upper Saluda River Composite watershed contains <1% in National Forest ownership (Hansen, 2002). This fragmented ownership pattern can limit landscape level efforts required to conserve wide-ranging species, such as those associated with aquatic habitats. This species is potentially at risk within the Broad River watersheds. Forest Service opportunity to affect viability outcomes for this species is limited. Therefore, species viability in the watersheds may be at risk. During the next 10 to 50 years, human populations are likely to expand, affecting urbanization, roads and associated traffic, and use of the forest by humans. As a result of implementation of the Revised Plan, National Forest activities will have no cumulative effects to aquatic species, by following guidelines ensuring the conservation of riparian and aquatic habitats.

## Determination and Rationale

Revised Plan implementation will have **no impact** on this species, due to the desired conditions and standards associated with the riparian corridor prescription, and the very small amount of the watershed on the Sumter National Forest known to support this species.

### **Robust redhorse (*Moxostoma robustum*)**

## Distribution, Status and Trend

This species is known historically from the Savannah River below Augusta, Georgia, the Pee Dee River in North Carolina, and the Oconee River in Georgia (Natureserve, 2003). Although it may have been extirpated from the Pee Dee River, it occurs in the Savannah River near the Georgia/South Carolina line in the Augusta Shoals area and in the area immediately below the New Savannah River Bluff Lock and Dam. The species may soon be introduced into the Broad River in South Carolina (Jeanne Riley, personal comment).

The only known viable population occurs in the Oconee River with approximately 1,000-3,000 adults in a 50-mile section of river; Oconee population may not be reproducing at levels sufficient to sustain the population and is vulnerable to catastrophic events. If it is determined that a major population exists in the Savannah River or that reintroductions have been successful, the GRANK may warrant revision (Natureserve, 2003).

## Habitat Relationships and Limiting Factors

Threats to the species may include chemical runoff from agricultural land and possibly turbidity caused by excessive silt in the water, such as may result from urbanization, or habitat destruction through inundation by dams is a potential threat. Based on the watershed analysis conducted for the Forest (Hansen, 2002), a high percentage of the lower Savannah River Composite watershed is in agricultural production. The lower Savannah River Composite watershed is currently experiencing residential and commercial growth.

## Potential Management Effects

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with aquatic resources across all alternatives. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trends towards federal listing.

The Sumter National Forest has an ownership pattern that is highly fragmented by private land. The Lower Savannah River composite watershed is comprised primarily (69%) of private land. This fragmented ownership pattern can limit landscape level efforts required to conserve wide-ranging species, such as those associated with aquatic habitats. This species is potentially at risk in this watershed; however, the Forest Service may influence conditions in the watershed to keep it well distributed through existing partnership watershed associations. Therefore, the likelihood of maintaining viability is moderate. During the next 10 to 50 years, human populations are likely to expand, affecting urbanization, roads and associated traffic, and use of the forest by humans. As a result of implementation of the Revised Plan, National Forest activities will have no cumulative effects to aquatic species, by following guidelines ensuring the conservation of riparian and aquatic habitats.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor prescription.

### Bachman's sparrow (*Aimophila aestivalis*)

## Distribution, Status and Trend

This species was ranked F3 in the viability analysis on the piedmont districts (rare and uncommon on the Forest, from 21-100 occurrences). Breeding habitat ranges from southern Missouri, Illinois, central Indiana, central Ohio, southwestern Pennsylvania, and Maryland south to eastern Texas, Gulf Coast, and south-central Florida. The species is absent or local in the northeastern breeding range, where it now breeds only in southern Virginia and possibly West Virginia and western Virginia; extirpated from Pennsylvania and Maryland (Natureserve, 2003). In the southeastern U.S., the species is fairly common, but local, in the outer Coastal Plain; uncommon in the inner Coastal Plain; and rare in the Piedmont (Hamel 1992).

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for Bachman's sparrow were woodlands, savannas, and grasslands on the piedmont districts. Bachman's sparrow is historically associated with old growth southern pine woodlands that are subject to frequent burning. The species is threatened by lack of habitat, resulting from development, lack of prescribed fire, and wildfire suppression. Single areas generally cannot provide continuously favorable habitat, so successful management in a region generally will require the provision of a mosaic of sites in different stages of vegetation succession (Natureserve, 2003).

## Potential Management Effects

Alternatives will vary in the size of habitat restoration efforts and therefore extent to which Bachman's sparrow habitat will be restored. Bachman's sparrows could be directly affected by prescribed burning activities, particularly when nesting. Bachman's sparrow will benefit indirectly through forestwide objectives to restore woodland, savanna, and grassland habitats on the landscape. Since sensitive species receive little or no protection on private land, public land plays a critical role in their conservation.

The habitat management requirements for this species, namely prescribed fire, suggests that this species will continue to be extremely vulnerable to extirpation on private land in the future. The cumulative effects of Revised Plan implementation on Bachman's sparrow is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to the forestwide objectives associated with woodland, savanna, and grasslands on the Forest.

### **Migrant loggerhead shrike (*Lanius ludovicianus migrans*)**

#### **Distribution, Status and Trend**

This species was ranked F3 in the viability analysis on the piedmont districts (rare and uncommon on the Forest, from 21-100 occurrences). This species has a spotty distribution and exhibits precipitous declines throughout its' wide range (Natureserve, 2003). Breeding habitat ranges from southeastern Manitoba east to Maritime provinces and south to eastern Texas, central Louisiana, and western North Carolina and Virginia, with isolated populations in western and northeastern Lower Peninsula of Michigan, southern Ontario, and south-central Pennsylvania. The species is extirpated from New England and Maritime provinces. Non-breeding populations occur in the southern half of breeding range south to northeastern Mexico, Gulf Coast, and Florida.

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for migrant loggerhead shrike were woodlands, savannas, and grasslands on the piedmont districts. Loggerhead shrike breeding habitat is typically open areas dominated by grasses and/or forbs, interspersed with shrubs or trees and bare ground. These habitat requirements may be met in a wide variety of habitats, including pasture, old field, prairie, savanna, or woodland. Loggerhead shrikes most often occupy "artificial habitats" or agricultural landscapes created by man (Pruitt, 2000). Loggerhead shrikes are likely threatened by loss of habitat, through development, habitat conversion, and lack of prescribed fire or mowing.

#### **Potential Management Effects**

Alternatives will vary in the size of habitat restoration efforts and therefore extent to which loggerhead shrike habitat will be restored. Loggerhead shrikes could be directly affected by prescribed burning activities, particularly when nesting. Loggerhead shrikes will benefit indirectly through forestwide objectives to restore woodland, savanna, and grassland habitats on the landscape. Since sensitive species receive little or no protection on private land, public land plays a critical role in their conservation. The habitat management requirements for this species, namely prescribed fire, suggests that this species will continue to be extremely vulnerable to extirpation on private land in the future. The cumulative effects of Revised Plan implementation on loggerhead shrikes is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due to primarily to the forestwide objectives associated with woodland, savanna, and grasslands on the Forest

### **Diana Fritillary (*Speyeria diana*)**

#### **Distribution, Status and Trend**

This species was ranked F3 in the viability analysis on the Andrew Pickens (rare and uncommon on the Forest, from 21-100 occurrences). Originally the species ranged as far north as western Pennsylvania, but presently it ranges throughout the Virginias; west formerly mostly through the Ohio Valley to Illinois, and south to northern Louisiana and north Georgia, though somewhat spotty (Natureserve, 2003). Within this area occurrences may be very hard to define, but the species is thought to be common within the Chattooga watershed (Cindy Wentworth, personal comment).

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Diana fritillary were canopy gaps and mature mesic hardwood forests on the Andrew Pickens. This species is actually known to be very sensitive to BTK used in gypsy moth spraying, which has become the only known large scale serious threat in the core of the range since the late 1980s. Increased logging of prime habitats is a potential threat (Natureserve, 2003).

#### **Potential Management Effects**

Mature mixed mesic forests used by Diana fritillary are abundant on the Andrew Pickens, and will be particularly conserved within the Chattooga Wild and Scenic River Corridor (Management Prescriptions 2.A.1., 2.A.2., 2.A.3.) and the riparian corridor prescription. Canopy gaps used by Diana fritillary will be promoted on 1-5% of closed canopy mid-and late-successional mesic deciduous forests through a forestwide objective. Gypsy moth is not abundant on the Forest, where it occurs in isolated locations. Although some individuals may be affected as a result of short-term management actions, such as those associated with forest health, logging, or recreational activities, indirect effects of the Revised Plan to habitats will be beneficial. By maintaining a diversity of habitats across the landscape, and assuming that gypsy moth infestations will continue to be of low incidence and in isolated locations, the cumulative effects of the Revised Plan to Diana fritillary will also be beneficial.

#### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor and wild and scenic river corridor prescriptions.

### **Rafinesque's Big-Eared Bat (*Corynorhinus rafinesquii*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens (extremely rare on the forest unit, generally from 1-5 occurrences). Natureserve (2003) describes the species as widespread in the southeastern U.S., with a large number of occurrences but with many consisting of very small groups or single individuals. The species ranges widely over the southern states from Virginia, West Virginia, Ohio, Indiana, and Illinois south to the Gulf of Mexico (but absent from southern Florida); west to Louisiana, Oklahoma, and eastern Texas (Natureserve, 2003). Bunch et.al.(1998) concluded that in South Carolina, the species was extremely scarce in the northwest piedmont and is mostly restricted to the mountains in small, widely scattered colonies.

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Rafinesque's

big-eared were late successional riparian, open wetlands, caves and mines, den trees, and lakeshores on the Andrew Pickens. The species is sensitive to nondestructive intrusion by humans (Natureserve, 2001; Bunch et.al. 1998), and may be sensitive to the use of pesticides that are known to be lethal to moths around foraging areas and roosts. The greatest threat may be direct loss of roosting habitats (Bunch et.al., 1998).

### **Potential Management Effects**

Late successional riparian forests will be conserved through the riparian corridor prescription (11). The largest known roosting colony on the Forest is conserved through the botanical/zoological prescription (4.D.). Caves and mines are conserved through the rare community prescription (9.F.). Direct effects to Rafinesque's big-eared could occur in association with roads, recreational, or logging activities if the species were roosting or foraging in the area. The implementation of forest plan management prescriptions will likely lead to few or no indirect effects to this species. Additional mitigation will be addressed site-specifically, as needed. As human populations continue to increase on private land, human threats to this species are likely to increase. The cumulative effects of Revised Plan implementation are not likely to adversely affect species viability.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor and rare community prescriptions.

### **Eastern Small-footed Myotis (*Myotis leibii*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens (extremely rare on the forest unit, generally from 1-5 occurrences). This species is fairly widespread in southeastern Canada and eastern U.S., but very spotty in distribution and rarely found in large numbers; few high quality occurrences exist (Natureserve, 2003).

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Eastern small-footed myotis were late successional riparian, caves and mines, and rock outcrops and cliffs on the Andrew Pickens. The eastern small-footed myotis is most vulnerable during hibernation, and is threatened by human disturbance around caves and mines that serve as significant hibernacula. Foraging areas (mostly streams and ponds) can be threatened by pesticides and anything else that might adversely affect production of the bat's insect food. The habitat around hibernacula and in foraging areas could be threatened by forest clearing (Natureserve, 2003).

### **Potential Management Effects**

Late successional riparian forests will be conserved through the riparian corridor prescription (11). The largest known roosting colony on the Forest is conserved through the botanical/zoological prescription (4.D.). Caves and mines are conserved through the rare community prescription (9.F.). Direct effects to Rafinesque's big-eared could occur in association with roads, recreational, or logging activities if the species were roosting or foraging in the area. The implementation of forest plan management prescriptions will likely lead to few or no indirect effects to this species. Additional mitigation will be addressed site-specifically, as needed. As human populations continue to increase on private land, human threats to this species are likely to increase. The cumulative effects of Revised Plan implementation are not likely to adversely affect species viability.



## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to desired conditions and standards associated with the riparian corridor and rare community prescriptions.

### Indigo Bush (*Amorpha schwerini*)

#### Distribution, Status and Trend

This species is endemic to the southeastern piedmont of North Carolina, South Carolina, Georgia, Mississippi, and Alabama. Although a trend for the species is known, the suppression of natural disturbance regimes and increased development, indicate a decline in potential habitat. For the viability analysis, this species was given a Forest Rank of F1 (extremely rare on the forest unit, generally from 1-5 occurrences).

#### Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for indigo bush were mature oak forests, glades and barrens on the piedmont districts. Threats to indigo bush are thought to mainly result from silvicultural practices, commercial and residential development, military training operations, and fire suppression (Natureserve, 2003).

#### Potential Management Effects

Habitat for indigo bush is conserved through botanical/zoological areas (4.D.), hardwood restoration (9.G.), and rare community (9.F.) prescriptions. Direct effects to the species are possible as a result of prescribed fire, timber harvesting, or recreational activities. Indirectly the Revised Plan will benefit habitat for the species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Georgia aster is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to implementation of forestwide objectives to create conditions to restore hardwood communities on 20,000 acres on the piedmont currently in pine, and implementation of botanical/zoological area, hardwood restoration, and rare community prescriptions.

### Fort Mountain Sedge (*Carex communis* var. *amplisquama*)

#### Distribution, Status and Trend

Natureserve (2003) describes the species as frequent though local across its range, which includes North Carolina, South Carolina, and Georgia. For the viability analysis, this species was given a Forest Rank of F2 on the Andrew Pickens (very rare, with 6-20 known occurrences on the Forest).

#### Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Fort Mountain sedge were woodlands, savannas, and grasslands on the Andrew Pickens, however Gaddy (1992) describes it as a plant of basic mesic coves. Limiting factors are likely habitat destruction.

### Potential Management Effects

Basic mesic coves occurring along the Brevard Belt on the Andrew Pickens are conserved through both rare community (9F) and botanical/zoological prescriptions. Implementation of a forestwide objectives will restore woodlands, savanna, and grasslands on 4,000-5,000 acres on the district. Although direct effects to individuals are possible due to recreational activities or prescribed fire, indirect effects to habitats are likely to be beneficial. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Forest Mountain sedge is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to implementation of botanical/zoological and rare community prescriptions in basic mesic forests known to be used by this species.

#### **Fort Mountain Sedge (*Carex communis* var. *amplisquama*)**

### Distribution, Status and Trend

Natureserve (2003) describes the species as frequent though local across its range, which includes North Carolina, South Carolina, and Georgia. For the viability analysis, this species was given a Forest Rank of F2 on the Andrew Pickens (very rare, with 6-20 known occurrences on the Forest).

### Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Fort Mountain sedge were woodlands, savannas, and grasslands on the Andrew Pickens, however Gaddy (1992) describes it as a plant of basic mesic coves. Limiting factors are likely habitat destruction.

### Potential Management Effects

Basic mesic coves occurring along the Brevard Belt on the Andrew Pickens are conserved through both rare community (9F) and botanical/zoological prescriptions. Implementation of a forestwide objective will restore woodlands, savanna, and grasslands on 4,000-5,000 acres on the district. Although direct effects to individuals are possible due to recreational activities, logging, mining, or prescribed fire, indirect effects to habitats are likely to be beneficial. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Fort Mountain sedge is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to implementation of botanical/zoological and rare community prescriptions in basic mesic forests known to be used by this species.

#### **Radford's Sedge (*Carex radfordii*)**

### Distribution, Status and Trend

Natureserve (2003) describes the species as a recently described species, endemic to the Blue Ridge Escarpment of southwestern North Carolina, northwestern South Carolina, and northeastern Georgia. McMillan (2003) suggested the species is common on the Andrew Pickens. For the viability analysis,

this species was given a Forest Rank of F2 on the Andrew Pickens (very rare, with 6-20 known occurrences on the Forest).

### **Habitat Relationships and Limiting Factors**

Natureserve (2003) suggests the species is restricted to soils exhibiting high concentrations of calcium and magnesium, and with fairly high soil pH compared to the generally acidic soils in the region. Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Radford's sedge were mature mesic hardwood forests.

### **Potential Management Effects**

Mature mesic hardwood forests are common on the Andrew Pickens ranger district. These will be maintained on unsuitable lands, particularly in riparian, rare community, scenic area, botanical/zoological area, old growth, and wilderness prescriptions. Direct effects and indirect effects to individuals are possible due to recreational activities, logging, mining, or prescribed fire, yet given the abundance of these habitats and their maintenance within unsuitable prescriptions, the Forest Plan is likely to have few indirect effects. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Radford's is likely to have effect due to the allocation and distribution of unsuitable lands on the district.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to implementation of unsuitable management prescriptions which will maintain mature mesic hardwood forests used by this species.

### **Liverwort (*Cheilolejeunea evansii*)**

### **Distribution, Status and Trend**

Natureserve (2003) describes the species as known from eleven extant occurrences in the Southern Appalachians in western North Carolina, western South Carolina, and northcentral Alabama. Nine occurrences are on public lands and all sites are managed for conservation. Davidson (2003) documented several sites within the Ellicott Rock Wilderness in South Carolina. For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens (extremely rare, with 1-5 known occurrences on the Forest).

### **Habitat Relationships and Limiting Factors**

Based on Natureserve (2003), this species is found on the bark of trees in moist escarpment gorge or gorge-like habitats, with best development in relatively open microsites within shaded gorges. Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for *C.evansii* were late successional riparian and mature hemlock forests. Based on Natureserve (2003), removal of trees in the vicinity of *C.evansii* pose a threat to this taxon.

### **Potential Management Effects**

Late succesional riparian and hemlock forests providing habitat for this species are managed as a designated wilderness area (1A). The species will also be protected under the riparian prescription (11). Although direct effects to individuals are possible due to recreational activities, they are unlikely due to the occurrence of this species on tree bark and other shaded microsites. There are likely to be no indirect effects to this species due to its' occurrence within designated wilderness. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. Cumulatively, the

Revised Plan is likely to have no effect, since the species occurs in areas which are unlikely to be managed.

### **Determination and Rationale**

Revised Plan implementation will have **no impact** on *C.evansii*, due to its' occurrence in habitats which are not being managed.

### **Spreading Pogonia (*Cleistes bifaria*)**

#### **Distribution, Status and Trend**

Based on Natureserve (2003), this species is a widespread but uncommon orchid. For the viability analysis, this species was given a Forest Rank of F2 on the piedmont districts (very rare on the forest unit, generally from 6-20 occurrences). McMillan (2003) suggested the species was fairly abundant in pine-oak heaths throughout the Andrew Pickens and all of Oconee and Pickens Counties.

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for small spreading pogonia were woodlands, savannas, and grasslands on the Andrew Pickens district, though effects of prescribed fire have not been documented on the district.

#### **Potential Management Effects**

The abundance of pine-oak heath habitats used by this species are abundant on the Andrew Pickens district, and restoration of woodlands, savannas, and grasslands are encouraged through forest objectives. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan should have few negative effects on habitat and may even benefit habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. Cumulatively the Revised Plan is likely to have little impact and may even benefit the species.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to the abundance of pine-oak heaths, and management objectives which encourage the restoration of woodlands, savannas, and grasslands on the Andrew Pickens.

### **Whorled Horsebalm (*Collinsonia verticillata*)**

#### **Distribution, Status and Trend**

Whorled horsebalm can be locally abundant but is scattered and rare throughout its range, which includes southeastern Virginia, west to eastern Tennessee, south to western North Carolina, northwest South Carolina, central Georgia, Mississippi, and disjunct in southern Ohio (Weakley, 2002). Whorled horsebalm is common along the Brevard Belt on the Andrew Pickens. Gaddy (1992) reported 25 known sites for the species.

#### **Habitat Relationships and Limiting Factors**

Habitat for whorled horsebalm is basic mesic and mature mesic hardwood forests on the Andrew Pickens, typically over mafic or calcareous rocks. These substrates are rare on the Andrew Pickens.

### Potential Management Effects

Basic mesic coves occurring along the Brevard Belt on the Andrew Pickens are conserved through both rare community (9F), botanical/zoological, and riparian corridor prescriptions. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on whorled horsebalm is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to implementation of botanical/zoological, rare community, and riparian corridor prescriptions which will conserve the basic mesic forests known to be used by this species.

### Mountain Witch Alder (*Fothergilla major*)

#### Distribution, Status and Trend

Natureserve (2003) describes the species as rare throughout its range of five southeastern states (disjunct in Arkansas). For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens (extremely rare on the forest unit, generally from 1-5 occurrences).

#### Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for mountain witch alder were mature oak forests, woodlands, savannas, and grasslands, and late successional riparian forests on the Andrew Pickens.

### Potential Management Effects

Habitat for the species will be conserved through riparian corridor prescriptions, and desired conditions in the mix of successional habitat prescription whereby hard and soft mast production is maintained or enhanced. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on mountain witch alder is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to implementation of riparian corridor prescriptions, and desired conditions in the mix of successional habitat prescription, whereby hard and soft mast production is maintained or enhanced.

### Shoal's Spider Lily (*Hymenocallis coronaria*)

#### Distribution, Status and Trend

For the viability analysis, this species was given a Forest Rank of F1 on the piedmont districts (extremely rare on the forest unit, generally from 1-5 occurrences). The species is known from major river systems along the fall line of Alabama, Georgia, and South Carolina.

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for shoal's spider lily were river channels on the piedmont districts. The species is likely threatened by hydrological modification such as damming of streams, and increased sediment loading or alteration of flows associated with logging, mining, or construction projects (Davenport, 1990). Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on shoal's spider lily is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

## Potential Management Effects

The riparian corridor prescription that addresses management adjacent to perennial and intermittent streams, and the forestwide standards which apply to management of ephemeral channels, should mitigate most direct and indirect effects associated with riverine channels across all alternatives. Riverine channels are included within the rare community prescription. Small direct and indirect effects associated with road or trail crossings, or mining activities, may have short-term impacts to individuals, but will not cause a trend towards federal listing.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to riparian corridor and rare community prescriptions.

### Butternut (*Juglans cinerea*)

## Distribution, Status and Trend

According to Natureserve (2003), more than 100 occurrences are known from at least 17 states within the range of the species; however, the abundance and condition are both in rapid decline due to butternut canker disease, with no known remedy.. For the viability analysis, this species was given a Forest Rank of F2 on the Andrew Pickens (very rare, with 6-20 known occurrences on the Forest).

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for butternut were mature mesic hardwood forests, late successional riparian, and basic mesic forests on the Andrew Pickens. Butternut is being killed throughout its range by *Sirococcus clavigignenti-juglandacearum*, a fungus of unknown origin. High mortality, higher rates of infection, and rapid loss of the remaining uninfected trees to timber cutting are factors in its' mortality.

## Potential Management Effects

The variety of habitats used by butternut are conserved through the riparian corridor and rare community prescriptions, as well as elsewhere throughout the Forest. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on butternut is likely to have no effect on the species, as it continues to decline as a result of the butternut canker.

## Determination and Rationale

Revised Plan implementation will have **no impact** on butternut, since although habitat will be maintained especially within rare community and riparian corridor prescriptions, uncontrollable species declines are still predicted as a result of butternut canker.

### Fraser's loosestrife (*Lysimachia fraseri*)

## Distribution, Status and Trend

This species was ranked F3 in the viability analysis on the Andrew Pickens (rare and uncommon on the Forest, from 21-100 occurrences), and is known from 86 occurrences across southern Illinois to northern Georgia (Bates, 1998), and 21 occurrences on the Sumter National Forest.

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for fraser's loosestrife were woodlands, savannas, and grasslands, mature oak forests, river channels, and canopy gaps on the Andrew Pickens.

Historically, much of the species' habitat was xeric woodlands, savannas, or grasslands that were maintained open by fires caused by lightning or Native American burning (Davis, et.al, 2002;). All the known sites for fraser's loosestrife on the forest are roadsides or utility rights-of-way, which are maintained open by annual monitoring. Currently, the species is threatened by roadside maintenance activities, competition with successional vegetation, and competition with non-native invasive species.

## Potential Management Effects

Alternative I will indirectly benefit habitat for the species by encouraging woodlands, savanna, and grasslands on 4,000-5,000 acres on the Andrew Pickens. Management tools needed to achieve this condition will primarily be dormant season prescribed fire, but may also include mid-story or overstory removal, or herbicide release. Seed collection, propagation, and outplanting, may also be needed. Direct effects of application of these tools could lead to the loss individuals in the short-term, but is expected to be outweighed by benefits to habitat and populations in the long-term. Fraser's loosestrife will benefit indirectly through forestwide objectives to restore woodland, savanna, and grassland habitats on the landscape. Glades and barrens, if found, will be conserved under the rare community prescription.

Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The distribution, along roadsides, and management requirements, namely prescribed fire, suggests that this species will continue to be extremely vulnerable to extirpation on private land in the future. The active management required to maintain and enhance fraser's loosestrife populations is likely to occur on National Forest land under the Revised Plan. Populations occurring on private or other public ownerships, such as road and utility companies, are likely to continue to be small and threatened by factors described above. The cumulative effects of Revised Plan implementation on fraser's loosestrife is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due primarily to the forestwide objectives associated with woodland, savanna, and grasslands on the Forest.

### **Sweet Pinesap (*Monotropsis odorata*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the piedmont districts (extremely rare on the forest unit, generally from 1-5 occurrences). The species is likely overlooked and is known from dozens of locations on the Andrew Pickens Ranger district (Shatley, personal observations). Based on Natureserve (2003), sweet pinesap is a monotypic endemic centered in the Appalachians, occurring more frequently in North Carolina and Virginia but becoming more rare at the limits of its range, which is from Maryland and West Virginia south to Alabama, Georgia, and possibly Florida.

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for sweet pinesap were mature mesic hardwood forests, mature oak forests, and woodlands, savannas, and grasslands on both Andrew Pickens and piedmont districts.

#### **Potential Management Effects**

The variety of habitats used by this species are abundant on the Andrew Pickens district, and will be encouraged in the hardwood restoration management prescription on the piedmont. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on sweet pinesap is likely to have little impact on the species.

#### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to the management prescription whereby hardwood forests used by the species are restored on the piedmont, and the abundance of habitats for the species known from the Andrew Pickens.

### **Gorge Leafy Liverwort (*Plagiochila caduciloba*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens district (extremely rare on the forest unit, generally from 1-5 occurrences). Based on Natureserve (2003), this species is a narrow endemic of the Southern Appalachians and known from twenty-one extant occurrences. Most of these occurrences are in North Carolina, the center of this liverwort's range, and a number of the occurrences are in protected areas..

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for gorge leafy liverwort are rock outcrops and cliffs (waterfall spray zones) and mature mesic hardwood forests on the Andrew Pickens. Development is a potential threat to this taxon (Natureserve, 2003), as our recreational impacts associated with waterfalls.



## Potential Management Effects

The waterfall spray zones (included as rock outcrops) will be conserved in the Revised Plan through the rare community and the riparian corridor prescriptions. Direct effects to the species are possible as a result of recreational activities in or near these communities. Indirectly the Revised Plan will have little effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on gorge leafy liverwort is likely to have little impact on the species.

## Determination and Rationale

Revised Plan implementation will have **no impact** on this species, due to its' occurrence in areas which are protected from active management, including the wilderness, rare community, and riparian corridor prescriptions.

### Sharps Leafy Liverwort (*Plagiochila sharpii*)

## Distribution, Status and Trend

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens district (extremely rare on the forest unit, generally from 1-5 occurrences). Based on Natureserve (2003), this species is known from a restricted range in Japan and Europe, and is a narrow endemic of the Southern Appalachians where it is known from twenty-one extant occurrences. Most of these occurrences are in North Carolina, the center of this liverwort's range, and a number of the occurrences are in protected areas.

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Sharps Leafy liverwort include late successional riparian forests on the Andrew Pickens. Development is potentially affected by activities occurring upstream of known occurrences (Natureserve, 2003).

## Potential Management Effects

Late successional riparian habitats likely to be used by this species will be conserved in the Revised Plan through the riparian corridor, Chauga Scenic Area, and wilderness prescriptions. Direct effects to the species are unlikely as a result of recreational activities in or near these communities. Indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Sharps leafy liverwort is likely to have no impact on the species.

## Determination and Rationale

Revised Plan implementation will have **no impact** on this species, due to its' occurrence in areas which are protected from active management, including the wilderness, scenic area, rare community, and riparian corridor prescriptions.

### Carolina Plagiomnium (*Plagiomnium carolinianum*)

## Distribution, Status and Trend

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens district (extremely rare on the forest unit, generally from 1-5 occurrences). According to Natureserve (2003), the species is known in the United States from Georgia, Tennessee, the Carolinas, and the Dominican Republic, but occurs in its greatest abundance in the escarpment gorges of the southern Blue Ridge.

### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for mountain wavy-leaf moss were late successional riparian and rock outcrops and cliffs (waterfall spray zones) on the Andrew Pickens. In the United States, dams have inundated some habitat and the construction of additional dams poses the greatest potential threat to this species (Natureserve, 2003).

### **Potential Management Effects**

The waterfall spray zones (included as rock outcrops) will be conserved in the Revised Plan through the rare community and the riparian corridor prescriptions. Direct effects to the species are possible as a result of recreational activities in or near these communities. Indirectly the Revised Plan will have little effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on Carolina plagiomnium is likely to have little impact on the species.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of the rare community and riparian corridor prescriptions.

### **Oglethorpe Oak (*Quercus oglethorpensis*)**

### **Distribution, Status and Trend**

This species was ranked F3 in the viability analysis on the piedmont districts (rare and uncommon on the Forest, from 21-100 occurrences). The main range of Oglethorpe oak is in western South Carolina and adjacent Georgia, with disjunct populations occurring in Mississippi and Louisiana. Natureserve (2003) reports 140 sites extant in 1985, though some are no longer in existence or had been misidentified (Robin Roecker personal observation).

### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Oglethorpe oak are late successional riparian and bogs, fens, seeps, and seasonal ponds on the piedmont districts. Populations are currently threatened by habitat alteration resulting mainly from commercial and residential development, silvicultural practices, and conversion to agriculture or pasture, or conversion to pine plantations. Inundation from dam construction (human and beaver) is a potential threat. Many occurrences on the Long Cane district of the Sumter National Forest are infected with a fungus, similar to chestnut blight (Roecker, personal observation; SE Wildlife Service, Inc., 1979).

### **Potential Management Effects**

Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have little effect on habitat for this species. Management prescriptions such as the riparian corridor, rare community, and hardwood restoration prescriptions will conserve habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on sweet pinesap is likely to have little impact on the.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of the rare community, riparian corridor, and hardwood restoration prescriptions.

### Liverwort (*Radula sullivanii*)

## Distribution, Status and Trend

Davidson (2003) documented one site within the Ellicott Rock Wilderness in South Carolina, and several in other ownerships within rock crevices or gorges in the vicinity of Lake Jocassee. For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens (extremely rare, with 1-5 known occurrences on the Forest).

## Habitat Relationships and Limiting Factors

Habitats for the species identified by Davidson (2003) include wet rock crevices and moist shaded rock faces. Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for *R.sullivanii* were late successional riparian, spary cliffs, and rock outcrops and cliffs.

## Potential Management Effects

Conservation of late succesional riparian, spray cliffs, and rock outcrops and cliffs will be emphasized in riparian (11), rare community (9F), and wilderness (1A) prescriptions. Due to the desired condition and unsuitability of these prescriptions for timber production, direct effects to individuals of this species are highly unlikely. There are likely to be no indirect effects to this species due to its' occurrence within designated wilderness and likely occurrence within unsuitable prescriptions.. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on *R.sullivanii* is likely to have no effect as the species, since it occurs in areas which are unlikely to be managed.

## Determination and Rationale

Revised Plan implementation will have **no impact** on *R.sullivanii*, due to its' occurrence in habitats which are not being managed.

### Hartwig's locust (*Robinia viscosa* var.*hartwegii*)

## Distribution, Status and Trend

Based on Natureserve (2003), this species is a narrow endemic, native only in North Carolina (also possibly South Carolina and Georgia), with only 5 documented occurrences. The species is known from one location on the Andrew Pickens district.

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats used by Hartwig's locust include canopy gaps and woodlands, savannas, and grasslands on the Andrew Pickens.

## Potential Management Effects

Forestwide objectives encouraging woodlands, savannas, and grasslands, and canopy gaps, will indirectly benefit this species, although direct effects to the species are possible as a result of logging,

prescribed fire, or recreational activities. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on hartwig's locust is likely to be beneficial.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of forestwide objectives which promote woodlands, savannas, grasslands, and canopy gaps.

### **Sun-facing Coneflower (*Rudbeckia heliopsidis*)**

#### **Distribution, Status and Trend**

Sun-facing coneflower and was ranked F2 in the viability analysis on the Andrew Pickens district (very rare, with 6-20 known occurrences on the Forest). Based on Natureserve (2003), the species is reported from a variety of physiographic provinces in 6 southeastern states but rare throughout this range with few, widely scattered occurrences

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for sun-facing coneflower include early successional forests and woodlands, savannas, and grasslands on the Andrew Pickens. The species is threatened by competition with successional vegetation.

#### **Potential Management Effects**

Forestwide objectives encouraging woodlands, savannas, and grasslands, and canopy gaps, will indirectly benefit this species, although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on sun-facing coneflower are likely to be beneficial.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of forestwide objectives which promote woodlands, savannas, grasslands, and canopy gaps.

### **Southern Oconee Bells (*Shortia galacifolia*)**

#### **Distribution, Status and Trend**

Oconee bells and was ranked F2 in the viability analysis on the Andrew Pickens district (very rare, with 6-20 known occurrences on the Forest). Based on Natureserve (2003), the species is endemic to a small part of the southern Appalachian Mountains. Despite its very local distribution, the species is abundant at most of its few remaining sites with few, widely scattered occurrences

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for Oconee bells include mature hemlock forests. The species has lost populations in the past due to horticultural collection, and multiple dam construction projects; the long-looked-for type locality is now under the waters of Lake Jocassee in South Carolina (Natureserve, 2003).

## Potential Management Effects

Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have little effect on habitat for this species. Management prescriptions, namely the riparian corridor prescription, will conserve habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. Many of the known sites for Oconee bells are conserved within State lands in the Jocassee Gorges area. The cumulative effects of Revised Plan implementation on Oconee bells is likely to have little impact on the species.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of the riparian corridor prescription.

### Georgia Aster (*Symphyotrichum georgianus*)

## Distribution, Status and Trend

This species was ranked F3 in the viability analysis on the piedmont districts (rare and uncommon on the Forest, from 21-100 occurrences). Georgia Aster, a candidate for federal listing, is a plant of roadsides, open woods, cedar barrens, utility rights-of-way, or other sunny situations, and appears to be adaptable to dry, open habitats independent of soil type. Georgia Aster is known to occur in North Carolina, Georgia, South Carolina, and Virginia. Based on information summarized in the status survey (Mathews, 1993), there are 56 surviving populations, though many appear to be declining. The majority of populations occur along state highway and powerline rights-of-way which can be vulnerable to herbicide spraying or other roadside maintenance activities, drought, and competition with successional vegetation.

Based on data from 2001, Georgia aster occurs at 12 geographically distinct sites on the Sumter National Forest, including 10 on the Enoree and 2 on the Long Cane, some consisting of more than one subpopulation. Most of the populations occurring on the Sumter National Forest are declining or at low numbers, with the exception of two.

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Each terrestrial sensitive species was linked to habitat elements. Habitats identified for Georgia aster were woodlands, savannas, and grasslands, and glades and barrens on both Andrew Pickens and piedmont districts.

Historically, much of the species' habitat was xeric woodlands, savannas, or grasslands that were maintained open by fires caused by lightning or Native American burning (Davis, et.al, 2002;). All the known sites for Georgia aster on the forest are roadsides or utility rights-of-way, which are maintained open by annual monitoring. Currently, the species is threatened by roadside maintenance activities, competition with successional vegetation, and competition with non-native invasive species.

## Potential Management Effects

Alternative I will meet conditions necessary to prevent listing by maintaining 10 geographically distinct populations. In order to meet these objectives, active management to encourage the species off the roadside will be required. Management tools needed to achieve this condition will primarily be dormant season prescribed fire, but may also include mid-story or overstory removal, or herbicide release. Seed collection, propagation, and outplanting, may also be needed. Direct effects of application of these tools could lead to the loss individuals in the short-term, but is expected to be outweighed by benefits to habitat and populations in the long-term. Georgia aster will benefit indirectly through forestwide objectives to restore woodland, savanna, and grassland habitats on the landscape. Glades and barrens, will be

conserved under the rare community prescription. Activities designed to maintain self-sustaining populations on the Forest will require active management to reduce competition with woody species and non-native invasive plants.

Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The distribution, along roadsides, and management requirements, namely prescribed fire, suggests that this species will continue to be extremely vulnerable to extirpation on private land in the future. The active management required to maintain and enhance Georgia aster populations is likely to occur on National Forest land under the Revised Plan. Populations occurring on private or other public ownerships, such as road and utility companies, are likely to continue to be small and threatened by factors described above. The cumulative effects of Revised Plan implementation on Georgia aster is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend toward federal listing**, due to primarily to the forestwide objectives associated with woodland, savanna, and grasslands on the Forest and with maintaining or restoring 10 self-sustaining populations on the Forest.

### **Ashleaf Goldenbanner (*Thermopsis mollis* var. *fraxinifolia*)**

### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens district (extremely rare on the forest unit, generally from 1-5 occurrences). Based on Natureserve (2003), the species is a Southern Appalachian endemic and known occurrences are in Tennessee, North Carolina, South Carolina, and Georgia where abundances are unknown. The species is extirpated in Alabama.

### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats used by ashleaf goldenbanner include woodlands, savannas, and grasslands and canopy gaps on the Andrew Pickens. The species is known from roadsides where it may be threatened by roadside maintenance activities.

### **Potential Management Effects**

Habitat will be promoted through forestwide objectives which encourage woodlands, savannas, and grasslands, and canopy gaps. Short-term direct effects resulting from tree removal and prescribed fire are possible. Activities designed to maintain self-sustaining populations on the Forest will require active management to reduce competition with woody species and non-native invasive plants. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The distribution, along roadsides, and management requirements, namely prescribed fire, suggests that this species will continue to be extremely vulnerable to extirpation on private land in the future. The active management required to maintain and enhance Georgia aster populations is likely to occur on National Forest land under the Revised Plan. Populations occurring on private or other public ownerships, such as road and utility companies, are likely to continue to be small and threatened by factors described above. The cumulative effects of Revised Plan implementation on ashleaf goldenbanner is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of forestwide objectives which promote woodlands, savannas, grasslands, and canopy gaps.

### **Lanceleaf Trillium (*Trillium lancifolium*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the piedmont districts (extremely rare on the forest unit, generally from 1-5 occurrences). The species is known from three locations on the Long Cane district of the Sumter National Forest. In 2003, the populations were large, containing greater than 250 individuals/each (Joyce Foster, personal observation).

#### **Habitat Relationships and Limiting Factors**

This species ranges from northcentral South Carolina and southeast Tennessee through west Georgia and Alabama to the panhandle of Florida and southeastern Alabama (Weakley, 2002). Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for lanceleaf trillium include late successional riparian on the piedmont districts.

#### **Potential Management Effects**

Habitat for this species will be conserved through both rare community (9F), botanical/zoological, and riparian corridor prescriptions. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on lanceleaf trillium are likely to have no effect or to benefit the species.

#### **Determination and Rationale**

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of botanical/zoological, rare community, and riparian corridor prescriptions.

### **Nodding Trillium (*Trillium rugelii*)**

#### **Distribution, Status and Trend**

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens district (extremely rare on the forest unit, generally from 1-5 occurrences). The species is known from all three districts on the Sumter National Forest and appears to be stable.

#### **Habitat Relationships and Limiting Factors**

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for nodding trillium include mature mesic hardwood forests and basic mesic forests on both Andrew Pickens and piedmont districts.

#### **Potential Management Effects**

Habitat for this species will be conserved through rare community (9F), botanical/zoological, and riparian corridor prescriptions. Direct effects to the species could occur as a result of prescribed fire or recreational activities. Indirectly the Revised Plan should have no effect or benefit habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on nodding trillium are likely to have no effect or to benefit the species.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of botanical/zoological, rare community, and riparian corridor prescriptions.

### Jeweled Trillium (*Trillium simile*)

## Distribution, Status and Trend

For the viability analysis, this species was given a Forest Rank of F1 on the Andrew Pickens districts (extremely rare on the forest unit, generally from 1-5 occurrences).

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for jeweled trillium include mature mesic hardwood forests on the Andrew Pickens.

## Potential Management Effects

Mature mesic forests occurring along the Brevard Belt on the Andrew Pickens are conserved through both rare community (9F), botanical/zoological, and riparian corridor prescriptions. Direct effects to the species could occur as a result of prescribed fire or recreational activities. Indirectly, the Revised Plan will have no effect or benefit habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of Revised Plan implementation on jeweled trillium is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

## Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of botanical/zoological, rare community, and riparian corridor prescriptions.

### Piedmont Strawberry (*Waldsteinia lobata*)

## Distribution, Status and Trend

This species was ranked F3 in the viability analysis on the Andrew Pickens district (rare and uncommon on the Forest, from 21-100 occurrences). Gaddy (1992) estimated that 50 colonies of this plant existed on the Andrew Pickens alone. The species ranges from southwestern North Carolina south to northwest South Carolina, and north and central Georgia (Weakley, 2002).

## Habitat Relationships and Limiting Factors

Habitat relationships for sensitive species were defined during species viability evaluation for the EIS. Habitats identified for piedmont strawberry include mature mesic hardwood forests and late successional riparian forests on the Andrew Pickens.

## Potential Management Effects

Basic mesic coves occurring along the Brevard Belt on the Andrew Pickens are conserved through both rare community (9F), botanical/zoological, and riparian corridor prescriptions. Although direct effects to the species are possible as a result of logging, prescribed fire, or recreational activities, indirectly the Revised Plan will have no effect on habitat for this species. Since rare plants receive little or no protection on private land, public land plays a critical role in their conservation. The cumulative effects of



Revised Plan implementation on Forest Mountain sedge is likely to be positive as forest management actions needed to enhance habitat for the species are implemented.

### Determination and Rationale

Revised Plan implementation **may impact individuals, but is not likely to cause a trend towards federal listing**, due primarily to implementation of botanical/zoological, rare community, and riparian corridor prescriptions.

## VIII. SIGNATURE BLOCK

BIOLOGICAL EVALUATION PREPARED BY:

/s/Robin Roecker                      October 27, 2003  
Forest Botanist/Ecologist              Date

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# APPENDIX F

## TERRESTRIAL SPECIES VIABILITY

*Table F-1. Summary of expected abundance, distribution, likelihood of limitation, and management effects for habitat elements by forest plan revision alternatives.*

### Forest Unit: Andrew Pickens Ranger District of Sumter

Habitat Elements	Alternative						
	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Open Wetlands							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
River Channels							
Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Glades and Barrens							
Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Table Mountain Pine Forests							
Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	2	2	2	2	5	2	2
Basic Mesic Forests							

Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Rock Outcrops and Cliffs							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	3	1	1
Spray Cliffs							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	3	1	1
Canebrakes							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	2	2	2	2	5	2	2
Caves and Mines							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	1	1	1
Mature Mesic Hardwood Forests							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	2	2	5	2	2	2	2
Mature Hemlock Forests							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	4	4	4	4	4	4	4
Mature Oak Forests							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	2	5	2	3	2	3
Mature Yellow Pine Forests							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	2	2	2	2	2	2	2
Early-Successional Forests							
Abundance	O	O	O	O	O	R	O

Distribution	G	G	G	F	G	F	G
Likelihood of Limitation	L	L	L	M	L	H	L
Management Effects	2	2	2	5	2	5	2
Mature Forest Interiors							
Abundance	C	C	C	C	C	C	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	3	5	3	3	3	3
Canopy Gaps							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	2	2	2	2	2	2	2
Woodlands, Savannas, and Grasslands							
Abundance	O	O	O	O	R	O	O
Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	M	M	M	M	H	M	M
Management Effects	2	2	2	2	3	2	2
Mixed Landscapes							
Abundance	C	C	C	O	C	O	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	3	3	3	3	3	3
Late Successional Riparian							
Abundance	C	C	C	C	C	C	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	3	3	3	3	3	3
Early-Successional Riparian							
Abundance	O	R	O	O	R	R	O
Distribution	F	F	F	P	F	P	F
Likelihood of Limitation	M	H	M	H	H	H	M
Management Effects	2	2	2	2	2	2	2
Snags							
Abundance	C	C	C	C	C	C	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	2	2	2	2	2	2	2
Downed Wood							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	2	2	2	2	2	2	2
Den Trees							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F

Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	2	2	2	2	2	2	2
Hard Mast							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	3	3	3	3	3	3
Remoteness							
Abundance	C	C	C	C	C	C	C
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	3	3	3	3	3	3	3
Lakeshores							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	1	1	1
Water Quality							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	1	1	1	1	1	1	1

## Forest Unit: Enoree and Long Cane Ranger Districts of Sumter

### Alternative

Habitat Elements	A	B	D	E	F	G	I
Bogs, Fens, Seeps, Seasonal Ponds							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Open Wetlands							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
River Channels							
Abundance	R	R	R	R	R	R	R
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Glades and Barrens							
Abundance	R	R	R	R	R	R	R

Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	1	1	1	1	3	1	1
Basic Mesic Forests							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	F	G	G
Likelihood of Limitation	M	M	M	M	H	M	M
Management Effects	1	1	1	1	3	1	1
Rock Outcrops and Cliffs							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	3	1	1
Canebrakes							
Abundance	R	R	R	R	R	R	R
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	2	2	2	2	3	2	2
Caves and Mines							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	3	1	1
Mature Mesic Hardwood Forests							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	3	2	5	2	3	2	2
Mature Oak Forests							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	2	2	2	2	3	2	3
Mature Yellow Pine Forests							
Abundance	C	C	C	C	C	C	C
Distribution	G	F	G	F	G	F	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	2	5	2	2	2	3
Early-Successional Forests							
Abundance	O	O	O	O	O	O	O
Distribution	G	G	G	F	G	F	G
Likelihood of Limitation	L	L	L	M	L	M	L
Management Effects	2	2	2	5	3	5	2
Mature Forest Interiors							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F

Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	2	2	5	2	3	2	2
Canopy Gaps							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	3	2	5	3	2	3	2
Woodlands, Savannas, and Grasslands							
Abundance	O	O	O	O	R	O	O
Distribution	F	F	F	F	P	F	F
Likelihood of Limitation	M	M	M	M	H	M	M
Management Effects	2	2	3	2	3	3	2
Mixed Landscapes							
Abundance	C	O	C	O	C	O	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	3	3	3	3	5	3
Late Successional Riparian							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	2	3	2	3	3	2
Early-Successional Riparian							
Abundance	O	R	O	R	R	R	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	H	M	H	H	H	M
Management Effects	2	2	2	5	2	5	2
Snags							
Abundance	C	C	C	C	C	C	C
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	2	3	2	2	2	2
Downed Wood							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	3	2	3	2	2	2	2
Den Trees							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	3	2	3	2	2	2	2
Hard Mast							
Abundance	O	O	O	O	O	O	O
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	M	M	M	M	M	M	M



Management Effects	2	2	3	2	2	2	2
Remoteness							
Abundance	O	O	O	O	O	O	O
Distribution	P	P	P	P	P	P	P
Likelihood of Limitation	H	H	H	H	H	H	H
Management Effects	3	3	3	3	3	3	3
Lakeshores							
Abundance	R	R	R	R	R	R	R
Distribution	G	G	G	G	G	G	G
Likelihood of Limitation	M	M	M	M	M	M	M
Management Effects	1	1	1	1	1	1	1
Water Quality							
Abundance	C	C	C	C	C	C	C
Distribution	F	F	F	F	F	F	F
Likelihood of Limitation	L	L	L	L	L	L	L
Management Effects	1	1	1	1	1	1	1

## Table F-1 Key to Variables

### **Habitat Abundance**

Values used to categorize projected abundance of each habitat element after 50 years of implementing each forest plan revision alternative.

<u>Code</u>	<u>Description</u>
R	<u>Rare</u> . The habitat element is rare, with generally less than 100 occurrences, or patches of the element generally covering less than 1 percent of the planning area.
O	<u>Occasional</u> . The habitat element is encountered occasionally, and generally found on 1 to 10 percent of the planning area.
C	<u>Common</u> . The habitat element is abundant and frequently encountered, and generally found on more than 10 percent of the planning area.

### **Habitat Distribution**

Values used to categorize projected distribution of each habitat element after 50 years of implementing each forest plan revision alternative.

<u>Code</u>	<u>Description</u>
P	<u>Poor</u> . The habitat element is poorly distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of high quality habitat patches is greatly reduced.
F	<u>Fair</u> . The habitat element is fairly well distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of high quality habitat patches is somewhat reduced,.
G	<u>Good</u> . The habitat element is well distributed within the planning area and intermixed lands relative to conditions present prior to European settlement. Number and size of high quality habitat patches is similar to or only slightly reduced relative to reference conditions.

### **Likelihood of Limitation**

General likelihood that the habitat element will be limiting to viability of associated species based on its abundance and distribution. See text for description of process used to determine likelihood of limitation.

<u>Code</u>	<u>Description</u>
L	Low
M	Moderate
H	High

## **Management Effect**

Values used to categorize the role of management effects on each habitat element for each forest plan revision alternative.

<u>Code</u>	<u>Description</u>
1	Abundance and distribution of the habitat element is maintained or improved by providing optimal protection, maintenance, and restoration to all occurrences (with limited exceptions in some cases). Little additional opportunity exists to decrease risk to viability of associated species because management is at or near optimal.
2	Abundance and distribution of the habitat element is improved through purposeful restoration, either through active management or passively by providing for successional progression. Opportunity for decreasing risk to associated species is primarily through increasing rates of restoration, where possible.
3	The habitat element is maintained at approximately current distribution and abundance, though location of elements may shift over time as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to increase abundance and distribution of the habitat element.
4	Regardless of management efforts, the habitat element is expected to decrease in distribution and abundance as a result of factors substantially outside of Forest Service control (e.g., invasive pests, acid deposition). Opportunity to reduce risk to viability of associated species is primarily through cooperative ventures with other agencies and organizations.
5	The habitat element is expected to decrease in distribution and abundance as a result of management action or inaction. Opportunity to reduce risk to viability of associated species is primarily through adopting and implementing objectives to maintain or increase this habitat element.

*Table F-2. Risk to species viability for each species/habitat relationship by forest plan revision alternative*

**Forest Unit: Andrew Pickens Ranger District of Sumter**

Scientific Name	Common Name	Status	FRank	Habitat Element	Viability Risk by Alternative							
					A	B	D	E	F	G	I	
<u>Mammals</u>												
Condylura cristata	Star-nosed mole	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1		1	1	1
Condylura cristata	Star-nosed mole	O	F1	Early-Successional Riparian	2	1	2	1		1	1	2
Condylura cristata	Star-nosed mole	O	F1	Late Successional Riparian	3	3	3	3		3	3	3
Corynorhinus rafinesquii	Rafinesque's big-eared bat	S	F1	Lakeshores	2	2	2	2		2	2	2
Corynorhinus rafinesquii	Rafinesque's big-eared bat	S	F1	Caves and Mines	2	2	2	2		2	2	2
Corynorhinus rafinesquii	Rafinesque's big-eared bat	S	F1	Den Trees	2	2	2	2		2	2	2
Corynorhinus rafinesquii	Rafinesque's big-eared bat	S	F1	Late Successional Riparian	3	3	3	3		3	3	3
Corynorhinus rafinesquii	Rafinesque's big-eared bat	S	F1	Open Wetlands	1	1	1	1		1	1	1
Lontra canadensis	River otter	O	F1	Water Quality	3	3	3	3		3	3	3
Lontra canadensis	River otter	O	F1	Late Successional Riparian	3	3	3	3		3	3	3
Myotis leibii	Eastern small-footed bat	S	F1	Caves and Mines	2	2	2	2		2	2	2
Myotis leibii	Eastern small-footed bat	S	F1	Rock Outcrops and Cliffs	2	2	2	2		2	2	2
Myotis leibii	Eastern small-footed bat	S	F1	Late Successional Riparian	3	3	3	3		3	3	3
Myotis septentrionalis	Northern long-eared bat	O	F1	Den Trees	2	2	2	2		2	2	2
Myotis septentrionalis	Northern long-eared bat	O	F1	Caves and Mines	2	2	2	2		2	2	2
Myotis septentrionalis	Northern long-eared bat	O	F1	Snags	3	3	3	3		3	3	3
Neotoma floridana haematoreia	Southern Appalachian eastern woodrat	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2		1	2	2
Neotoma floridana haematoreia	Southern Appalachian eastern woodrat	O	F1	Rock Outcrops and Cliffs	2	2	2	2		2	2	2
Neotoma floridana haematoreia	Southern Appalachian eastern woodrat	O	F1	Glades and Barrens	1	1	1	1		1	1	1

Neotoma floridana haematorea	Southern Appalachian eastern woodrat	O	F1	Mature Oak Forests	3	3	3	3	3	3	3
Spilogale putorius	Spotted skunk	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Spilogale putorius	Spotted skunk	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<b><u>Birds</u></b>											
Accipiter cooperii	Cooper's hawk	O	F3	Mixed Landscapes	5	5	5	5	5	5	5
Bonasa umbellus	Ruffed grouse	O	F3	Early-Successional Forests	5	5	5	4	5	3	5
Colinus virginianus	Northern bobwhite	O	F2	Mature Yellow Pine Forests	3	3	3	3	3	3	3
Colinus virginianus	Northern bobwhite	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Dendroica dominica	Yellow-throated warbler	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Dendroica fusca	Blackburnian warbler	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Hylocichla mustelina	Wood thrush	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Hylocichla mustelina	Wood thrush	O	F3	Canopy Gaps	5	5	5	5	5	5	5
Hylocichla mustelina	Wood thrush	O	F3	Mature Forest Interiors	5	5	5	5	5	5	5
Icterus spurius	Orchard oriole	O	F2	Mixed Landscapes	4	4	4	4	4	4	4
Icterus spurius	Orchard oriole	O	F2	Mature Oak Forests	4	4	4	4	4	4	4
Icterus spurius	Orchard oriole	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Icterus spurius	Orchard oriole	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Lanius ludovicianus	Loggerhead shrike	O	F2	Grasslands	3	3	3	3	2	3	3
Oporornis formosus	Kentucky warbler	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Oporornis formosus	Kentucky warbler	O	F3	Canopy Gaps	5	5	5	5	5	5	5
Oporornis formosus	Kentucky warbler	O	F3	Mature Forest Interiors	5	5	5	5	5	5	5
Scolopax minor	American woodcock	O	F3	Bogs, Fens, Seeps, Seasonal Ponds	3	3	3	3	3	3	3
Scolopax minor	American woodcock	O	F3	Early-Successional Riparian	4	3	4	3	3	3	4
Wilsonia canadensis	Canada warbler	O	F2	Canopy Gaps	4	4	4	4	4	4	4
<b><u>Reptiles</u></b>											
Anolis carolinensis	Carolina anole	O	F1	Mature Yellow Pine Forests	2	2	2	2	2	2	2
Anolis carolinensis	Carolina anole	O	F1	Mixed Landscapes	3	3	3	3	3	3	3
Anolis carolinensis	Carolina anole	O	F1	Mature Oak Forests	3	3	3	3	3	3	3
Anolis carolinensis	Carolina anole	O	F1	Canopy Gaps	3	3	3	3	3	3	3
Elaphe guttata guttata	Corn snake	O	F1	Snags	3	3	3	3	3	3	3
Elaphe guttata guttata	Corn snake	O	F1	Mature Yellow Pine Forests	2	2	2	2	2	2	2

<i>Elaphe guttata guttata</i>	Corn snake	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
<i>Elaphe guttata guttata</i>	Corn snake	O	F1	Downed Wood	3	3	3	3	3	3	3
<b><u>Amphibians</u></b>											
<i>Aneides aeneus</i>	Green salamander	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<i>Aneides aeneus</i>	Green salamander	O	F1	Caves and Mines	2	2	2	2	2	2	2
<i>Aneides aeneus</i>	Green salamander	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
<i>Aneides aeneus</i>	Green salamander	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
<i>Desmognathus aeneus</i>	Seepage salamander	O	F1	Downed Wood	3	3	3	3	3	3	3
<i>Desmognathus aeneus</i>	Seepage salamander	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
<i>Desmognathus aeneus</i>	Seepage salamander	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<i>Desmognathus ochrophaeus</i>	Mountain dusky salamander	O	F1	Downed Wood	3	3	3	3	3	3	3
<i>Desmognathus ochrophaeus</i>	Mountain dusky salamander	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
<i>Desmognathus ochrophaeus</i>	Mountain dusky salamander	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<i>Desmognathus ochrophaeus</i>	Mountain dusky salamander	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
<i>Plethodon teyahalee</i>	Southern Appalachian salamander	S	F1	Downed Wood	3	3	3	3	3	3	3
<i>Plethodon teyahalee</i>	Southern Appalachian salamander	S	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<b><u>Plants--Vascular</u></b>											
<i>Acer pensylvanicum</i>	Striped maple	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
<i>Acer saccharum</i> ssp. <i>leucoderme</i>	Chalk maple	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
<i>Acer saccharum</i> ssp. <i>leucoderme</i>	Chalk maple	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
<i>Aconitum uncinatum</i>	Blue monkshood	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
<i>Aconitum uncinatum</i>	Blue monkshood	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
<i>Aconitum uncinatum</i>	Blue monkshood	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
<i>Aplectrum hyemale</i>	Puttyroot	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
<i>Aralia racemosa</i>	American spikenard	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
<i>Aristolochia macrophylla</i>	Pipevine	O	F3	Basic Mesic Forests	3	3	3	3	3	3	3
<i>Aristolochia macrophylla</i>	Pipevine	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
<i>Asplenium monanthes</i>	Single-sorus spleenwort	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
<i>Asplenium resiliens</i>	Blackstem spleenwort	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
<i>Asplenium rhizophyllum</i>	Walking-fern spleenwort	O	F2	Rock Outcrops and Cliffs	3	3	3	3	3	3	3

Aster laevis var. concinnus	Smooth purple aster	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Aster laevis var. concinnus	Smooth purple aster	O	F1	Glades and Barrens	1	1	1	1	1	1	1
Aster surculosus	Creeping aster	O	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Aster surculosus	Creeping aster	O	F3	Glades and Barrens	3	3	3	3	3	3	3
Athyrium pycnocarpon	Narrow-leaved glade fern	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Boykinia aconitifolia	Brook saxifrage	O	F3	Spray Cliffs	4	4	4	4	4	4	4
Boykinia aconitifolia	Brook saxifrage	O	F3	River Channels	3	3	3	3	3	3	3
Cardamine flagellifera	Bittercress	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Cardamine flagellifera	Bittercress	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Carex aestivalis	Summer sedge	O	F1	Mixed Landscapes	3	3	3	3	3	3	3
Carex amplisquama	Fort Mountain sedge	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Carex appalachica	Appalachian sedge	O	F1	Canopy Gaps	3	3	3	3	3	3	3
Carex bromoides ssp. montana	Blue Ridge brome sedge	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Carex bushii	Bush's sedge	O	F1	Open Wetlands	1	1	1	1	1	1	1
Carex gracillima	Graceful sedge	O	F2	Late Successional Riparian	4	4	4	4	4	4	4
Carex gracillima	Graceful sedge	O	F2	Basic Mesic Forests	2	2	2	2	2	2	2
Carex manhartii	Manhart's sedge	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Carex pedunculata	Longstalk sedge	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Carex plantaginea	Plantain-leaved sedge	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Carex plantaginea	Plantain-leaved sedge	O	F2	Basic Mesic Forests	2	2	2	2	2	2	2
Carex radfordii	Radford's sedge	S	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Carex ruthii	Ruth's sedge	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Carex scabrata	Rough sedge	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Carex stricta	Tussock caric sedge	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Carex woodii	Wood's sedge	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Carex woodii	Wood's sedge	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Caulophyllum thalictroides	Blue cohosh	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Caulophyllum thalictroides	Blue cohosh	O	F2	Basic Mesic Forests	2	2	2	2	2	2	2
Circaea lutetiana ssp. canadensis	Intermediate enchanter's nightshade	O	F2	Basic Mesic Forests	2	2	2	2	2	2	2
Circaea lutetiana ssp. canadensis	Intermediate enchanter's nightshade	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4

Cleistes bifaria	Small spreading pogonia	S	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Comptonia peregrina	Sweet fern	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Comptonia peregrina	Sweet fern	O	F1	Mature Oak Forests	3	3	3	3	3	3	3
Comptonia peregrina	Sweet fern	O	F1	Table Mountain Pine Forests	1	1	1	1	1	1	1
Cuscuta rostrata	Beaked dodder	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Cystopteris protrusa	Lowland brittlefern	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Cystopteris protrusa	Lowland brittlefern	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Dicentra eximia	Bleeding heart	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Diphylleia cymosa	Umbrella leaf	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Dryopteris goldiana	Goldie's woodfern	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Dryopteris intermedia	Evergreen woodfern	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Echinacea laevigata	Smooth coneflower	F	F3	Glades and Barrens	3	3	3	3	3	3	3
Echinacea laevigata	Smooth coneflower	F	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Eryngium yuccifolium	Rattlesnake-master	O	F2	Glades and Barrens	2	2	2	2	2	2	2
Eryngium yuccifolium	Rattlesnake-master	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Euonymus atropurpureus	Wahoo	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Euonymus atropurpureus	Wahoo	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Euonymus atropurpureus	Wahoo	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Fothergilla major	Witch alder	S	F1	Mature Oak Forests	3	3	3	3	3	3	3
Fothergilla major	Witch alder	S	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Fothergilla major	Witch alder	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Gaultheria procumbens	Teaberry	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Gaultheria procumbens	Teaberry	O	F2	Table Mountain Pine Forests	2	2	2	2	2	2	2
Gaultheria procumbens	Teaberry	O	F2	Mature Yellow Pine Forests	3	3	3	3	3	3	3
Gymnopogon ambiguus	Beardgrass	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Gymnopogon ambiguus	Beardgrass	O	F2	Glades and Barrens	2	2	2	2	2	2	2
Heuchera parviflora	Little-leaved alumroot	O	F2	Rock Outcrops and Cliffs	3	3	3	3	3	3	3
Hexastylis shuttleworthii var. shuttleworthii	Large-flowered heartleaf	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5



Hexastylis shuttleworthii var. shuttleworthii	Large-flowered heartleaf	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Houstonia longifolia var. glabra	Granite dome bluet	O	F3	Rock Outcrops and Cliffs	4	4	4	4	4	4	4
Hydrocotyle americana	American pennywort	O	F1	Open Wetlands	1	1	1	1	1	1	1
Hydrocotyle americana	American pennywort	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Hypericum crux-andreae	St. Peter's-wort	O	F3	Mature Yellow Pine Forests	4	4	4	4	4	4	4
Hypericum crux-andreae	St. Peter's-wort	O	F3	Open Wetlands	3	3	3	3	3	3	3
Isotria medeoloides	Small whorled pogonia	F	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Isotria medeoloides	Small whorled pogonia	F	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Isotria verticillata	Large whorled pogonia	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Juglans cinerea	Butternut	S	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Juglans cinerea	Butternut	S	F2	Late Successional Riparian	4	4	4	4	4	4	4
Juglans cinerea	Butternut	S	F2	Basic Mesic Forests	2	2	2	2	2	2	2
Juncus gymnocarpus	Coville's rush	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Juncus subcaudatus	Woods rush	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Krigia montana	False dandelion	O	F2	Rock Outcrops and Cliffs	3	3	3	3	3	3	3
Liatris squarrulosa	Earle's blazing star	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Liparis liliifolia	Large twayblade	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Liparis liliifolia	Large twayblade	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Listera smallii	Kidney-leaf twayblade	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Lobelia amoena	Southern lobelia	O	F3	Bogs, Fens, Seeps, Seasonal Ponds	3	3	3	3	3	3	3
Lobelia amoena	Southern lobelia	O	F3	Early-Successional Riparian	4	3	4	3	3	3	4
Lonicera flava	Yellow honeysuckle	O	F1	Mature Oak Forests	3	3	3	3	3	3	3
Lonicera flava	Yellow honeysuckle	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Lygodium palmatum	Climbing fern	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Lygodium palmatum	Climbing fern	O	F2	Late Successional Riparian	4	4	4	4	4	4	4
				Woodlands, Savannas, and Grasslands							
Lysimachia fraseri	Fraser's loosestrife	S	F3		4	4	4	4	3	4	4
Lysimachia fraseri	Fraser's loosestrife	S	F3	Mature Oak Forests	5	5	5	5	5	5	5
Lysimachia fraseri	Fraser's loosestrife	S	F3	River Channels	3	3	3	3	3	3	3
Lysimachia fraseri	Fraser's loosestrife	S	F3	Canopy Gaps	5	5	5	5	5	5	5
Matelea carolinensis	Carolina anglepod	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4

Melanthium latifolium	Broadleaf bunchflower	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Melanthium latifolium	Broadleaf bunchflower	O	F2	Canopy Gaps	4	4	4	4	4	4	4
Melanthium parviflorum	Small-flowered false hellebore	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Menispermum canadense	Canada moonseed	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Menispermum canadense	Canada moonseed	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Menispermum canadense	Canada moonseed	O	F1	River Channels	1	1	1	1	1	1	1
Menispermum canadense	Canada moonseed	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Monarda didyma	Oswego Tea	O	F1	Bogs, Fens, Seeps, Seasonal Ponds Woodlands, Savannas, and	1	1	1	1	1	1	1
Nestronia umbellula	Nestronia	O	F1	Grasslands	2	2	2	2	1	2	2
Nestronia umbellula	Nestronia	O	F1	Mature Oak Forests	3	3	3	3	3	3	3
Onosmodium virginianum	Virginia false gromwell	O	F2	Glades and Barrens	2	2	2	2	2	2	2
Panax quinquefolius	Ginseng	O	F3	Basic Mesic Forests	3	3	3	3	3	3	3
Panax quinquefolius	Ginseng	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Parnassia asarifolia	Kidneyleaf grass-of-parnassus	O	F2	Late Successional Riparian	4	4	4	4	4	4	4
Parnassia asarifolia	Kidneyleaf grass-of-parnassus	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Pellaea atropurpurea	Purple-stem cliffbreak	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Phacelia bipinnatifida	Fernleaf phacelia	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Phacelia bipinnatifida	Fernleaf phacelia	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Philadelphus hirsutus	Streambank mock orange	O	F2	Rock Outcrops and Cliffs	3	3	3	3	3	3	3
Philadelphus inodorus	Mock orange	O	F3	Mature Oak Forests	5	5	5	5	5	5	5
Platanthera psycodes	Small purple-fringed orchid	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Polygala paucifolia	Gay-wing milkwort	O	F1	Mature Mesic Hardwood Forests Woodlands, Savannas, and	3	3	3	3	3	3	3
Polygala polygama var. polygama	Purple milkwort	O	F2	Grasslands	3	3	3	3	2	3	3
Potamogeton epihydrus	Nuttall's pondweed	O	F2	Open Wetlands	2	2	2	2	2	2	2
Rhododendron arborescens	Smooth azalea	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Rhododendron arborescens	Smooth azalea	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Rhododendron arborescens	Smooth azalea	O	F3	River Channels	3	3	3	3	3	3	3
Rhododendron catawbiense	Catawba rhododendron	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Rhus typhina	Staghorn sumac	O	F1	Early-Successional Forests	3	3	3	2	3	1	3
Rhynchosia tomentosa	Hairy snoutbean	O	F2	Mature Oak Forests	4	4	4	4	4	4	4
Rudbeckia heliopsisidis	Sun-facing coneflower	S	F2	Early-Successional Forests	4	4	4	3	4	2	4

Rudbeckia heliopsidis	Sun-facing coneflower	S	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Sanicula trifoliata	Large-fruited snakeroot	O	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Sanicula trifoliata	Large-fruited snakeroot	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Saxifraga michauxii	Michaux's saxifrage	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Saxifraga michauxii	Michaux's saxifrage	O	F2	Spray Cliffs	3	3	3	3	3	3	3
Shortia galacifolia var. galacifolia	Oconee bell	S	F2	Mature Hemlock Forests	2	2	2	2	2	2	2
Spigelia marilandica	Pink root	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Spiraea tomentosa	Hardhack	O	F2	Open Wetlands	2	2	2	2	2	2	2
Spiraea tomentosa	Hardhack	O	F2	Early-Successional Forests	4	4	4	3	4	2	4
Spiranthes ovalis	Oval ladies'-tresses	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Spiranthes ovalis	Oval ladies'-tresses	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Stachys latidens	Broad-toothed hedge-nettle	O	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Stewartia ovata	Mountain camellia	O	F2	Late Successional Riparian	4	4	4	4	4	4	4
Stewartia ovata	Mountain camellia	O	F2	Mature Hemlock Forests	2	2	2	2	2	2	2
Talinum teretifolium	Roundleaf flame-flower	O	F1	Glades and Barrens	1	1	1	1	1	1	1
Tephrosia spicata	Spiked hoary-pea	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Tetragonotheca helianthoides	Pineland squarehead	O	F2	Mature Oak Forests	4	4	4	4	4	4	4
Tetragonotheca helianthoides	Pineland squarehead	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Thalictrum macrostylum	Piedmont meadowrue	O	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Thalictrum macrostylum	Piedmont meadowrue	O	F3	Mature Oak Forests	5	5	5	5	5	5	5
Thermopsis fraxinifolia	Ash-leaved bushpea	O	F3	Mature Oak Forests	5	5	5	5	5	5	5
Thermopsis mollis	Appalachian golden-banner	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Tiarella cordifolia var. cordifolia	Heart-leaved foamflower	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Tiarella cordifolia var. cordifolia	Heart-leaved foamflower	O	F3	Bogs, Fens, Seeps, Seasonal Ponds	3	3	3	3	3	3	3
Tiarella cordifolia var. cordifolia	Heart-leaved foamflower	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Tragia urticifolia	Nettle-leaf noseburn	O	F3	Rock Outcrops and Cliffs	4	4	4	4	4	4	4
Tragia urticifolia	Nettle-leaf noseburn	O	F3	Glades and Barrens	3	3	3	3	3	3	3
Tragia urticifolia	Nettle-leaf noseburn	O	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Trichomanes boschianum	Bristle fern	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2

Trichomanes petersii	Dwarf filmy fern	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Trillium discolor	Faded trillium	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Trillium grandiflorum	Large-flowered trillium	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Trillium rugelii	Southern nodding trillium	S	F1	Basic Mesic Forests	1	1	1	1	1	1	1
Trillium rugelii	Southern nodding trillium	S	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Trillium simile	Sweet white trillium	S	F2	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Trillium undulatum	Painted trillium	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Trillium undulatum	Painted trillium	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Triphora trianthophora	Nodding pogonia	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Viola conspersa	American dog violet	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Viola pubescens var. leiocarpon	Yellow violet	O	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Viola pubescens var. leiocarpon	Yellow violet	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Viola tripartita var. tripartita	Three-parted violet	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Viola tripartita var. tripartita	Three-parted violet	O	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Waldsteinia lobata	Lobed barren-strawberry	S	F3	Mature Mesic Hardwood Forests	5	5	5	5	5	5	5
Waldsteinia lobata	Lobed barren-strawberry	S	F3	Late Successional Riparian	5	5	5	5	5	5	5
Woodwardia areolata	Netted chain fern	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2
Xerophyllum asphodeloides	Eastern turkey beard	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Xerophyllum asphodeloides	Eastern turkey beard	O	F1	Table Mountain Pine Forests	1	1	1	1	1	1	1
<b><u>Plants--Nonvascular</u></b>											
Acrobolbus ciliatus	A liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Aneura maxima	Liverwort	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Aneura maxima	Liverwort	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Aneura maxima	Liverwort	O	F1	Spray Cliffs	2	2	2	2	2	2	2
Cheilolejeunea evansii	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Cheilolejeunea myriantha	Liverwort	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Cheilolejeunea myriantha	Liverwort	O	F1	Mature Hemlock Forests	1	1	1	1	1	1	1
Lejeunea blomquistii	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Lophocolea appalachiana	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Lophocolea appalachiana	Liverwort	S	F1	Spray Cliffs	2	2	2	2	2	2	2
Marsupella emarginata var. latiloba	Liverwort	S	F1	Spray Cliffs	2	2	2	2	2	2	2

Marsupella emarginata var. latiloba	Liverwort	S	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Plagiochila austinii	Liverwort	S	F2	Spray Cliffs	3	3	3	3	3	3	3
Plagiochila austinii	Liverwort	S	F2	Rock Outcrops and Cliffs	3	3	3	3	3	3	3
Plagiochila austinii	Liverwort	S	F2	Late Successional Riparian	4	4	4	4	4	4	4
Plagiochila caduciloba	Liverwort	S	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Plagiochila caduciloba	Liverwort	S	F1	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Plagiochila echinata	Liverwort	S	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Plagiochila echinata	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Plagiochila sharpii	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Plagiomnium carolinianum	Mountain wavy-leaf moss	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Plagiomnium carolinianum	Mountain wavy-leaf moss	S	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Radula sullivantii	Liverwort	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Radula sullivantii	Liverwort	S	F1	Spray Cliffs	2	2	2	2	2	2	2
Radula sullivantii	Liverwort	S	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2

## Forest Unit: Enoree and Long Cane Ranger Districts of Sumter

Scientific Name	Common Name	Status	FRank	Habitat Element	Viability Risk by Alternative						
					A	B	D	E	F	G	I
<b><u>Mammals</u></b>											
Lontra canadensis	River otter	O	F1	Water Quality	3	3	3	3	3	3	3
Lontra canadensis	River otter	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
<b><u>Birds</u></b>											
Aimophila aestivalis	Bachman's sparrow	S	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Caprimulgus carolinensis	Chuck-wills-widow	O	F2	Mature Yellow Pine Forests	4	4	4	4	4	4	4
Caprimulgus carolinensis	Chuck-wills-widow	O	F2	Mixed Landscapes	4	4	4	4	4	4	4
Dendroica discolor	Prairie warbler	O	F3	Open Wetlands	3	3	3	3	3	3	3
Dendroica discolor	Prairie warbler	O	F3	Early-Successional Forests	5	5	5	4	5	4	5
Dendroica dominica	Yellow-throated warbler	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Haliaeetus leucocephalus	Bald eagle	F	F1	Lakeshores	2	2	2	2	2	2	2
Haliaeetus leucocephalus	Bald eagle	F	F1	Late Successional Riparian	3	3	3	3	3	3	3
Hylocichla mustelina	Wood thrush	O	F3	Mature Forest Interiors	4	4	4	4	4	4	4
Hylocichla mustelina	Wood thrush	O	F3	Canopy Gaps	4	4	4	4	4	4	4
Hylocichla mustelina	Wood thrush	O	F3	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Lanius ludovicianus	Loggerhead shrike	O	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Mycteria americana	Wood stork	F	F3	Open Wetlands	3	3	3	3	3	3	3
Oporornis formosus	Kentucky warbler	O	F3	Canopy Gaps	4	4	4	4	4	4	4
Oporornis formosus	Kentucky warbler	O	F3	Mature Forest Interiors	4	4	4	4	4	4	4
Oporornis formosus	Kentucky warbler	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Protonotaria citrea	Prothonotory warbler	O	F3	Early-Successional Riparian	4	3	4	3	3	3	4
Protonotaria citrea	Prothonotory warbler	O	F3	Snags	5	5	5	5	5	5	5
Protonotaria citrea	Prothonotory warbler	O	F3	Late Successional Riparian	5	5	5	5	5	5	5
Scolopax minor	American woodcock	O	F2	Bogs, Fens, Seeps, Seasonal Ponds	2	2	2	2	2	2	2

Scolopax minor	American woodcock	O	F2	Early-Successional Riparian	3	2	3	2	2	2	3
Sitta pusilla	Brown-headed nuthatch	O	F3	Mature Yellow Pine Forests	5	5	5	5	5	5	5
Sitta pusilla	Brown-headed nuthatch	O	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4
Wilsonia citrina	Hooded warbler	O	F3	Mature Oak Forests	4	4	4	4	4	4	4
Wilsonia citrina	Hooded warbler	O	F3	Canopy Gaps	4	4	4	4	4	4	4
Wilsonia citrina	Hooded warbler	O	F3	Mature Forest Interiors	4	4	4	4	4	4	4
Wilsonia citrina	Hooded warbler	O	F3	Early-Successional Forests	5	5	5	4	5	4	5

### **Reptiles**

Anolis carolinensis	Carolina anole	O	F2	Mature Oak Forests	3	3	3	3	3	3	3
Anolis carolinensis	Carolina anole	O	F2	Canopy Gaps	3	3	3	3	3	3	3
Anolis carolinensis	Carolina anole	O	F2	Mature Yellow Pine Forests	4	4	4	4	4	4	4
Anolis carolinensis	Carolina anole	O	F2	Mixed Landscapes	4	4	4	4	4	4	4
Elaphe guttata guttata	Corn snake	O	F1	Downed Wood	3	3	3	3	3	3	3
Elaphe guttata guttata	Corn snake	O	F1	Snags	3	3	3	3	3	3	3
Elaphe guttata guttata	Corn snake	O	F1	Mature Yellow Pine Forests	3	3	3	3	3	3	3
Elaphe guttata guttata	Corn snake	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Eumeces inexpectatus	Southeastern five-lined skink	O	F2	Downed Wood	4	4	4	4	4	4	4
Eumeces inexpectatus	Southeastern five-lined skink	O	F2	Mature Yellow Pine Forests	4	4	4	4	4	4	4
Eumeces inexpectatus	Southeastern five-lined skink	O	F2	Canopy Gaps	3	3	3	3	3	3	3
Eumeces inexpectatus	Southeastern five-lined skink	O	F2	Mature Oak Forests	3	3	3	3	3	3	3
Tantilla coronata	Southeastern crowned snake	O	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Tantilla coronata	Southeastern crowned snake	O	F1	Glades and Barrens	1	1	1	1	1	1	1
Tantilla coronata	Southeastern crowned snake	O	F1	Mature Yellow Pine Forests	3	3	3	3	3	3	3

### **Amphibians**

Plethodon websteri	Webster's salamander	S	F2	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Plethodon websteri	Webster's salamander	S	F2	Downed Wood	4	4	4	4	4	4	4

### **Plants--Vascular**

Amorpha schwerini	Indigo bush	O	F1	Mature Oak Forests	2	2	2	2	2	2	2
Amorpha schwerini	Indigo bush	O	F1	Glades and Barrens	1	1	1	1	1	1	1
Amorpha schwerini	Indigo bush	O	F1	River Channels	1	1	1	1	1	1	1
Aster georgianus	Georgia aster	S	F3	Woodlands, Savannas, and Grasslands	4	4	4	4	3	4	4

Aster georgianus	Georgia aster	S	F3	Glades and Barrens	3	3	3	3	3	3	3
Carex gracillima	Graceful sedge	O	F1	Late Successional Riparian	3	3	3	3	3	3	3
Carex gracillima	Graceful sedge	O	F1	Basic Mesic Forests	2	2	2	2	1	2	2
Carex impressinervia	Impressed nerve sedge	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Cystopteris protrusa	Lowland brittlefern	O	F1	Basic Mesic Forests	2	2	2	2	1	2	2
Cystopteris protrusa	Lowland brittlefern	O	F1	Mature Mesic Hardwood Forests	2	2	2	2	2	2	2
Dodecatheon meadia ssp. meadia	Eastern shooting star	O	F1	Basic Mesic Forests	2	2	2	2	1	2	2
Dodecatheon meadia ssp. meadia	Eastern shooting star	O	F1	Bogs, Fens, Seeps, Seasonal Ponds	1	1	1	1	1	1	1
Forestiera ligustrina	Upland swampprivet	O	F2	Mature Oak Forests	3	3	3	3	3	3	3
Forestiera ligustrina	Upland swampprivet	O	F2	Woodlands, Savannas, and Grasslands	3	3	3	3	2	3	3
Frasera caroliniensis	Columbo	O	F2	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Hymenocallis coronaria	Shoals spider lily	O	F1	River Channels	1	1	1	1	1	1	1
Lithospermum tuberosum	Tuberous gromwell	O	F1	Mature Mesic Hardwood Forests	2	2	2	2	2	2	2
Lonicera flava	Yellow honeysuckle	O	F1	Mature Oak Forests	2	2	2	2	2	2	2
Lonicera flava	Yellow honeysuckle	O	F1	Rock Outcrops and Cliffs	2	2	2	2	2	2	2
Monotropsis odorata	Sweet pinesap	S	F1	Mature Mesic Hardwood Forests	2	2	2	2	2	2	2
Monotropsis odorata	Sweet pinesap	S	F1	Mature Oak Forests	2	2	2	2	2	2	2
Monotropsis odorata	Sweet pinesap	S	F1	Woodlands, Savannas, and Grasslands	2	2	2	2	1	2	2
Osmorhiza claytonii	Hairy sweet cicely	O	F1	Mature Mesic Hardwood Forests	2	2	2	2	2	2	2
Osmorhiza claytonii	Hairy sweet cicely	O	F1	Basic Mesic Forests	2	2	2	2	1	2	2
Panax quinquefolius	Ginseng	O	F2	Mature Mesic Hardwood Forests	3	3	3	3	3	3	3
Panax quinquefolius	Ginseng	O	F2	Basic Mesic Forests	3	3	3	3	2	3	3
Quercus oglethorpensis	Oglethorpe oak	S	F3	Late Successional Riparian	5	5	5	5	5	5	5
Quercus oglethorpensis	Oglethorpe oak	S	F3	Bogs, Fens, Seeps, Seasonal Ponds	3	3	3	3	3	3	3
Quercus sinuata var. sinuata	Durand's white oak	O	F2	Late Successional Riparian	4	4	4	4	4	4	4
Ribes echinellum	Florida gooseberry	F	F1	Basic Mesic Forests	2	2	2	2	1	2	2
Trillium discolor	Faded trillium	O	F3	Mature Mesic Hardwood Forests	4	4	4	4	4	4	4
Trillium lancifolium	Narrow-leaved trillium	S	F1	Late Successional Riparian	3	3	3	3	3	3	3
Trillium rugelii	Southern nodding trillium	S	F1	Mature Mesic Hardwood Forests	2	2	2	2	2	2	2
Trillium rugelii	Southern nodding trillium	S	F1	Basic Mesic Forests	2	2	2	2	1	2	2



## Table F-2 Key to Variables

### **Status**

<u>Code</u>	<u>Description</u>
F	Federally listed or proposed as Threatened or Endangered.
S	Regional Forester's Sensitive Species List.
O	Locally rare and other.

### **F Rank**

<u>Code</u>	<u>Description</u>
F?	Present on the forest, but abundance information is insufficient to develop rank.
FO	Not present, no known occurrences on the forest unit, and unit is outside the species range or habitat is not present.
F1	Extremely rare on the forest unit, generally with 1-5 occurrences.
F2	Very rare on the forest unit, generally with 6-20 occurrences.
F3	Rare and uncommon on the forest unit, from 21-100 occurrences.
F4	Widespread, abundant, and apparently secure on the forest unit.
F5	Demonstrably secure on the forest unit.
FP	Possibly could occur on the forest unit, but documented occurrences not known.
FH	Of documented historical occurrence on the forest unit; may be rediscovered.
FX	Once occurred but has been extirpated from the forest unit; it is not likely to be rediscovered.

### **Viability Risk (see text for process used to define level of risk)**

<u>Code</u>	<u>Description</u>
1	Very High
2	High
3	Moderately High
4	Moderate
5	Low

# APPENDIX G

## AQUATIC SPECIES VIABILITY

COMMON NAME	SCIENTIFIC NAME	G-RANK	FEDERAL	AFS	Watershed	Forest	Percent FS Ownership	WCR	Viability Outcome					Comments
									1	2	3	4	5	
Carolina darter	Etheostoma collis	G3		V	305010601	Sumter	26.255	A			S			Disjunct and moderate watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010602	Sumter	0.535	A			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010603	Sumter	0.746	BA			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010604	Sumter	1.083	A			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010605	Sumter	7.326	A			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010607	Sumter	0.003	A			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010705	Sumter	16.627	A			S			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010706	Sumter	3.181	BA			SP			Disjunct and low watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010707	Sumter	31.367	A			S			Disjunct and moderate watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010802	Sumter	23.185	A			S			Disjunct and moderate watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010804	Sumter	23.521	A			S			Disjunct and moderate watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010805	Sumter	48.860	A			S			Disjunct and moderate watershed ownership.
Carolina darter	Etheostoma collis	G3		V	305010806	Sumter	44.153	E	X					
Rayed pink fatmucket	Lampsilis splendida	G3		V	305010915	Sumter	0.068	A			S			Disjunct and low watershed ownership.
Non PETS Species	Non PETS Species				306010102	Sumter	9.505	E	X					
Non PETS Species	Non PETS Species				306010103	Sumter	0.716	E	X					
Non PETS Species	Non PETS Species				306010105	Sumter	15.747	A			S			Disjunct and low watershed ownership.
Non PETS Species	Non PETS Species				306010108	Sumter	3.351	BA			S			Disjunct and low watershed ownership.
Brook floater	Alasmidonta varicosa	G3			306010201	Sumter	13.689	BA		S				Disjunct and low watershed ownership in SC; however conditions may be improved through existing partnership watershed projects..
Oconee stream crayfish	Cambarus chaugaensis	G2		E	306010201	Sumter	13.689	BA		S				Disjunct and low watershed ownership in SC; however conditions may be improved through existing partnership watershed projects.

							Percent FS		Viability Outcome					
COMMON NAME	SCIENTIFIC NAME	G-RANK	FEDERAL	AFS	Watershed	Forest	Ownership	WCR	1	2	3	4	5	Comments
Non Pets Species	Non PETS Species				306010208	Sumter	10.315	A			S			Disjunct and low watershed ownership.
Oconee stream crayfish	Cambarus chaugaensis	G2		E	306010212	Sumter	41.725	A		S				Disjunct and moderate watershed ownership; however conditions may be improved through existing partnership watershed projects..
Non PETS Species	Non PETS Species				306010310	Sumter	3.718	A			S			Disjunct and low watershed ownership.
Non PETS Species	Non PETS Species				306010314	Sumter	5.932	A			S			Disjunct and low watershed ownership.
Non PETS Species	Non PETS Species				306010315	Sumter	26.735	A		S				Disjunct and moderate watershed ownership ; however conditions may be improved through existing partnership watershed projects.
Non PETS Species	Non PETS Species				306010603	Sumter	30.477	E	X					
Brook floater	Alasmidonta varicosa	G3		T	306010701	Sumter	8.633	A		S				Disjunct and low watershed ownership ; however conditions may be improved through existing partnership watershed projects.
Carolina heelsplitter	Lasmigona decorata	G1	E	E	306010701	Sumter	8.633	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Robust redhorse	Moxostoma robustum	G1		E	306010701	Sumter	8.633	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Brook floater	Alasmidonta varicosa	G3		T	306010702	Sumter	15.318	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Carolina heelsplitter	Lasmigona decorata	G1	E	E	306010702	Sumter	15.318	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Robust redhorse	Moxostoma robustum	G1		E	306010702	Sumter	15.318	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects..
Brook floater	Alasmidonta varicosa	G3		T	306010704	Sumter	13.400	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Carolina heelsplitter	Lasmigona decorata	G1	E	E	306010704	Sumter	13.400	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.
Robust redhorse	Moxostoma robustum	G1		E	306010704	Sumter	13.400	A		S				Disjunct and low watershed ownership; however conditions may be improved through existing partnership watershed projects.

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## **APPENDIX H**

# **CHATTOOGA RIVER HWY 28 ANALYSIS**

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### **PURPOSE**

Appendix H outlines the recreational/social effects of opening up all or part of the Chattooga Wild and Scenic River upstream of Highway 28 to whitewater boating (the physical and biological effects are addressed in Chapter 3). The need to consider this action was raised as an issue during the public involvement processes for both Amendment 14 of the Sumter National Forest Plan, and the Sumter Forest Plan Revision itself.

### **DESCRIPTION OF THREE (3) ALTERNATIVES THAT ADDRESS WHITEWATER BOATING USE ABOVE HIGHWAY 28**

#### **Alternatives B, D, F, and I – No Action**

No boating is allowed above Highway 28. This is the “status quo” alternative.

#### **Alternative E – Boating allowed between NC-1107 (Grimshawes) & Highway 28**

Under this alternative, the sections of river from NC-1107 (Grimshawes bridge) to Highway 28 bridge would be open to boating all year (self-regulating alternative).

There would be:

- No limits on the number of trips per day;
- Maximum group size of 12 craft, and a minimum group size of 2 craft per trip (from Bull Pen Bridge to Burrells Ford Bridge, within the Ellicott Rock Wilderness, a maximum group size of 12 craft and 12 people);
- Self-guided use only;
- Crafts are limited to inflatable kayaks and hardboats (canoes and kayaks);
- No new access points developed, but existing facilities would be maintained.

## Alternative A – Boating allowed between Burrell’s Ford Bridge & Highway 28

Under this alternative, the section of river from Burrell’s Ford bridge to Highway 28 bridge would be open for boating from December 1 through March 31, but only at levels at or above 2.5 feet (1400 cfs) at the Highway 76 gauge.

There would be:

- No limits on the number of trips per day;
- Maximum group size of 12 craft, and a minimum group size of 2 craft per trip;
- Self-guided use only;
- Crafts are limited to inflatable kayaks and hardboats (canoes and kayaks);
- No new access points developed, but existing facilities would be maintained.

## AFFECTED ENVIRONMENT - RECREATION

The headwaters of the Chattooga Wild and Scenic River are defined for the purposes of this analysis as the sections between Grimshawes Bridge in North Carolina and Highway 28 Bridge in South Carolina. These sections cover approximately 21 river miles in the states of Georgia, South Carolina and North Carolina. They are separated into three sections by four roads (see Table H-1 and Figure H-1 below).

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*Table H-1. Identification of Chattooga River Headwater Sections*

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Section	W&S River Classification	State	Length (miles)
Grimshawes Bridge on NC-1107 to Bull Pen Bridge ( <b>GS-BP</b> )	Wild, Scenic, & Recreational	NC	5
Bull Pen Bridge To Burrells Ford Bridge ( <b>BP-BF</b> )	Wild and Scenic	NC, SC, GA	5.7
Burrells Ford Bridge to Highway 28 Bridge ( <b>BF-28</b> )	Wild, Scenic, & Recreational	SC & GA	10

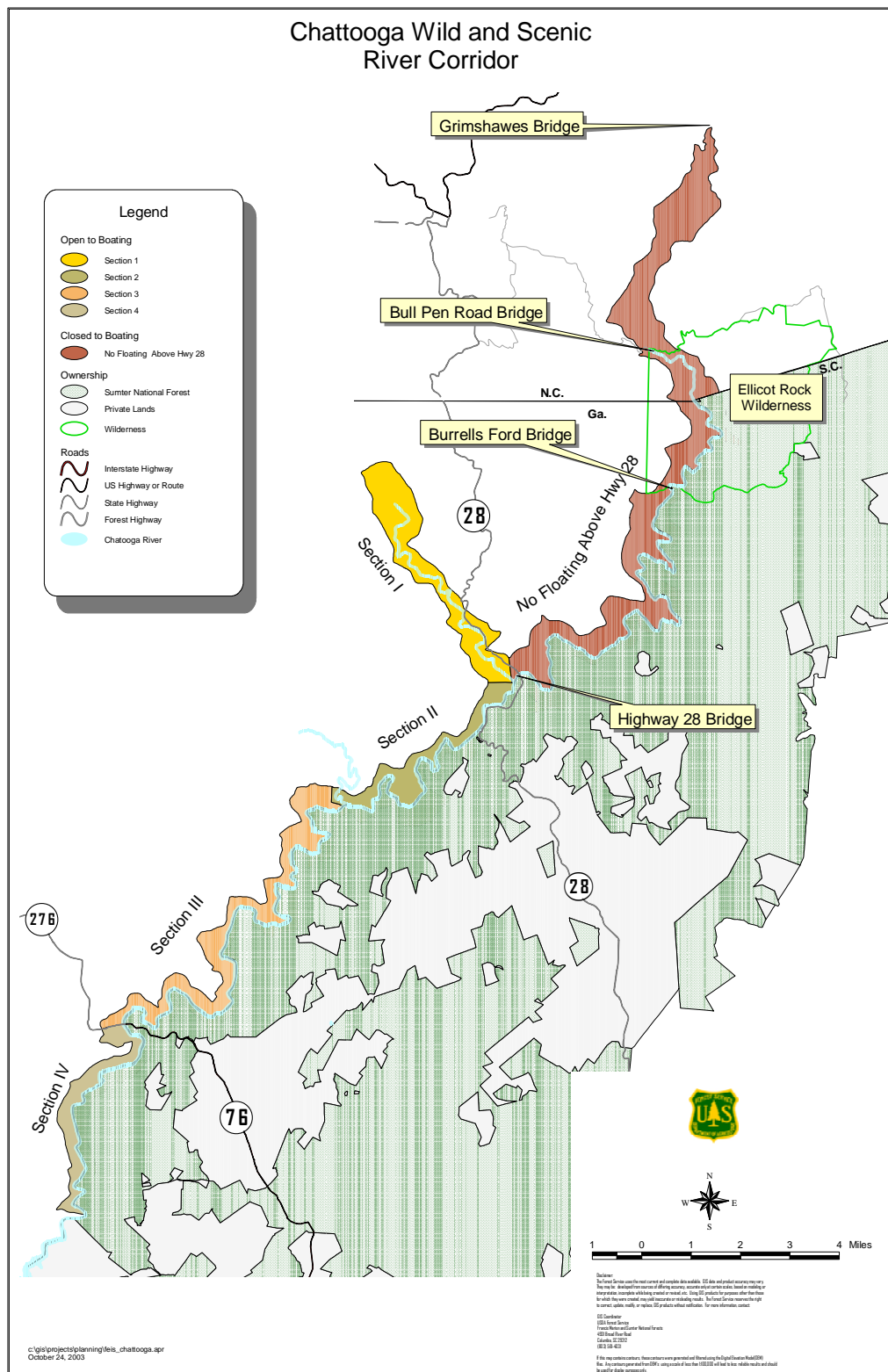


Figure H-1. The Headwaters of the Chattooga River

Congress designated 57 miles of the Chattooga River as a component of the National Wild and Scenic River system on May 10, 1974. The river was found to have many outstandingly remarkable values including geologic, biologic, scenic, recreation and historic. A Forest Service Technical Report (USDA Forest Service 1996) found that the Chattooga River still possessed all the outstandingly remarkable values that it had in 1971, and that Forest Service management of the river had not changed these values.

One of the primary reasons for nominating the Chattooga River for inclusion in the National Wild and Scenic River System was to protect and enhance its outstanding recreational value: a remote whitewater river environment where solitude, adventure and challenge could be experienced (Federal Register 1976, USDA Forest Service 1996). Restrictions in the Act limit the types of recreation use, especially in the ‘wild’ and ‘scenic’ sections. Compatible uses on the Chattooga include boating, hiking, hunting, fishing and camping.

## **Scenery**

The scenery of the Chattooga Wild and Scenic River was one of the outstandingly remarkable values that led to its inclusion in the National Wild and Scenic Rivers System in 1974. The visual characteristics are varied and tied to scenes associated with a naturally appearing river gorge that carved its way through the massive face of the Southeastern Blue Ridge Escarpment. Most of the Chattooga River upstream of Highway 28 crashes through the steepest, most pronounced portion of this gorge averaging an 84-foot drop per mile.

Scenery is a major determinant of the quality of the visitors’ experience. Studies since designation have shown that visitors are pleased with the scenery on the river. In addition, the lack of man-made features adds to the enjoyment of the experience. One of the best ways to see much of the rugged and beautiful scenery of the Chattooga is from the river itself, either by foot or in a boat.

The Forest Service uses a system of classifying scenery and aesthetics of the forest. This system describes different degrees of acceptable alteration of the natural landscape based upon the importance of aesthetics. For example, in the ‘wild’ and ‘scenic’ sections of the river there is less development and relatively few signs of man. These sections are managed so that human activities are not evident to the casual observer. Most of the sections of the Chattooga above Highway 28 are designated as ‘wild.’

In the ‘recreational’ sections of the river there are more signs of man’s presence with roads paralleling the river and pastoral views. These sections are managed so that human activities remain visually subordinate to the characteristic landscape.

For a more in-depth discussion of the Scenery Management System, refer to the “Scenery” section in Chapter 3 of the Sumter Draft Environmental Impact Statement.

The section from **Grimshawes Bridge on NC 1107 to Bull Pen Bridge (GS-BP)** averages 25-30 feet in width in its upper reaches and drops on a steep gradient through whitewater cascades hemmed in by dense vegetation and high ridges. The largest free-falling waterfall on the river drops 25 vertical feet into a deep pool. The west bank rises almost 50 feet above the falls. In many places along this run sheer rock outcrops and cliffs tower 400-600 feet above the river. An especially noteworthy 2 ½ mile section known as Chattooga Cliffs involves a series of outcrops 2,800 to 3,300 feet in elevation. Exposed boulders and steep, slick, rock walled sides make it difficult to climb out of the riverbed. In another place the river enters a narrowly enclosed rock canyon where deep water flows slowly between sheer walls of solid rock rising 75 feet out of the water.

The section from **Bull Pen Bridge to Burrells Ford (BP-BF)** flows through the Ellicott Rock Wilderness for 5.2 miles. The scenery is similar to the **GS-BP** section with high ridges enclosing the river, enormous boulders, some over 50 feet high with trees growing on top, steep gradients through whitewater cascades all hemmed in by dense vegetation. Also in this section Scotsman Creek drops over a small waterfall and down a rock ledge into the river.

The section from **Burrells Ford to Highway 28 Bridge (BF-28)** flows around huge rocks and narrow sluices and drops over 25 foot Big Bend Falls and 21 small waterfalls and rapids in less than two miles. The Chattooga then enters Rock Gorge, the steepest part of the Chattooga River Gorge. High, forested ridges rise 200 feet above the river, and huge, house sized boulders constrict the river into a narrow channel with numerous falls and sluices. Below Lick Log Creek the gradient is much more gentle and the steep ridges on either side begin to widen down to Nicholson Fields.

## **Fishing Experience and Fisheries Management**

Trout fishing on the Chattooga River is a tradition for many local and regional anglers. The section of river upstream of Highway 28 is considered to be the best trout fishing waters in South Carolina. Trout Unlimited named this section one of the top 100 trout fishing streams in the nation.

For the majority of anglers on the Chattooga River, the setting where the activity takes place is at least as important as the fishing activity itself. The remote and spectacular natural settings, including forested ridges, rock outcrops, huge groves of white pine and hemlock, boulders, and rushing, clear waters, along with relatively low visitor use, combine with the angling to offer an experience which is greater than the sum of its parts. This setting also contributes to the formation of strong emotional ties between anglers and the river; feelings of ownership and attachment, a phenomenon commonly referred to as a “sense of place” (Bixler and Backlund 2002). Any change in culture or practice on the river could threaten this identity.

Historically, the Georgia and South Carolina Department of Natural Resources (GA & SC DNR) have managed the Chattooga as a trout fishery from Ellicott Rock (SC border



with NC) downstream to the Highway 76 Bridge. Backcountry anglers (for purposes of this analysis, those who fish more than one-quarter mile from an access point) experienced solitude and good trout fishing between Highways 28 and 76, except from June to early September when the water warmed and catch rates declined. Redeye bass fishing was excellent during this period and served to mitigate, in part, for some of the trout fishing trips lost annually due to warm weather. During these months there were some encounters between anglers and boaters (canoes and rafts), swimmers and tubers (at access points), contributing to a decrease in the experience of those enthusiasts for whom solitude is an integral part of their outdoor recreation experience.

The experience of solitude varies depending on the degree of naturalness (unmodified natural environment) in an area, the ease of access to that area, and the expected number of encounters with other individuals or groups in the area. In this analysis, the only factor that will vary the solitude experience of an enthusiast is the number of encounters with others. The other two variables (degree of naturalness and ease of access) remain constant.

Among trout fishermen, solitude appears to be most important to backcountry anglers. These anglers tend to fish ¼ mile or more from access points and space themselves out along the river. These fishermen would be most affected by an increase in the number of encounters with other user groups, and in particular with boaters that might float into and through waters that are being fished, or that might require the angler to move within the river in order to allow boats to pass.

Angler access to the river and parking areas are limited and shared with other user groups such as campers and hikers. The majority of angling on the Chattooga occurs at or within close proximity to stocking access points (backcountry anglers seek a more remote experience away from these areas). In terms of angler numbers, the section from Burrells Ford to Highway 28 supports the highest use on the entire river, and within this section, the Burrells Ford area is the most popular (Rankin, pers. com.).

The Chattooga River above Highway 28 is managed today for a variety of angling experiences: the sections above Burrells Ford are managed for “wild trout” where catch and release is encouraged; the easily accessible Burrells Ford area is managed for “put and take;” the backcountry area between Burrells Ford and Reed Creek is managed “sub-adult put, grow and take;” Reed Creek to Highway 28 is managed “delayed harvest” catch and release November 1 through May 14; and the easily accessible section between Highway 28 and Long Bottom Ford is managed “put and take.” The Chattooga River now provides year-round fishing experiences for anglers seeking everything from backcountry and solitude to more accessible opportunities near roads where other people may be encountered.

## Whitewater Boating Experience

In 1976 the sections of the Chattooga Wild and Scenic River upstream from the Highway 28 Bridge were closed to boating (Federal Register 1976). In effect, paddling was zoned to the sections downstream of Highway 28, while trout angling and management was emphasized mostly upstream from the bridge.

The Chattooga above Highway 28 offers opportunities for a small sub-group (5-10%) of whitewater boaters sometimes referred to as “creekers.” “Creek” boating is a highly technical form of whitewater paddling that requires steep mountain rivers with high gradients. Generally, a part of the run will exceed 100 feet per mile (fpm) in gradient, with flow regimes typically between 100 to 500 cubic feet per second (cfs). In a typical “creeking” opportunity there are drops, vertical waterfalls, “tight and technical” water (small channel size, tight turns, short eddies), and at least one Class IV rapid.

Because of their small size and low flow regimes, navigability of a “creek” is highly dependent on recent weather/moisture activity and is available for very short durations of time (creeks can rise, crest and start back down within a day or less). Many of the “creek” boaters using a particular area live within a relatively easy commute since use tends to be spontaneous and not planned in advance. Many of these boaters are well versed in the use of internet-based weather forecasting sites to better predict where a “creeking” opportunity might present itself (Kinney 1997).

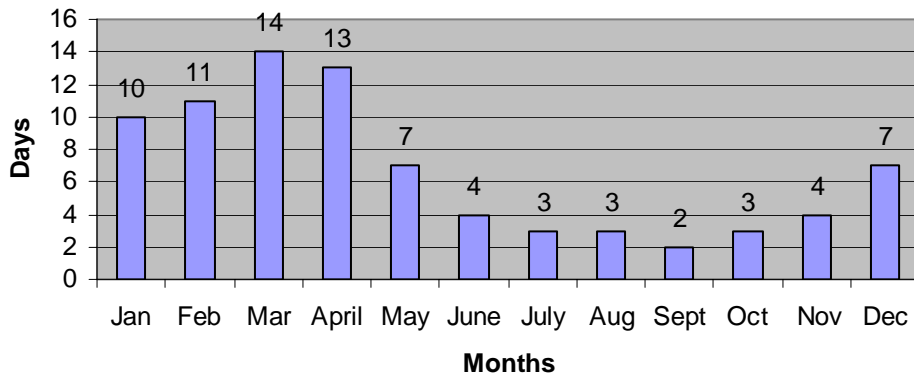
“Creek” boaters usually travel in small groups of 2-6 boaters and are highly skilled in negotiating challenging whitewater. They tend to use the latest in high performance equipment specifically designed for “creeks,” and are generally trained and equipped in safety procedures and self-rescue techniques. Watercraft would likely include open canoes, decked canoes, kayaks, and high performance inflatable kayaks. This user group does not generally camp from their boat during a run because the weight of the camping gear would at best impair paddling performance (for that matter, they usually would not carry much at all with them due to performance concerns). On the Chattooga above Highway 28 boaters would be expected to access the river primarily by using existing river access points at Grimshawes, Bull Pen, and Burrells Ford. Another likely put-in site that would require a short portage is from the end of Big Bend Road accessing the **BF-28** section just above Big Bend Falls.

The Chattooga above Highway 28 is considered a “creek” boating opportunity primarily because all three sections have steep gradients, Class IV and V rapids, drops, waterfalls, and are navigable only during discreet high water events of relatively short duration. As “creeking” opportunities go, the section from Grimshawes to Bull Pen Bridge (**GS-BP**) would likely be the most difficult and would require the most water (2.5 feet or higher at the Highway 76 bridge). The section from Bull Pen Bridge to Burrells Ford (**BP-BF**) is considerably less difficult and less dangerous than nearby Overflow Creek, making it accessible to a less highly skilled boater. Finally, the section from Burrells Ford to Highway 28 (**BF-28**) falls somewhere in between the other two sections. It is longer than the other two and has a great deal of flat water to paddle below Rock Gorge. It also

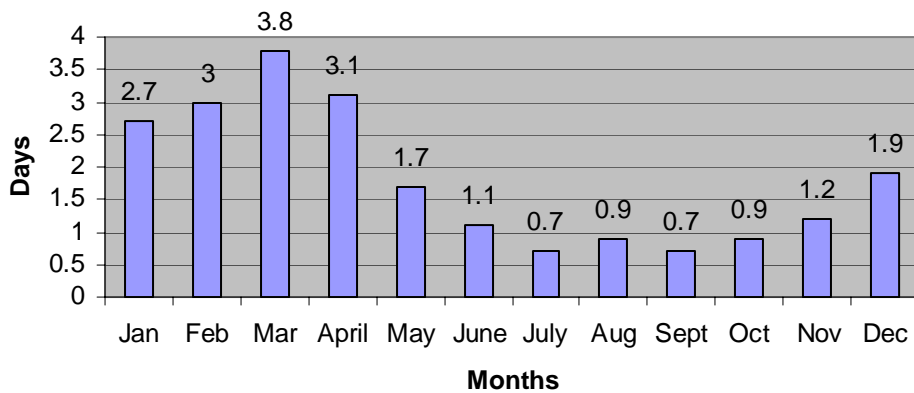
requires lower water levels than the upper two. It is longer than Overflow and provides a more remote experience.

These sections would generally become floatable when water levels measure between 2.0 (850 cfs) and 2.5 feet (1400 cfs) at the Highway 76 gauge (except **GS-BP**). USGS average daily flow data for the past 62 years shows an average of 81 days per year when the Highway 76 gauge measures 2.0 feet or higher (Figure H-2). More than 50% of these days fall between December 1 and March 31 of an average year. At the 2.5 level or higher, the USGS data shows fewer boatable days available - an average of 22 per year (Figure H-3).

**Figure H-2. Days/month when Chattooga R. flows are 850 cfs (2.0 feet) or greater at Hwy 76 gauge**



**Figure H-3. Days/month when Chattooga R. flows are 1400 cfs (2.5 feet) or greater at Hwy 76 gauge**



As is the case with anglers, there is much value added to the boating experience by the remote and natural setting of the Chattooga upstream from Highway 28 (refer to the Scenery and Fishing Experience sections above). Demand for these settings is increasing in the rapidly developing Southeast.

## **Wilderness**

The Ellicott Rock Wilderness was designated by Congress in 1975 and today has a total of 8,271 acres in Georgia, North Carolina and South Carolina. It is the only Wilderness lying in three states. Designation as a wilderness markedly increased visitation, most of which occurs within the river corridor. Opportunities to experience solitude in the river corridor are becoming more difficult because of this concentration of use. The Ellicott Rock Wilderness encompasses a 5.2 mile section of the Wild and Scenic Chattooga River between Bull Pen Bridge and Burrells Ford Bridge (**BP-BF**). Although the area is rugged and mountainous, trails accessing the Chattooga are relatively easy since they are primarily downhill to the river, but conversely, they are more strenuous coming out. Day hiking, backpacking and angling constitute the primary human use.

Trails within the Wilderness include the Chattooga Trail, which follows the river upstream from Burrells Ford for approximately 3.5 miles and terminates at a point about ¼ mile north of the Ellicott Rock survey marker within North Carolina. From that point the Ellicott Rock Trail travels 3.5 miles west away from the river to a trailhead on Bull Pen Road, and the Fork Mountain Trail travels 7.5 miles east to the Sloan Bridge Picnic Area on SC Highway 107.

Additionally, most of the primitive/undeveloped camping in Ellicott Rock occurs along the river. Rivers tend to be human attractors. People enjoy the sound of water, views, and the ease of access to the water itself.

For a broader discussion on Wilderness, refer to the “Wilderness and Roadless Areas” section in Chapter 3 of the Sumter Draft Environmental Impact Statement.

## **Other Dispersed Recreation Activities**

This section captures the remaining dispersed recreation activities occurring along the Chattooga River upstream of Highway 28 not covered in the earlier sections: hiking, backpacking, hunting, and primitive camping.

Trails where the above user groups may encounter and possibly be disturbed by the presence of boaters are found along the main stem of the Chattooga. Included among these is the Chattooga Trail, which follows the river upstream for approximately 16 miles from Highway 28 to a point about ¼ mile north of the Ellicott Rock survey marker in North Carolina (the Foothills Trail overlaps the Chattooga Trail for approximately 7 miles from Lick Log Creek north to a point near King Creek and the Burrells Ford Road). The Chattooga Trail is heavily used by hikers, backpackers and anglers, a majority, if not

all, of whom seek solitude during their visit to the river corridor. The other trail, entirely within North Carolina, follows the river from Bull Pen Bridge upstream for approximately 3 miles and then turns away from the river in a northwesterly direction.

Several undeveloped/primitive campsites are found all along the river near the trails. Also, the popular Burrells Ford Walk-in Campground is located approximately ½ mile south of Burrells Ford. The site is a little more developed than the traditional primitive sites along the river (includes toilets), but still requires a ½ mile walk to access the site. The facility has several campsites, some of which are located immediately adjacent the Chattooga.

The river is the primary attraction of the trails and sites in the corridor, where visitors look to commune with nature and the river, view the gorges and rapids, take a dip in the cool water, and experience solitude. Opportunities to experience the latter are becoming a rarity.

## **Safety**

The Chattooga River drops approximately 1,500 feet in elevation within the 20 miles from Grimshawes Bridge downstream to the Highway 28 Bridge. The river has an ever-changing bottom ranging from accumulations of sand and sediments to a rough and rocky bottom with a substantial distribution of large and irregularly shaped boulders within its banks. Downed trees may also be present, particularly in the narrower sections in the upper reaches. Removal of these trees would not be compatible with the Wilderness designation. Whereas the combination of these attributes with recreational use results in inherent risks to the user, some users consider it as part of the experience defined by the challenge, adventure and satisfaction from knowing that natural dangers have been successfully negotiated.

Since 1970 there have been thirty-nine fatalities on the Chattooga River. Thirty-one of these were directly or indirectly associated with floating. All but one of these floating fatalities were self-guided boaters, the other one being a guide on a commercially guided training trip. Ten fatalities are known to be associated with the use of rafts, nine with kayaks, four with canoes, two with inner tubes, and one with an inflatable kayak.

The Forest Service promotes safety on the river in a variety of ways including the requirement to use protective equipment in certain sections; by prohibiting some kinds of craft in some sections; by restricting paddling alone in some sections; by posting pertinent information on maps, brochures, websites, and signs.

## **Search and Rescue**

The states have delegated authorities for search, rescue and recovery activities on the Chattooga River to local Sheriff's departments. The Forest Service cooperates in search,

rescue and recovery efforts with local Sheriffs, Search and Rescue organizations, the South Carolina Department of Natural Resources (DNR), Outfitter/Guide Companies, and other entities under a Memorandum of Understanding that defines authorities, roles, responsibilities, and operating procedures.

According to Andrew Pickens Ranger District staff (Borgen, pers. com.), a range of five to ten search and rescue operations are conducted each year associated with boaters on the Chattooga River. Most deal with self-guided boaters, the majority of which are not very highly impactful (i.e. generally associated with people who do not return from a trip at the originally scheduled time). However, a small number of these operations can be and are generally associated with fatalities or accessing and transporting injured persons from remote areas. Since January of 1993, seven fatalities were associated with boating while four were associated with hiking or swimming.

## **ENVIRONMENTAL/SOCIAL CONSEQUENCES - RECREATION**

### **Scenery**

#### **Alternative B, D, F and I – No Action**

##### **Direct and Indirect**

All river users would continue to experience the river above Highway 28 in its natural, free-flowing state, without roads or development alongside it. The character of the river is ever-changing as natural processes occur, trees fall, rocks shift, and water levels fluctuate. As use of the corridor continues to grow, indirect effects including litter, trampling of understory vegetation, human waste, and burning of downed wood at isolated locations (e.g. primitive campsites) would be mitigated to protect the resources and the experiences. These effects would tend to be focused from Highway 28 upstream to the Ellicott Rock survey marker, an area of the river that is trailed and heavily used by hikers, backpackers and anglers.

##### **Cumulative**

Probable future actions include the reconstruction of the Highway 28 Bridge and the paving of Burrells Ford Road and associated parking near the Burrells Ford Bridge. There are no plans to increase parking capacity or access points in order to help limit future use in the area. These actions would cause a short-term, localized impact to scenery. Considering these activities, there are no current or foreseeable activities that would cause any cumulative effects to scenery.

## **Alternatives E and A**

### **Direct and Indirect**

A greater number of river users would experience the river above Highway 28 in its natural, free-flowing state, without roads or development alongside it. The character of the river is ever-changing as natural processes occur, trees fall, rocks shift, and water levels fluctuate. There may be additional visual impacts than in Alternatives B, D, F and I since there is a new user group in the mix. As use of the corridor grows, indirect effects including litter, trampling of understory vegetation, human waste, and burning of downed wood at isolated locations (e.g. primitive campsites, put-ins, take-outs, portages, and lunch stops) would be mitigated to protect the resources and the experiences. These effects would tend to be focused from Highway 28 upstream to the Ellicott Rock survey marker, an area of the river that is trailed and heavily used by hikers, backpackers, anglers, and now boaters.

### **Cumulative**

Probable future actions include the reconstruction of the Highway 28 Bridge and the paving of Burrells Ford Road and associated parking near the Burrells Ford Bridge. There are no plans to increase parking capacity or access points in order to help limit future use in the area. These actions would cause a short-term, localized impact to scenery. Considering these activities, there are no current or foreseeable activities that would cause any cumulative effects to scenery.

## **Fishing Experience and Fisheries Management**

### **Alternative B, D, F and I – No Action**

#### **Direct and Indirect**

There would be no changes in fisheries management or fishing experience under these alternatives. The zoning that has been in place for over 25 years will continue to mitigate potential conflicts between boaters and other dispersed recreation users. Boating would continue to be restricted in the 21 river miles upstream of the Highway 28 Bridge, but would still occur downstream to Tugaloo Lake. Anglers would continue to experience high quality fishing opportunities enhanced by the remote settings and solitude that are such an integral part of the Chattooga experience.

#### **Cumulative**

No cumulative effects to the fishing experience or fisheries management would be expected under these alternatives.

## **Alternative E**

Under this alternative, the river from NC Road 1107 (Grimshawes Bridge) downstream to the Highway 28 Bridge would be open to boating year-round at all water levels. The analysis assumes that most boating would be precluded naturally (self-regulating) in the section from Grimshawes Bridge to Bull Pen Bridge until water levels reach 2.5 feet (1400 cfs) or higher at the Highway 76 gauge. In the two lower sections (Bull Pen - Burrells Ford, and Burrells Ford - Highway 28) it is assumed that most boating would be precluded until water levels reach 2.0 feet (850 cfs) or higher at the Highway 76 gauge. However, not all boaters will conform to the water level assumptions in this analysis. Some may attempt to float the river at lower levels (this is particularly true below the Burrells Ford Bridge). Additionally, improved technology and equipment in the future may facilitate low water boating.

### **Direct and Indirect**

Relying upon historical weather data gathered from 1939 to 2001, the **Grimshawes Bridge to Bull Pen Bridge (GS-BP)** section is expected to have an average of 22 days per year available for boating (see Figure H-3 below). Of these, an average of 8 days occur between December and February. Of the 14 days remaining, about 6 (40% of 14) would most likely occur on weekends and holidays.

This section is expected to have the lowest boating use of all the three sections above Highway 28, in part because it is expected that there will be fewer available days for boating, on average, and in part because of its inherent technical difficulty and smaller size.

This section also appears to have the lowest angler use of the three sections. Although data from Georgia and South Carolina DNR angler surveys is not conclusive (Table H-2), it appears to suggest that fishing declines significantly at flows of 2.5 feet (1400 cfs) or higher as measured at the Highway 76 gauge. Therefore, the potential for undesired encounters between anglers and boaters is most likely lowest in the **GS-BP** section.



*Table H-2. Results from the 1987 GA DNR Roving Angler Survey and the 1998-99 SC DNR Angler Survey (near stocking points)*

Survey	Flows at Hwy 76 gauge (ccs)	Number of Survey days	Percent Survey days	Total Number of Anglers	Percent Anglers	Average Number of Anglers per Survey day
1987	<850	167	87%	303	87%	1.8
	850-1400	23	12%	44	13%	1.9
	>1400	3	2%	0	0%	0.0
	<b>TOTAL</b>	<b>193</b>		<b>347</b>		<b>1.8</b>
1998-99	<850	33	70%	469	67%	14.2
	850-1400	11	23%	217	31%	19.7
	>1400	3	6%	16	2%	5.3
	<b>TOTAL</b>	<b>47</b>		<b>702</b>		<b>14.9</b>
The GA DNR Study was conducted between Ellicott Rock and Big Bend Falls, and the SC DNR Study was conducted near stocking points within the <b>BF-28</b> section.						

*Table H-3. Average Annual (1939-2001) Days available for Boating by Alternative and River Section derived from USGS mean daily flow data at the Highway 76 gauge on the Chattooga River*

Alternative	Stream Section	Boatable days available per year	Subset of Boatable days - Dec through March	Subset of Boatable days - April through Nov	Subset of Boatable days falling on weekends/holidays - April through Nov
<b>B,D,F,I</b>	<b>GS-BP</b>	0	0	0	0
	<b>BP-BF</b>	0	0	0	0
	<b>BF-28</b>	0	0	0	0
<b>E</b>	<b>GS-BP</b>	22	11	11	4
	<b>BP-BF</b>	81	42	39	16
	<b>BF-28</b>	81	42	39	16
<b>A</b>	<b>GS-BP</b>	0	0	0	0
	<b>BP-BF</b>	0	0	0	0
	<b>BF-28</b>	11	11	0	0

**GS-BP** = Grimshawes to Bull Pen Bridge; **BP-BF** = Bull Pen to Burrell's Ford Bridge; **BF-28** = Burrells Ford to Highway 28

Correspondingly, when compared to the other two sections above Highway 28 (**BP-BF** and **BF-28**), the potential for undesired encounters between anglers and boaters at access points (Grimshawes and Bull Pen Bridge) is most likely lowest in this section.

The **Bull Pen Bridge to Burrells Ford (BP-BF)** section is expected to have an average of 81 days per year available for boating (see Figure H-2 above). Of those, an average of 22 occur at the 2.5 level or higher, leaving 59 days where the potential for undesired encounters between anglers and boaters would most likely be highest (since trout fishing is expected to decline significantly at the 2.5 foot level or higher at the Highway 76 gauge).

Of the 59 days remaining in an average year, most of the potential undesired encounters between anglers and boaters would be expected on the 39 days falling between March and November, and of these, the highest potential would be on the 16 days (40% of 39) attributed to weekends and holidays spread over the 9-month period.

This section is expected to have higher boating use than the **GS-BP** section, in part because there would likely be more days available for boating, and in part because the section is not deemed as technical.

Angler use in this section is also expected to be higher than the **GS-BP** section, especially near the Burrells Ford area. In the GA DNR survey, backcountry anglers used 57% of survey days falling between 2.0 and 2.5 feet at the Highway 76 gauge, while 100% of the SC DNR survey days conducted near stocking points at the same water levels were fished. Therefore, potential encounters between anglers and boaters is likely on the 59 days per year that would most likely be available for boating between 2.0 and 2.5 feet. This does not account for boaters who may attempt to float the river at lower levels, or for changes in equipment and technology that facilitate this action.

Correspondingly, potentially undesirable encounters between anglers and boaters at access points in this section will most likely be higher than in the **GS-BP** section. Most encounters would probably occur at Burrells Ford (particularly between 2.0 and 2.5 feet at the Highway 76 Bridge).

The **Burrells Ford to Highway 28 (BF-28)** section is also expected to have an average of 81 days per year available for boating (see Figure H-2 above). As in the **BP-BF** section, an average of 22 days will probably occur at the 2.5 level or higher, leaving 59 days where the potential for encounters between anglers and boaters would most likely be the highest.

Of the 59 days remaining in an average year, most of the potential for undesired encounters between anglers and boaters would be expected on the 39 days falling between March and November, and of these, the highest potential would be on the 16 days (40% of 39) attributed to weekends and holidays spread over the 9-month period.

This section is expected to have higher boating use than the **BP-BF** section because it is the lowest and widest of the three sections, and is likely to have more opportunities for boating below the 2.0-foot threshold.

Angler use is expected to be higher than in the **BP-BF** section also, especially in the Burrells Ford and Highway 28 areas. This is due to the intensive fisheries management

program in this section (see “Affected Environment” section). Therefore, the number of days per year when anglers might potentially encounter and be disturbed by boaters would be greater than in the **BP-BF** section. Again, this does not account for boaters who may attempt to float the river at lower levels, or for changes in equipment and technology that facilitate this action.

Although the GA and SC DNR survey data is not conclusive, the primary difference in angler use between the **BP-BF** and **BF-28** sections appears to be the anglers fishing near stocking areas. This group is heavily concentrated in the **BF-28** area.

Undesired encounters between anglers and boaters at access points are expected to be higher than in the **BP-BF** section. Most of this interaction would probably occur at Burrells Ford (particularly between 2.0 and 2.5 feet at the Highway 76 Bridge). Highway 28 Bridge would most likely be the next highest in terms of interactions, while Big Bend Road would be the least since it is not a stocking point and not as many anglers congregate there.

## **Summary**

As discussed above, encounters between anglers and boaters will occur under this alternative, many of which may be undesired by one or both users. Because a significant number of these encounters may be undesired, user conflicts are very likely to result. They may occur when boaters pass directly through areas being actively fished where a broken line, entanglement or other interference with the fishing activity takes place. Conflicts can also occur when an actual encounter (visual or auditory) brings about a loss of solitude. The **BP-BF** and **BF-28** sections appear to have the highest likelihood for conflict.

Similarly, conflicts might arise between anglers and boaters at access points from competition for limited parking, or when boaters congregate at the put-in or take-out and actually interfere with or otherwise disturb the fishing activity. Potential for these types of conflicts appear to be highest at Burrells Ford Bridge, followed by Highway 28.

Also, as mentioned earlier, not all boaters will conform to the water level assumptions in this analysis. Some may attempt to float the river at lower levels (this is particularly true below the Burrells Ford Bridge). Additionally, improved technology and equipment in the future may facilitate low water boating, and could thereby increase the number of undesired encounters and the potential for conflict.

From a solitude standpoint, backcountry anglers would most likely be the group whose experience would be most negatively affected from undesired encounters with boaters (Durniak and Keefer, pers. com). This is because most of these anglers prefer to commune with nature and experience their activity apart from other users, especially those users whose activities have the potential to disturb or conflict with their desired

experience. A group of boaters would almost certainly be an intrusion to their experience, particularly if the angler were wading. As the number of daily encounters increases, the greater the impact to the solitude experience – not to mention the potential for interfering with the fishing activity itself. These types of encounters would be expected to increase in the future through natural growth of both activities, and also as the greater boating public discovers this new opportunity on the nationally renowned Chattooga River. As a result of undesired encounters and the potential for conflict, it is very likely that displacement of some of the anglers may also ensue.

In a recent study of anglers who are members of the Rabun and Chattooga River Chapters of Trout Unlimited (Bixler and Backlund 2002), most respondents indicated that if the Chattooga were not able to meet their desired experience for whatever reason, they would likely select another river to secure that experience rather than selecting another activity. Fifty-one percent of the respondents indicated that they had between one and three substitutes, while thirteen percent indicated that they had no substitute for the Chattooga. The three most frequently listed rivers that were considered acceptable substitutes for the Chattooga are the Davidson, Nantahala, Tuckaseegee, and Chauga Rivers.

### **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (on high use weekends) will be mitigated by road design features and designated parking spaces. This may cause parking to be even more of a premium, especially on those days when angling and boating activities have the highest potential to overlap.

### **Alternative A**

#### **Direct and Indirect**

Under this Alternative, boating would be allowed from Burrells Ford downstream to the Highway 28 Bridge from December 1 through March 31 at water levels measuring or exceeding 2.5 feet (1400 cfs) at the Highway 76 gauge.

According to USGS average daily flow data for the past 62 years, an average of 11.4 days are available for boaters at the 2.5 level or higher (see Figure H-3 above) between December 1 and March 31. Of these, about 5 days (40%) would be expected to fall on weekends or holidays. However, since enforcement of the 2.5 foot level is expected to be difficult, at best, it can be expected that some boating will occur on dates before 12/1 and/or after 3/31 and at levels less than 2.5 feet during the 12/1 through 3/31 time period. Despite this unlawful use, overall boating use under this alternative is expected to be less than is expected for the **BF-28** section under Alternative E (Table H-3). This is because, according to historical data, there would most likely be fewer available days for boating,

and because those days would most likely occur from December through March, during the colder months of the year.

Angler use at this time of year and at the specified water levels is also expected to be relatively low in comparison to other periods of time throughout the year. Although the angler survey data (GA DNR 1987, and 1998-99 SC DNR) is not conclusive, it appears to suggest that trout fishing in the **BF-28** section declines at flows of 2.5 feet or higher as measured at the Highway 76 gauge.

The 1998-99 SC DNR survey (targeting anglers fishing within ¼ mile of stocking points) reported 16 anglers on one of the three random survey days where flows were 2.5 feet or higher (the other two survey days reported zero). The SC DNR data appears to suggest that these anglers may be more responsive to stocking times than to actual water levels (at least at levels slightly over 1400 cfs and below).

Encounters between anglers and boaters will likely occur under this alternative. A significant number of these encounters may be undesired and could lead to conflicts, especially during the mid-February through March time period, as stated earlier. Undesired encounters could lead to conflicts. The highest potential for conflict would most likely be present at access points. Conflicts could arise here from competition for limited parking, or when boaters congregate at the put-in or take-out and actually interfere with or otherwise disturb the fishing activity. Potential for undesired encounters and possible conflicts appear to be highest at Burrells Ford Bridge, followed by Highway 28.

Also, as discussed earlier, not all boaters will comply with the stipulated time period and 2.5 foot threshold because of difficulties with enforcement and implementation. Noncompliance would increase the potential for encounters, thereby increasing the potential for disturbances and conflict.

In a recent study of anglers who are members of the Rabun and Chattooga River Chapters of Trout Unlimited (Bixler and Backlund 2002), most respondents indicated that if the Chattooga were not able to meet their desired experience for whatever reason, they would likely select another river to secure that experience rather than selecting another activity. Fifty-one percent of the respondents indicated that they had between one and three substitutes, while thirteen percent indicated that they had no substitute for the Chattooga. The three most frequently listed rivers that were considered acceptable substitutes for the Chattooga are the Davidson, Nantahala, Tuckaseegee, and Chauga Rivers. In summary, encounters between anglers and boaters (and consequently the potential for conflict) appear to be less than in the **BF-28** section under Alternative E.

### **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (on high use weekends) will be mitigated by road design features

and designated parking spaces. This may cause parking to be even more of a premium, especially on those days when angling and boating activities have a higher potential to overlap (most likely when the “put and take” program starts sometime between mid-February and March, as stated earlier).

## **Whitewater Boating Experience**

### **Alternatives B, D, F, and I**

#### **Direct and Indirect**

Under these alternatives, boating would continue to be restricted in the 21 miles of river upstream of the Highway 28 Bridge, along the main stem of the Chattooga. Boating would still occur downstream to Tugaloo Lake, while “creek-boating” would still occur on other rivers and tributaries in the area. Some of these waters include the French Broad, Big Laurel, Thompson, Wilson Creek, Linville Gorge, Cullasaja, Horsepasture, Santeetlah, and multiple runs of the Pigeon in North Carolina; the Tallulah, Conesauga, and Mill Creek in Georgia, along with Big Creek, Holcombe, Overflow and Stekoa in the Chattooga watershed itself; and the Chauga, Brasstown, and Whitewater in South Carolina.

#### **Cumulative**

No cumulative impacts have been identified.

### **Alternative E**

#### **Direct and Indirect**

Under this alternative, the river from NC Road 1107 (Grimshawes Bridge) downstream to the Highway 28 Bridge would be open to boating year-round at all water levels. However, boating is assumed to be precluded naturally (self-regulating) in the section from Grimshawes Bridge to Bull Pen Bridge until water levels reach 2.5 feet (1400 cfs) or higher at the Highway 76 gauge. In the two lower sections (Bull Pen - Burrells Ford, and Burrells Ford - Highway 28) boating is assumed to be precluded naturally until water levels reach 2.0 feet (850 cfs) or higher at the Highway 76 gauge. However, not all boaters will conform their activities to the water level assumptions provided in this analysis.

The Grimshawes to Bull Pen Bridge section (**GS-BP**) will likely be less popular than the lower two sections because it is considered more difficult by most boaters and requires more water to navigate. Based on historical weather data, this section averages 22 days per year available for boating (Table H-3).

The Bull Pen Bridge to Burrells Ford section (**BP-BF**) arguably offers the most favorable combination of characteristics for a variety of boaters and will likely be the most popular of the three-headwater sections. This section is considered a “creeking” opportunity, but is considered less difficult and less dangerous than nearby Overflow Creek, making it accessible to less skilled boaters. Based on historical weather data, this section averages 81 days per year available for boating (Table H-3).

The Burrells Ford to Highway 28 section (**BF-28**) falls somewhere in between. It is longer and more remote than the upper two sections and Overflow Creek. It is considered more difficult than the **BP-BF** section due to Big Bend Falls and the Rock Gorge section, but less demanding than Overflow Creek. This section has the capacity to be used at lower water levels in comparison to the upper sections. Based on historical weather data, it has an average of 81 days available for boating per year (Table H-3).

Competition for parking may be an issue when angling and boating activities, as well as other non-boating activities have the potential to overlap.

### **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (on high use weekends) will be mitigated by road design features and designated parking spaces. This may cause parking to be even more of a premium, especially on those days when angling, boating, and other activities have the potential to overlap.

### **Possible Mitigation Measures**

- Sign river access points appropriately to discourage less experienced boaters, especially at Burrells Ford Bridge access. Signs should not market the activity, but properly warn potential boaters. Website and brochure information should also be developed that warns about the dangers without encouraging use.
- Do not provide additional facilities that might otherwise encourage this use.

## **Alternative A**

### **Direct and Indirect**

Under this Alternative, boating would be allowed from Burrells Ford downstream to the Highway 28 Bridge from December 1 through March 31 at water levels measuring or exceeding 2.5 feet (1400 cfs) at the Highway 76 gauge. According to USGS average daily flow data for the past 62 years, this translates into an average of 11.4 days per year

that would be available for “creekers” (Figure H-3 and Table H-3) December through March.

When compared to Alternative E, historical weather data indicates that, on average, there are fewer opportunities in terms of potential days available for boating. In addition, as compared to Alternative E, the diversity of settings in which to conduct the activity (both temporal and spatial) will be less.

Competition for limited parking at Burrells Ford is not expected to be a significant issue between December and March at the 2.5 water level or higher.

### **Cumulative**

Cumulative effects are not as pronounced as under Alternatives B, D, F, and I since some days will be made available for boating in the **BF-28** section.

### **Possible Mitigation Measures**

- Sign river access points appropriately to discourage less experienced boaters, especially at Burrells Ford Bridge access. Signs should not market the activity, but properly warn potential boaters. Website and brochure information should also be developed that warns about the dangers without encouraging use.
- Do not provide additional facilities that might otherwise encourage this use.

## **Wilderness**

### **Alternatives B, D, F, and I**

#### **Direct and Indirect**

There would be no changes in wilderness management or wilderness experience under these alternatives. Boating would continue to be restricted in the 21 miles of river upstream of the Highway 28 Bridge, but would still occur downstream to Tugaloo Lake. The primary attraction to the Ellicott Rock Wilderness is the Chattooga River itself. Most of the use in the wilderness is concentrated along the river corridor, where opportunities to experience solitude have become increasingly difficult.

Even though limited access and parking would continue to be a problem in meeting demand, these conditions would also serve to mitigate overuse impacts on natural resources, the quality of the remote experiences, and solitude.



## **Cumulative**

No cumulative effects to wilderness experience or wilderness management have been identified under these alternatives.

## **Alternative E**

### **Direct and Indirect**

Under this alternative, the section of river encompassed by the Ellicott Rock Wilderness (**BP-BF**) would be open to boating year-round at all water levels. However, most boating would not be expected to occur until water levels reach 2.0 feet (850 cfs) or higher at the Highway 76 gauge. This translates into an average of 81 days available for boating in an average year (Table H-3). Of those days, 35% would be expected to occur December through February when hiking and backpacking use in the Ellicott Rock Wilderness is low (refer to the “Fishing Experience and Fisheries Management” section above for a discussion of the impacts of boaters on backcountry anglers). Therefore, it is the average of 53 days available for boating between March and November (Figure H-2), and of those, the 21 or so expected to fall on weekends and holidays that appear to have the greatest potential to impact the solitude experience of wilderness users. These impacts could be significant since opportunities to experience solitude have become increasingly difficult in the corridor, even without the introduction of a new user group. This does not account for additional boaters who may attempt to float the river at lower levels, or for changes in equipment and technology that facilitate this action.

In the Ellicott Rock Wilderness, boater group size would be restricted to a maximum of 12 craft and 12 boaters.

As discussed above, boaters would not be expected to camp from their craft while using the river since the weight of the camping gear would at best impair paddling performance on the technical water. They would be expected to float from put-in to take-out and stay on the river or on the riverbanks during the entire trip. Therefore, vegetation loss, soil compaction and erosion impacts from boaters are not expected to be significant in the Ellicott Rock Wilderness.

## **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (on high use weekends) will be mitigated by road design features and designated parking spaces. This may cause parking to be even more of a premium, especially on those days when hiking, backpacking, angling, boating, and other activities are likely to overlap (on an average of 39 days April through November, and especially on the 16 days expected to fall on weekends and holidays within that period).

## **Alternative A**

### **Direct and Indirect**

Under this Alternative, as in Alternatives B, D, F, and I, boating would not be allowed from Bull Pen Bridge downstream to Burrells Ford. There would be no changes in wilderness management or wilderness experience under these alternatives. Boating would continue to be restricted in the 5.7 miles of river between Bull Pen Bridge and Burrells Ford.

The primary attraction to the Ellicott Rock Wilderness would continue to be the Chattooga River itself. Most of the use in the wilderness is concentrated along the river corridor, where opportunities to experience solitude have become increasingly difficult.

Even though limited access and parking would continue to be a problem in meeting demand, these conditions would also serve to mitigate overuse impacts on natural resources, the quality of the remote experiences, and solitude.

### **Cumulative**

There should be no cumulative effects to wilderness experience or wilderness management under these alternatives.

## **Other Dispersed Recreation Activities**

### **Alternatives B, D, F, and I**

### **Direct and Indirect**

There would be no changes in the experiences of hikers, backpackers, hunters and primitive campers under these alternatives. Boating would continue to be restricted in the 21 miles of river upstream of the Highway 28 Bridge, but would still occur downstream to Tugaloo Lake.

The primary attraction to the area is the Chattooga River itself. Most of the use is concentrated along the river, where opportunities to experience solitude have become increasingly difficult.

## **Cumulative**

There should be no cumulative effects to hikers, backpackers and primitive campers under these alternatives.

## **Alternative E**

### **Direct and Indirect**

Under this alternative, the river from NC Road 1107 (Grimshawes Bridge) downstream to the Highway 28 Bridge would be open to boating year-round at all water levels. However, most boating use is expected to be precluded naturally in the section from Grimshawes Bridge to Bull Pen Bridge (**GS-BP**) until water levels reach 2.5 feet (1400 cfs) or higher at the Highway 76 gauge. In the two lower sections (**BP-BF**, and **BF-28**) most boating would not be expected to occur until water levels reach 2.0 feet (850 cfs) or higher at the Highway 76 gauge. However, not all boaters will conform their activities to the water level assumptions in this analysis. Some may attempt to float the river at lower levels. Improved technology and equipment may also facilitate floating the river below the level assumptions in the future.

The **Grimshawes Bridge to Bull Pen Bridge (GS-BP)** section would have probably an average of 22 days per year available for boating (see Figure H-3 above). Of those, 35% would most likely fall between December and February when hiking, backpacking and primitive camping use is relatively low. Therefore, it is the average 14 days available for boating between March and November (Figure H-3), and of those, the 6 or so expected to fall on weekends and holidays that appear to have the greatest potential to impact the solitude experience of these user groups.

As discussed earlier, this section is expected to have the lowest boating use of all the three sections of the Chattooga above Highway 28. This is also expected to be the case for hiking, backpacking and primitive camping.

The **Bull Pen Bridge to Burrells Ford (BP-BF)** section would have an expected average of 81 days per year available for paddling (see Figure H-2 and Table H-3). Of those, 35% would be expected to occur December through February when hiking, backpacking and primitive camping use in the Ellicott Rock Wilderness is low. Therefore, it is the average 53 days available for boating between March and November (Figure H-2), and of those, the 21 or so expected to fall on weekends and holidays that have the greatest potential to impact the solitude experience of these user groups.

As mentioned in the Wilderness section above, these impacts could be significant since opportunities to experience solitude have become increasingly difficult in this part of the corridor, even without the introduction of a new user group. This does not account for boaters who may attempt to float the river at lower levels, or for changes in equipment and technology that facilitate this action.

As discussed earlier, higher boating use would be expected in this section, although boater group size would be restricted to a maximum of 12 craft and 12 boaters within the wilderness. Use is also expected to be higher for hiking, backpacking and primitive camping.

On average, the **Burrells Ford to Highway 28 (BF-28)** section would be expected to have the same number of days available for boating as the **BP-BF** section. However, actual boating use is expected to be higher because this section is lower on the river and wider, and is likely to have more opportunities for boating below the 2.0-foot threshold. Hiking and backpacking use are expected to be about the same as the **BP-BF** section, while primitive camping would likely be higher due to the popularity of the Burrells Ford Walk-in campground. Therefore, the addition of boating in this section would most likely result in a high likelihood of impacting the solitude experience of other dispersed recreation user groups. As mentioned earlier, these impacts could be significant since opportunities to experience solitude have become increasingly difficult along the river, even without the introduction of a new user group.

In all three sections boaters would not be expected to camp from their craft while using the river. This is because the weight of the camping gear would at best impair paddling performance on the technical water. They would in turn be expected to float from put-in to take-out and stay on the river or on the riverbanks during the entire trip. Competition for primitive campsites is expected to be minimal. The one exception would be the Burrells Ford Walk-in campground, especially when hiking, backpacking, and angling uses are likely to overlap with boating (on an average of 53 days March through November, and especially on the 21 days expected to fall on weekends and holidays within that period). Competition for parking at Burrells Ford would likely be an issue at these times also, and to a lesser extent, at Highway 28 and Big Bend Road.

### **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (on high use weekends) will be mitigated by road design features and designated parking spaces. This may cause parking to be even more of a premium, especially on those days when hiking, backpacking, angling, boating, and other activities are likely to overlap (on an average of 39 days April through November, and especially on the 16 days expected to fall on weekends and holidays within that period).

## **Alternative A**

### **Direct and Indirect**

Under this Alternative, boating would be allowed from Burrells Ford downstream to the Highway 28 Bridge from December 1 through March 31 at water levels measuring or

exceeding 2.5 feet (1400 cfs) at the Highway 76 gauge. According to USGS average daily flow data for the past 62 years, this translates into an average of 11.4 days per year that would be available for boaters (Figure H-3 and Table H-3) December through March. Of these, about 5 days (40%) would be expected to fall on weekends or holidays.

However, since enforcement of the 2.5 foot level is expected to be difficult, at best, it can be expected that some boating will occur on dates before 12/1 and/or after 3/31 and at levels less than 2.5 feet during the 12/1 through 3/31 time period. Despite this unlawful use, overall boating use under this alternative is expected to be less than is expected for the **BF-28** section under Alternative E (Table H-3). This is because, according to historical data, there would most likely be fewer available days for boating, and because those days would most likely occur from December through March, during the colder months of the year.

Competition for campsites at the Burrells Ford Walk-in campground, or for parking at Burrells Ford or Highway 28 would likely be an issue during this time period, particularly mid-February through March.

In summary, this section is expected to have less boating use than the **GS-BP** section under Alternative E (see Table H-3). Hiking, backpacking and primitive camping use is also expected to be low during this period, so the potential for undesired encounters and potential conflicts with boaters is expected to be less than in the **BF-28** section under Alternative E.

### **Cumulative**

Burrells Ford Road may be improved/paved in the near future. If so, indiscriminate parking near the river (especially on high use weekends) will be mitigated by road design features and designated parking spaces. This may cause parking to be even more of a premium on the 4 days, on average, available for boating in March (2 of which could fall on weekends or holidays), especially if these coincide with high use days for anglers.

## **Safety**

### **Alternatives B, D, F, and I**

#### **Direct, Indirect, and Cumulative**

Under these alternatives boating would continue to be restricted in the 21 miles of river upstream of the Highway 28 Bridge, but would still occur downstream to Tugaloo Lake. There would be no changes expected in safety factors (direct, indirect or cumulative) on the river upstream of Highway 28 outside of what has been considered historical influences and trends.

## **Alternative E**

### **Direct, Indirect, and Cumulative**

Under this alternative, the Chattooga River from NC Road 1107 (Grimshawes Bridge) downstream to the Highway 28 Bridge would be open for boating year-round at all water levels. However, according to USGS average daily flow data for the past 62 years, section **GS-BP** would have an average of 22 days available for boating per year, while sections **BP-BF** and **BF-28** would each have an average of 81 days available (see Figures H-2, H-3 and Table H-3).

With an increase in the number of days available for boating under this alternative it is reasonable to assume that accidents, injuries and fatalities associated with boating would increase. There may also be accidents, injuries and fatalities associated with search and rescue personnel dispatched to boating incidents.

Lack of professionally guided trips may also contribute towards incidents that would otherwise be preventable. These situations could be mitigated if less experienced boaters had the option of securing professional services rather than venturing out on their own.

There are no current or foreseeable activities that would cause any cumulative effects to safety factor on the Chattooga Wild and Scenic River above Highway 28.

## **Alternative A**

### **Direct, Indirect, and Cumulative**

Under this alternative, boating would be allowed from Burrells Ford downstream to the Highway 28 Bridge from December 1 through March 31 at water levels measuring or exceeding 2.5 feet (1400 cfs) at the Highway 76 gauge. According to USGS average daily flow data for the past 62 years, this translates into an average of 11.4 days per year available to boaters December through March (Figure H-3 and Table H-3).

With an increase in the number of days available for boating under this alternative, it is reasonable to assume that accidents, injuries and fatalities associated with boating would also increase. There may also be accidents, injuries and fatalities associated with search and rescue personnel dispatched to boating incidents. However, since the days available for boating are fewer than in Alternative E, impacts to safety under this alternative are expected to be relatively less. Additionally, since boating is only available during the colder months (December through March), this would tend to inhibit boating by the less experienced and prepared boater.

Lack of professionally guided trips may contribute towards incidents that would otherwise be preventable. These situations could be mitigated if inexperienced boaters had the option of securing professional services rather than venturing out on their own.

There are no current or foreseeable activities that would cause any cumulative effects to safety factors on the Chattooga Wild and Scenic River above Highway 28.

## **Search and Rescue**

### **Alternative B, D, F and I**

#### **Direct, Indirect, and Cumulative**

Under these alternatives boating would continue to be restricted in the 21 miles of river upstream of the Highway 28 Bridge, but would still occur downstream to Tugaloo Lake. There would be no changes expected in search and rescue operations (direct, indirect or cumulative) on the river upstream of Highway 28 outside of what has been considered historical influences and trends.

### **Alternative E**

#### **Direct and Indirect**

Under this alternative, the Chattooga River from NC 1107 (Grimshawes Bridge) downstream to the Highway 28 Bridge would be open to boating year-round at all water levels. However, according to USGS average daily flow data for the past 62 years, section **GS-BP** would have an average of 22 days available for boating per year, while sections **BP-BF** and **BF-28** would each have an average of 81 days available (see Figures H-2, H-3 and Table H-3). This does not account for boaters who may attempt to float the river at lower levels, or for changes in equipment and technology that facilitate this action.

According to Andrew Pickens Ranger District staff (Borgen, pers. com.), a range of five to ten search and rescue operations per year are associated with boaters on the lower Chattooga. The majority of these operations deal with self-guided boaters. Since self-guided boater use has averaged around 25,000 per year, it would be reasonable to assume, all things equal, that the number of search and rescue operations would be comparably less above Highway 28 (because of the fewer number of days, on average, that may potentially be available for boating).

As a comparison, the section of Overflow Creek (a tributary of the West Fork of the Chattooga in Georgia) from USFS Road 86B to Overflow Creek Bridge (approximately 6 miles) is similar to sections of the Chattooga upstream from Highway 28, although considered by some to be a much more technical and difficult watercourse to navigate. It possesses several Class V rapids, very steep gradients, and the access into and out of the gorge is very difficult. However, Tallulah Ranger District Staff do not recall any reported search and rescue operations involving boaters on Overflow Creek in the last 14 years. On the other hand, the Chattooga main stem may be more of an attraction to less

experienced boaters as compared to Overflow Creek simply because of its name and renowned reputation.

Another possible proxy is the section of the Tallulah Gorge (fed by dam releases) opened to boaters in 1997 and managed by the Tallulah Gorge State Park in Georgia. This is also considered a “creeking” opportunity with difficult access in and out of the gorge. According to State Park staff, no known search and rescue efforts have been undertaken since the river opened to boaters.

When search and rescue operations do occur, a majority of them are not very highly impactful (Borgen, pers. com.) and are generally associated with people who do not return from a trip at a previously scheduled time. However, a small number of these operations do involve accessing and transporting injured persons and/or fatalities from remote areas. If and when these rescue operations are required above Highway 28, pockets of inaccessible ground in those sections could make the operation very difficult and costly (e.g. Chattooga Cliffs in the **GS-BP** section and the Rock Gorge in the **BF-28** section). There is also inherent risk to the search and rescue workers, and at times there are environmental impacts from the operations themselves (e.g. use of ATV’s and other specialized equipment to extract fatalities or the injured, opening up closed roads, warming fires, wilderness impacts, etc.).

### **Cumulative**

There are no current or foreseeable activities that would cause any cumulative effects to search and rescue operations on the Chattooga Wild and Scenic River above Highway 28.

### **Possible Mitigation Measures**

- Sign river access points appropriately to discourage less experienced boaters, especially at Burrells Ford Bridge access. Signs should not market the activity, but properly warn potential boaters. Website and brochure information should also be developed that warns about the dangers without encouraging use.
- Do not provide additional facilities that might otherwise encourage this use.

## **Alternative A**

### **Direct and Indirect**

Under this alternative, boating would be allowed from Burrells Ford downstream to the Highway 28 Bridge from December 1 through March 31 at water levels measuring or exceeding 2.5 feet (1400 cfs) at the Highway 76 gauge. According to USGS average daily flow data for the past 62 years, this translates into an average of 11.4 days per year available for boating (Figure H-3 and Table H-3). However, as was mentioned earlier,



since enforcement of the 2.5-foot level is expected to be difficult, there would likely be additional unlawful boating use during this period.

It may be reasonable to assume, that the potential number of search and rescue operations could be less (above Highway 28) under Alternative A than under Alternative E because there are, on average, fewer days available for boating.

Additionally, restricting boating to the colder months (December through March) and higher water levels may discourage the less skilled and prepared boaters. This could further reduce the potential need for search and rescue operations.

In summary, Alternative A would likely require fewer search and rescue operations than Alternative E.

### **Cumulative**

There are no current of foreseeable activities that would cause any cumulative effects to search and rescue operations on the Chattooga Wild and Scenic River above Highway 28.

### **Possible Mitigation Measures**

- Sign river access points appropriately to discourage less experienced boaters, especially at Burrells Ford Bridge access. Signs should not market the activity, but properly warn potential boaters. Website and brochure information should also be developed that warns about the dangers without encouraging use.
- Do not provide additional facilities that might otherwise encourage this use.

# APPENDIX I

## SOCIAL AND ECONOMIC TABLES

TABLE I-1: COUNTY AND STATE POPULATION CHARACTERISTICS POPULATION BY RACE, 1980					
	1980				
	Persons	White	Black	Other Race	% Minority
State of South Carolina	3,120,700	2,147,200	948,620	59,399	32.3%
<b>South Carolina Counties</b>					
Abbeville	22,627	15,103	7,456	245	34.0%
Chester	30,148	18,455	11,630	275	39.5%
Edgefield	17,528	8,753	8,725	261	51.3%
Fairfield	20,700	8,580	12,083	226	59.5%
Greenwood	55,869	40,904	16,714	646	31.1%
Laurens	52,214	36,956	15,165	445	29.9%
McCormick	7,797	3,044	4,729	108	62.0%
Newberry	31,242	21,272	9,884	273	32.5%
Oconee	48,611	43,656	4,837	454	10.9%
Saluda	16,136	10,424	5,702	145	36.2%
Union	30,764	21,627	9,057	301	30.4%
<b>FOREST AREA</b>					
<b>Total</b>	<b>333,626</b>	<b>228,774</b>	<b>105,982</b>	<b>3,379</b>	<b>32.8%</b>
<b>Average</b>	<b>30,330</b>	<b>20,798</b>	<b>9,635</b>	<b>307</b>	<b>32.8%</b>

Source: U.S. Bureau of Census

**TABLE I-2: COUNTY AND STATE POPULATION CHARACTERISTICS  
POPULATION BY RACE, 1990**

	1990				
	Persons	White	Black	Other Race	% Minority
State of South Carolina	3,486,310	2,407,700	1,040,000	39,010	30.9%
<b>South Carolina Counties</b>					
Abbeville	23,862	16,295	7,507	60	31.7%
Chester	32,170	19,091	12,839	240	40.7%
Edgefield	18,375	9,764	8,511	100	46.9%
Fairfield	22,295	9,244	13,034	17	58.5%
Greenwood	59,567	41,101	18,013	453	31.0%
Laurens	58,092	41,421	16,358	313	28.7%
McCormick	8,868	3,657	5,193	18	58.8%
Newberry	33,172	21,492	11,557	123	35.2%
Oconee	57,494	52,241	4,989	264	9.1%
Saluda	16,357	10,883	5,421	53	33.5%
Union	30,337	21,158	9,104	75	30.3%
<b>FOREST AREA</b>					
<b>Total</b>	<b>360,589</b>	<b>246,347</b>	<b>112,526</b>	<b>1,716</b>	<b>31.7%</b>
<b>Average</b>	<b>32,781</b>	<b>22,395</b>	<b>10,230</b>	<b>156</b>	<b>31.7%</b>

**Source:** U.S. Bureau of Census

**TABLE I-3: COUNTY AND STATE POULATION CHARACTERISTICS  
POPULATION BY RACE, 2000**

	2000				
	Persons	White	Black	Other Race	% Minority
State of South Carolina	4,012,012	2,695,560	1,185,216	131,236	32.8%
<b>South Carolina Counties</b>					
Abbeville	26,167	17,881	7,926	360	31.7%
Chester	34,068	20,416	13,168	484	40.1%
Edgefield	24,595	13,962	10,209	424	43.2%
Fairfield	23,454	9,282	13,859	313	60.4%
Greenwood	66,271	43,455	21,036	1,780	34.4%
Laurens	69,567	49,789	19,245	533	28.4%
McCormick	9,958	4,459	5,365	134	55.2%
Newberry	36,108	23,115	11,958	1,035	36.0%
Oconee	66,215	59,025	5,550	1,640	10.9%
Saluda	19,181	12,622	5,753	806	34.2%
Union	29,881	20,262	9,278	341	32.2%
<b>FOREST AREA</b>					
<b>Total</b>	<b>405,465</b>	<b>274,268</b>	<b>123,347</b>	<b>7,850</b>	<b>32.4%</b>
<b>Average</b>	<b>36,860</b>	<b>24,933</b>	<b>11,213</b>	<b>714</b>	<b>32.4%</b>

**Source:** U.S. Bureau of Census

**TABLE I-4: COUNTY AND STATE POPULATION CHARACTERISTICS  
PERCENT POPULATION CHANGE, 1980 - 2000**

	% Change 1980-1990		% Change 1990-2000	
	Population	Minority Population	Population	Minority Population
State of South Carolina	11.7%	7.0%	11.5%	21.2%
<b>South Carolina Counties</b>				
Abbeville	5.5%	-1.7%	9.6%	9.5%
Chester	6.7%	9.9%	5.8%	4.3%
Edgefield	4.8%	-4.2%	33.8%	23.4%
Fairfield	7.7%	6.0%	5.1%	8.5%
Greenwood	6.6%	6.4%	11.2%	23.5%
Laurens	11.3%	6.8%	17.9%	18.6%
McCormick	13.7%	7.7%	12.2%	5.5%
Newberry	6.2%	15.0%	8.8%	11.2%
Oconee	18.3%	-0.7%	15.1%	36.8%
Saluda	1.4%	-6.4%	17.2%	19.8%
Union	-1.4%	-1.9%	-1.6%	4.7%
<b>FOREST AREA</b>				
<b>Average</b>	<b>8.1%</b>	<b>4.5%</b>	<b>12.4%</b>	<b>14.8%</b>

**Source:** Bureau of Census

**TABLE I-5: COUNTY AND STATE POPULATION CHARACTERISTICS  
POPULATION DENSITY AND DENSITY CHANGE 1980,1990 AND 2000**

	Area in Sq. Miles	Population Density (Persons/Sq. Mile)			Change in Population Density (%)	
		1980	1990	2000	1980-1990	1990-2000
State of South Carolina	30,111.1	103.6	115.8	133.2	11.7%	15.0%
<b>South Carolina Counties</b>						
Abbeville	508	44.5	47.0	51.5	5.5%	9.6%
Chester	581	51.9	55.4	58.6	6.7%	5.8%
Edgefield	502	34.9	36.6	49.0	4.8%	33.8%
Fairfield	687	30.1	32.5	34.1	7.7%	5.1%
Greenwood	456	122.5	130.6	145.3	6.6%	11.2%
Laurens	713	73.2	81.5	97.6	11.3%	19.7%
McCormick	360	21.7	24.6	27.7	13.7%	12.2%
Newberry	631	49.5	52.6	57.2	6.2%	8.8%
Oconee	625	77.8	92.0	105.9	18.3%	15.1%
Saluda	451	35.8	36.3	42.5	1.4%	17.2%
Union	514	59.9	59.0	58.1	-1.4%	-1.6%
<b>FOREST AREA</b>						
<b>Total</b>	<b>6,028</b>	<b>55.3</b>	<b>59.8</b>	<b>67.3</b>	<b>8.1%</b>	<b>12.4%</b>
<b>Average</b>	<b>548</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>	<b>N/A</b>

N/A = Not applicable or not available

Source: U.S. Bureau of Census

**TABLE I-6: COUNTY AND STATE POPULATION CHARACTERISTICS  
URBAN AND RURAL DISTRIBUTION AND PERCENT RURAL - 1980 AND 1990**

	1980			1990		
	Urban	Rural	% Rural	Urban	Rural	% Rural
State of South Carolina	1,689,300	1,432,600	45.9%	1,905,378	1,581,325	45.4%
<b>South Carolina Counties</b>						
Abbeville	5,918	16,709	73.8%	5,979	17,883	74.9%
Chester	9,421	20,727	68.8%	7,158	25,012	77.7%
Edgefield	5,337	12,191	69.6%	5,258	13,117	71.4%
Fairfield	2,919	17,781	85.9%	3,475	18,820	84.4%
Greenwood	25,352	32,495	58.2%	20,807	38,760	65.1%
Laurens	20,018	32,196	61.7%	18,443	39,649	68.3%
McCormick	0	7,797	100.0%	0	8,868	100.0%
Newberry	9,866	21,376	68.4%	10,542	22,630	68.2%
Oconee	14,527	34,084	70.1%	14,601	42,893	74.6%
Saluda	3,166	12,984	80.5%	3,183	13,174	80.5%
Union	10,523	20,228	65.8%	9,836	20,501	67.6%
<b>FOREST AREA</b>						
<b>Total</b>	<b>107,047</b>	<b>228,568</b>	<b>68.5%</b>	<b>99,282</b>	<b>261,307</b>	<b>72.5%</b>
<b>Average</b>	<b>9,732</b>	<b>20,779</b>	<b>68.5%</b>	<b>9,026</b>	<b>23,755</b>	<b>72.5%</b>

**Source:** Bureau of Census

**TABLE I-7: COUNTY AND STATE UNEMPLOYMENT & INCOME  
IN COUNTIES WITH NATIONAL FOREST LANDS, 1980 & 1990**

	1980			1990			Real Average Annual Income	
	Unemploy- ment %	Per Capita Income	Median Income	Unemploy- ment %	Per Capita Income	Median Income	% Change 1980-90 Per Capita Income	% Change 1980-90 Median Income
State of South Carolina	6.9%	\$5,884	\$16,978	4.7%	\$11,897	\$30,797	2.4%	1.3%
<b>South Carolina Counties</b>								
Abbeville	8.7%	\$5,379	\$16,477	5.9%	\$10,214	\$28,501	1.8%	0.8%
Chester	8.7%	\$5,310	\$16,610	7.4%	\$9,806	\$26,812	1.5%	0.2%
Edgefield	6.9%	\$4,750	\$14,537	5.1%	\$10,651	\$28,613	3.5%	2.2%
Fairfield	7.6%	\$4,496	\$15,171	7.4%	\$9,011	\$25,781	2.3%	0.7%
Greenwood	6.4%	\$3,121	\$17,868	6.2%	\$11,429	\$29,385	1.6%	0.3%
Laurens	8.0%	\$5,509	\$17,515	4.7%	\$10,739	\$29,193	2.1%	0.5%
McCormick	10.2%	\$4,285	\$14,438	8.4%	\$7,929	\$24,040	1.5%	0.5%
Newberry	5.0%	\$5,834	\$17,379	5.8%	\$10,487	\$28,005	1.2%	0.1%
Oconee	8.1%	\$5,784	\$16,101	4.8%	\$12,352	\$30,858	3.0%	1.9%
Saluda	8.1%	\$4,723	\$14,364	5.5%	\$9,814	\$27,466	2.7%	1.9%
Union	10.1%	\$5,334	\$16,523	6.1%	\$9,669	\$26,003	1.3%	-0.1%
<b>FOREST AREA</b>								
<b>Average</b>	<b>8.0%</b>	<b>\$5,230</b>	<b>\$16,089</b>	<b>6.1%</b>	<b>\$10,191</b>	<b>\$27,696</b>	<b>2.1%</b>	<b>0.8%</b>

Source: Bureau of Census



**TABLE I-8: PEOPLE OF ALL AGES IN POVERTY, 1989 AND 1995**

	1989 Percentage		1995 Percentage	
	Estimate	90 % Confidence Interval	Estimate	90 % Confidence Interval
State of South Carolina	15.7	15.1 to 16.3	15.4	15.3 to 15.5
<b>South Carolina Counties</b>				
Abbeville	14.4	11.5 to 17.2	13.5	12.2 to 14.7
Chester	17.8	14.3 to 21.2	16.8	15.7 to 18.0
Edgefield	18.4	14.5 to 22.3	16.6	14.9 to 18.4
Fairfield	20.5	16.4 to 24.5	20.6	18.9 to 22.3
Greenwood	14.6	11.8 to 17.5	15.4	14.5 to 16.2
Laurens	14.6	11.7 to 17.4	12.9	12.0 to 13.8
McCormick	20.5	16.4 to 24.6	22.8	20.1 to 25.6
Newberry	14.9	12.0 to 17.9	15.3	14.2 to 16.4
Oconee	11.3	9.1 to 13.6	11.4	10.6 to 12.2
Saluda	17.4	13.9 to 20.8	18.3	16.6 to 20.0
Union	14.9	11.9 to 17.8	17.0	15.8 to 18.2
<b>FOREST AREA</b>				
<b>Average</b>	<b>16.3</b>		<b>16.4</b>	

**Source:** U.S. Bureau of Census, Small Area Income and Poverty Estimates Program

TABLE I-9: HOUSEHOLD DATA, 1980 AND 1990					
	65+ Households % Change	Persons per household		% Female Head of Household With Children Present	
	1980-90	1980	1990	1980	1990
State of South Carolina	34.5%	2.93	2.68	6.9%	7.5%
<b>South Carolina Counties</b>					
Abbeville	23.4%	2.86	2.64	6.4%	6.8%
Chester	20.8%	3.01	2.80	7.8%	9.4%
Edgefield	21.6%	3.15	2.82	6.1%	7.0%
Fairfield	24.4%	3.21	2.93	7.4%	9.9%
Greenwood	23.4%	2.79	2.55	6.3%	8.0%
Laurens	28.2%	2.89	2.68	6.5%	7.4%
McCormick	23.4%	3.17	2.75	8.9%	8.6%
Newberry	11.4%	2.80	2.63	5.9%	7.8%
Oconee	43.6%	2.78	2.55	4.7%	5.3%
Saluda	14.6%	3.03	2.76	5.4%	5.4%
Union	18.6%	2.90	2.64	5.5%	8.3%
<b>FOREST AREA</b>					
<b>Total</b>	<b>24.3%</b>			<b>6.2%</b>	<b>7.5%</b>
<b>Average</b>	<b>24.3%</b>	<b>3.00</b>	<b>2.70</b>	<b>6.2%</b>	<b>7.5%</b>

Source: U. S. Bureau Of Census

**TABLE I-10: HOUSING DATA, 1980 AND 1990**

	Total Housing Units						Housing Units Median Value	
	1980	1990	2000	% of Change			1980	1990
				1970-80	1980-90	1990-00		
State of South Carolina	1,153,381	1,424,155	1,753,670	41.5%	23.5%	23.1%	\$35,100	\$61,100
<b>South Carolina Counties</b>								
Abbeville	8,547	8,547	11,656	20.4%	0.0%	36.4%	\$27,200	\$43,600
Chester	10,737	12,293	14,374	15.1%	14.5%	16.9%	\$24,800	\$40,700
Edgefield	6,207	7,290	9,223	36.4%	17.4%	26.5%	\$29,500	\$52,100
Fairfield	7,452	8,730	10,383	26.5%	17.1%	18.9%	\$25,500	\$47,500
Greenwood	21,017	24,735	28,243	27.2%	17.7%	14.2%	\$32,000	\$50,100
Laurens	19,628	23,201	30,239	24.1%	18.2%	30.3%	\$27,100	\$44,700
McCormick	2,979	3,347	4,459	26.1%	12.4%	33.2%	\$24,800	\$39,200
Newberry	12,296	14,455	16,805	24.3%	17.6%	16.3%	\$27,700	\$49,200
Oconee	20,226	25,983	32,383	44.1%	28.5%	24.6%	\$30,800	\$56,900
Saluda	5,975	6,792	8,543	28.3%	13.7%	25.8%	\$30,200	\$46,600
Union	11,393	12,230	13,351	19.9%	7.3%	9.2%	\$23,500	\$38,000
<b>FOREST AREA</b>								
<b>Total</b>	<b>126,457</b>	<b>147,603</b>	<b>179,659</b>	<b>26.9%</b>	<b>16.7%</b>	<b>21.7%</b>		
<b>Average</b>	<b>10,308</b>	<b>13,418</b>	<b>16,333</b>	<b>26.9%</b>	<b>16.7%</b>	<b>21.7%</b>	<b>\$27,555</b>	<b>\$46,236</b>

Source: Bureau of Census

**TABLE I-11: PERSONAL INCOME AND TRANSFER PAYMENTS, 1990 AND 1997**

	Per Capita Personal Income			Per Capita Government Transfer Payments		
	1990	1997	% of Change 1990-97	1990	1997	% of Change 1990-97
State of South Carolina	\$15,427	\$20,508	4.2%	\$2,439	\$3,911	7.0%
<b>South Carolina Counties</b>						
Abbeville	\$12,151	\$17,102	5.0%	\$2,371	\$3,788	6.9%
Chester	\$12,111	\$16,279	4.3%	\$2,456	\$3,994	7.2%
Edgefield	\$13,000	\$16,576	3.5%	\$2,222	\$3,550	6.9%
Fairfield	\$12,375	\$17,301	4.9%	\$2,665	\$4,428	7.5%
Greenwood	\$15,173	\$20,981	4.7%	\$2,390	\$3,790	6.8%
Laurens	\$14,485	\$19,773	4.5%	\$3,256	\$5,692	8.3%
McCormick	\$10,005	\$14,571	5.5%	\$2,136	\$4,509	11.3%
Newberry	\$13,398	\$18,273	4.5%	\$2,611	\$4,043	6.4%
Oconee	\$16,115	\$21,349	4.1%	\$2,363	\$3,998	7.8%
Saluda	\$13,445	\$18,376	4.6%	\$2,305	\$3,890	7.8%
Union	\$12,228	\$16,829	4.7%	\$2,562	\$4,202	7.3%
<b>FOREST AREA</b>						
<b>Average</b>	<b>\$13,135</b>	<b>\$17,946</b>	<b>4.6%</b>	<b>\$2,485</b>	<b>\$4,171</b>	<b>7.7%</b>

**NOTE:** Dollars are in nominal terms(year of occurrence) and change represents average annual percent change.

**Source:** U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System Database.

TABLE I-12: COUNTY EMPLOYMENT AND UNEMPLOYMENT RATE, 1997		
	Employment 1997	Unemployment Rate (%) 1997
State of South Carolina	1,826,244	4.5%
<b>South Carolina Counties</b>		
Abbeville	11,969	6.6%
Chester	14,141	9.1%
Edgefield	8,440	4.7%
Fairfield	10,029	7.7%
Greenwood	32,195	5.0%
Laurens	28,950	3.9%
McCormick	3,780	8.4%
Newberry	17,716	4.5%
Oconee	27,502	4.4%
Saluda	8,585	4.0%
Union	14,161	6.5%
<b>FOREST AREA</b>		
<b>Total</b>	<b>177,468</b>	<b>5.4%</b>
<b>Average</b>	<b>16,133</b>	<b>5.4%</b>

**Source:** U.S. Bureau of Labor Statistics Local Area Unemployment

**TABLE I-13: DIVERSITY OF THE SUMTER NF AREA ECONOMY BY SECTOR 1985 AND 1996**

Industry	Industry output	% of Output Total	Industry output	% of Output Total	Employment	% of Total	Employment	% of Total	Total Income	% of Total	Total Income	% of Total
	1985*		1996*		1985		1996		1985		1996	
<b>Agriculture</b>	\$252.7	2.9%	\$346.5	2.3%	6,409	4.6%	5,643	3.2%	\$86.8	2.4%	\$152.0	2.3%
<b>Mining</b>	\$9.8	0.1%	\$28.7	0.2%	133	0.1%	113	0.1%	\$5.2	0.1%	\$14.5	0.2%
<b>Construction</b>	\$357.9	4.1%	\$916.1	6.1%	6,502	4.7%	10,932	6.2%	\$138.9	3.9%	\$368.8	5.5%
Mfg--SIC 24 Lumber & Wood Prods.	\$239.1	2.8%	\$501.8	3.4%	3,425	2.5%	3,840	2.2%	\$78.0	2.2%	\$175.6	2.6%
Mfg--SIC 25 Wood Furniture & Fixtures	\$2.2	0.0%	\$18.9	0.1%	50	0.0%	231	0.1%	\$0.9	0.0%	\$7.4	0.1%
Mfg--SIC 26 Paper & Pulp Products	\$27.1	0.3%	\$36.7	0.2%	268	0.2%	213	0.1%	\$10.4	0.3%	\$10.0	0.1%
Other Manufacturing	\$4,631.4	53.5%	\$7,495.0	50.3%	54,617	39.2%	54,449	31.0%	\$1,303.3	36.3%	\$2,363.3	35.0%
<b>Total Manufacturing</b>	\$4,899.7	56.6%	\$8,052.4	54.0%	58,360	41.9%	58,733	33.5%	\$1,392.6	38.8%	\$2,556.3	37.9%
Recreation Related Services												
Recreational Related Wholesale	\$2.0	0.0%	\$0.0	0.0%	45	0.0%	0	0.0%	\$1.0	0.0%	\$0.0	0.0%
Recreational Related Retail Trade	\$5.5	0.1%	\$0.0	0.0%	168	0.1%	0	0.0%	\$2.8	0.1%	\$0.0	0.0%
Local, Interurban Passenger Transit	\$0.0	0.0%	\$3.0	0.0%	0	0.0%	93	0.0%	\$0.0	0.0%	\$1.9	0.0%
Recreation Related Industries												
Air Transportation	\$0.9	0.0%	\$4.0	0.0%	10	0.0%	49	0.0%	\$0.3	0.0%	\$1.8	0.0%
Wholesale & Retail Trade	\$30.4	0.4%	\$509.5	0.2%	768	0.6%	9,122	0.3%	\$15.7	0.4%	\$290.7	0.2%
General Merchandise Stores	\$0.0	0.0%	\$159.2	0.1%	0	0.0%	4,370	0.1%	\$0.0	0.0%	\$93.9	0.1%
Food Stores	\$0.0	0.0%	\$121.0	0.0%	0	0.0%	5,530	0.2%	\$0.0	0.0%	\$84.1	0.1%
Eating & Drinking	\$20.5	0.2%	\$218.2	0.2%	551	0.4%	7,196	0.6%	\$6.4	0.2%	\$87.8	0.2%
Miscellaneous Retail	\$0.0	0.0%	\$145.7	0.0%	0	0.0%	5,019	0.1%	\$0.0	0.0%	\$98.6	0.1%
Hotel and Lodging Places	\$6.3	0.1%	\$18.2	0.0%	205	0.1%	465	0.1%	\$3.3	0.1%	\$7.8	0.0%
Laundry, Cleaning and Shoe Repair	\$1.4	0.0%	\$20.7	0.0%	75	0.1%	1,152	0.1%	\$0.8	0.0%	\$13.5	0.0%
Automobile Rental and Leasing	\$0.1	0.0%	\$9.8	0.0%	1	0.0%	109	0.0%	\$0.0	0.0%	\$4.8	0.0%
Automobile Repair and Service	\$3.9	0.0%	\$73.3	0.1%	76	0.1%	1,073	0.1%	\$1.6	0.0%	\$29.6	0.0%
Amusement & Recreation Services NEC	\$2.0	0.0%	\$38.4	0.1%	69	0.0%	852	0.2%	\$1.0	0.0%	\$21.7	0.1%
Total Tourism Estimate	\$73.0	0.8%	\$1,320.9	0.7%	1,968	1.4%	0	1.7%	\$33.0	0.9%	\$736.0	0.8%
<b>Transportation &amp; Utilities--Non-Tourism</b>	\$738.6	8.5%	\$1,296.1	8.7%	5,703	4.1%	5,878	3.4%	\$380.7	10.6%	\$867.3	12.9%
<b>Finance, Insurance, Real Estate</b>	\$338.8	3.9%	\$826.9	5.5%	4,648	3.3%	5,569	3.2%	\$214.2	6.0%	\$523.7	7.8%
<b>Services--Non-Tourism</b>	\$465.9	5.4%	\$984.9	7.5%	14,623	10.5%	24,316	15.5%	\$277.3	7.7%	\$548.3	9.1%
<b>Wholesale &amp; Retail Trade--Non-Tourism</b>	\$700.0	8.1%	\$0.0	7.2%	17,851	12.8%		16.5%	\$338.2	9.4%	\$0.0	9.1%
<b>Government</b>	\$795.5	9.2%	\$1,095.1	7.3%	21,598	15.5%	28,049	16.0%	\$700.6	19.5%	\$941.0	13.9%
Other--Misc	\$20.6	0.2%	\$39.8	0.3%	1,573	1.1%	1,306	0.7%	\$20.6	0.6%	\$39.8	0.6%
<b>Totals (* Dollars in Millions)</b>	<b>\$8,652.3</b>	<b>100.0%</b>	<b>\$14,907.4</b>	<b>100.0%</b>	<b>139,366</b>	<b>100.0%</b>	<b>175,568</b>	<b>100.0%</b>	<b>\$3,588.0</b>	<b>100.0%</b>	<b>\$6,747.7</b>	<b>100.0%</b>

**Bold type** = 9-one digit SIC industries

**Source:** 1985 and 1996 IMPLAN Data

**TABLE I-14: NET EXPORTS, 1985 AND 1996**

COMMODITY	Net Exports--Exports Less Imports		Net Exporting industries as a Percentage of Total Positive Exporting Industries	
	1985	1996	1985	1996
<b>Agriculture</b>	(\$81.0)	(\$93.7)	0.0%	0.0%
<b>Mining</b>	(\$361.6)	(\$329.0)	0.0%	0.0%
<b>Construction</b>	(\$79.6)	(\$11.6)	0.0%	0.0%
Mfg.--SIC 23 Lumber & Wood Products	\$125.8	\$277.5	6.7%	10.0%
Mfg.--SIC 25 Wood Furniture & Fixtures	(\$21.0)	(\$35.9)	0.0%	0.0%
Mfg.--SIC 26 Paper & Pulp Products	(\$109.8)	(\$161.6)	0.0%	0.0%
Other Manufacturing	\$1,468.2	\$2,211.3	78.2%	79.8%
<b>Total Manufacturing</b>	\$1,463.2	\$2,291.3	77.9%	82.6%
Commodities Existing in Tourism Estimate:				
Local, Interurban Passenger Transit	(\$5.2)	(\$21.0)	0.0%	0.0%
Air Transportation	(\$69.4)	(\$86.9)	0.0%	0.0%
Recreation Related Wholesale Trade	(\$3.0)	\$0.0	0.0%	0.0%
Recreation Related Retail Trade	(\$7.6)	\$0.0	0.0%	0.0%
General Merchandise Stores	\$0.0	(\$29.7)	0.0%	0.0%
Food Stores	\$0.0	(\$45.1)	0.0%	0.0%
Eating & Drinking	(\$66.6)	(\$93.9)	0.0%	0.0%
Miscellaneous Retail	\$0.0	(\$44.3)	0.0%	0.0%
Hotels and Lodging Places	(\$36.9)	(\$102.7)	0.0%	0.0%
Laundry, Cleaning and Shoe Repair	(\$3.8)	(\$7.6)	0.0%	0.0%
Automobile Rental and Leasing	(\$28.2)	(\$34.4)	0.0%	0.0%
Automobile Repair and Services	(\$37.7)	(\$35.5)	0.0%	0.0%
Amusement and Recreation Services	(\$9.3)	(\$14.9)	0.0%	0.0%
Total for Commodities in Tourism Est. (Ex. 433,447,456,465)	(\$267.8)	(\$515.9)	0.0%	0.0%
Estimate of Trade in Tourism Estimate**	(\$22.5)	(\$45.4)	0.0%	0.0%
<b>Transportation &amp; Utilities (433)</b>	\$26.6	\$180.4	1.4%	6.5%
<b>Wholesale &amp; Retail Trade--Non-Tourism (447)</b>	(\$314.2)	(\$646.0)	0.0%	0.0%
<b>Finance, Insurance, and Real Estate (456)</b>	(\$650.6)	(\$1,120.8)	0.0%	0.0%
<b>Services--Non-Tourism (465)</b>	(\$559.1)	(\$1,143.0)	0.0%	0.0%
Total of Commodities 433, 447, 456, 465	(\$1,497.4)	(\$2,729.4)	0.0%	0.0%
<b>Government</b>	\$256.6	\$103.5	13.7%	3.7%
Other--Miscellaneous	(\$77.6)	(\$40.2)	0.0%	0.0%
<b>TOTAL NET TRADE (EXPORTS)</b>	<b>(\$645.1)</b>	<b>(\$1,324.0)</b>	<b>100.0%</b>	<b>100.0%</b>
<b>TOTAL POSITIVE TRADE INDUSTRIES (EXPORTS)</b>	<b>\$1,877.2</b>	<b>\$2,772.8</b>		

**NOTE:** One digit SIC commodities are in bold type

**NOTE:** 1996 IMPLAN did not have Recreation Related Wholesale and Retail Trade.

**Source:** 1985 and 1996 IMPLAN Data

**TABLE I-15: PAYMENT IN LIEU OF TAXES PAYMENTS TO COUNTIES, 1990 AND 1999**

	Payments		% of Change 1990-99
	1990	1999	
State of South Carolina	\$109,783	\$185,049	68.6%
<b>South Carolina Counties</b>			
Abbeville	\$4,632	\$8,432	82.0%
Chester	\$1,204	\$1,249	3.7%
Edgefield	\$3,063	\$3,074	0.4%
Fairfield	\$1,100	\$1,095	-0.5%
Greenwood	\$1,138	\$1,180	3.7%
Laurens	\$2,086	\$2,068	-0.9%
McCormick	\$9,177	\$11,791	28.5%
Newberry	\$5,634	\$5,592	-0.7%
Oconee	\$9,727	\$9,579	-1.5%
Saluda	\$434	\$442	1.8%
Union	\$5,995	\$5,924	-1.2%
<b>FOREST AREA</b>			
<b>Total</b>	<b>\$44,190</b>	<b>\$50,426</b>	<b>14.1%</b>
<b>% of State Total</b>	<b>40.3%</b>	<b>27.3%</b>	<b>-32.3%</b>

**Source:** U.S. Bureau of Land Management



**TABLE I-16: TWENTY FIVE PERCENT FUND PAYMENTS BY COUNTIES WITH NATIONAL FOREST LANDS,  
1986, 1989, 1992, 1995, 1997**

	1986	1990	1992	1995	1997	% of Change 1986-97
<b>South Carolina Counties</b>						
Abbeville	\$89,308.77	\$86,195.47	\$110,102.23	\$81,192.11	\$66,052.45	-26.0%
Chester	\$47,127.79	\$44,984.22	\$59,636.94	\$43,977.75	\$35,777.35	-24.1%
Edgefield	\$119,009.21	\$116,345.58	\$146,850.13	\$107,991.87	\$87,854.93	-26.2%
Fairfield	\$43,065.46	\$41,390.56	\$52,247.75	\$38,528.78	\$31,344.43	-27.2%
Greenwood	\$40,732.94	\$39,507.82	\$49,871.14	\$38,080.21	\$30,979.50	-23.9%
Laurens	\$81,634.16	\$78,040.63	\$98,686.00	\$72,773.50	\$59,203.63	27.5%
McCormick	\$191,407.23	\$182,010.13	\$229,791.07	\$171,025.38	\$139,134.77	-27.3%
Newberry	\$220,508.89	\$210,886.40	\$266,024.98	\$196,799.32	\$160,102.72	-27.4%
Oconee	\$309,837.23	\$298,733.01	\$376,561.03	\$278,711.24	\$227,778.97	-26.5%
Saluda	\$15,889.29	\$16,735.54	\$21,125.45	\$15,578.42	\$12,673.56	-20.2%
Union	\$231,408.32	\$222,776.85	\$281,213.59	\$208,521.39	\$169,639.01	-26.7%
<b>FOREST AREA</b>						
<b>Total</b>	<b>\$1,389,929.29</b>	<b>\$1,337,606.21</b>	<b>\$1,692,110.31</b>	<b>\$1,253,179.97</b>	<b>\$1,020,541.32</b>	<b>-26.6%</b>
<b>Average</b>	<b>\$126,357.21</b>	<b>\$121,600.56</b>	<b>\$153,828.21</b>	<b>\$113,925.45</b>	<b>\$92,776.48</b>	<b>-26.6%</b>

**Source:** USDA Forest Service, Rocky Mountain Research Station

**TABLE I-17: LAND-USE PERCENT, 1982 AND 1992**

	Acres	% Share							
		Forest		Farm		Urban		Residential	
		1982	1992	1982	1992	1982	1992	1982	1992
<b>South Carolina Counties</b>									
Abbeville	1,349,390,000	26.3%	24.6%	52.4%	49.8%	2.1%	2.8%	19.2%	22.8%
Chester	1,529,760,000	17.0%	16.2%	71.2%	71.3%	3.6%	4.5%	8.2%	8.0%
Edgefield	1,252,510,000	12.8%	9.6%	71.0%	72.9%	0.8%	1.3%	15.5%	16.2%
Fairfield	1,833,930,000	6.8%	5.7%	86.0%	86.6%	1.7%	2.2%	5.5%	5.6%
Greenwood	1,193,740,000	15.4%	13.9%	68.1%	66.3%	5.2%	6.6%	11.3%	13.1%
Laurens	1,883,650,000	17.8%	16.2%	69.0%	67.5%	3.6%	4.5%	9.7%	11.9%
McCormick	1,050,930,000	6.1%	6.2%	51.1%	52.0%	1.6%	2.1%	41.2%	39.8%
Newberry	1,656,260,000	20.0%	18.5%	59.1%	58.0%	2.8%	4.3%	18.2%	19.2%
Oconee	1,770,140,000	18.3%	15.2%	48.0%	49.1%	5.9%	8.3%	27.7%	27.4%
Saluda	1,198,540,000	28.5%	26.2%	65.7%	65.3%	0.5%	0.6%	5.3%	7.9%
Union	1,307,660,000	22.3%	21.4%	54.1%	53.8%	2.7%	3.3%	20.9%	21.5%
<b>FOREST AREA</b>									
<b>Total</b>	<b>16,026,510,000</b>								
<b>Weighted Average</b>		<b>17.3%</b>	<b>15.7%</b>	<b>63.9%</b>	<b>63.6%</b>	<b>2.9%</b>	<b>3.8%</b>	<b>16.0%</b>	<b>16.9%</b>

**Source:** Natural Resource Information System

TABLE I-18: SHANON-WEAVER ENTROPHY INDICIES		
	1977 Four Digit SIC	1993 Four Digit SIC
<b>South Carolina Counties</b>		
Abbeville	0.41493	0.59117
Chester	0.39233	0.58290
Edgefield	0.45133	0.59158
Fairfield	0.48988	0.55363
Greenwood	0.46111	0.62703
Laurens	0.51683	0.63186
McCormick	0.37419	0.51513
Newberry	0.52785	0.61425
Oconee	0.50639	0.62410
Saluda	0.49949	0.53140
Union	0.45572	0.55903
<b>FOREST AREA Weighted Average</b>	0.45855	0.58773
<b>South Carolina</b>	0.59504	0.71523
<b>United States</b>	0.66483	0.73973

**Source:** USDA Forest Service, IMI

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## APPENDIX J

# AIR QUALITY AND AIR QUALITY RELATED VALUES

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### OVERVIEW

Through a series of legislative and regulatory requirements, federal land management agencies have the unique responsibility to not only protect the air, land, and water resources under their respective authorities from degradation associated with the impacts of air pollution emitted outside the borders of Agency lands (Clean Air Act, 1990), but to protect those same resources from the impacts of air pollutants produced within those borders (Clean Air Act, 1990, Organic Act, 1977, Wilderness Act, 1997). The authority and responsibility to protect resources within National Forest lands are not limited to Class I Wilderness Areas, but requires federal land managers to take the necessary steps to protect all federal lands from those impacts. The Clean Air Act of 1990 contains numerous sections dealing with these responsibilities, and Section 101(c) states the primary purpose of the Act:

“A primary goal of this Act is to encourage or otherwise promote reasonable Federal, State, and local governmental actions, consistent with the provisions of this Act, for pollution prevention.” (Clean Air Act, 1990)

Further, the National Forest Management Act states that Land and Resource Management Plans are, in part, specifically based on:

“...recognition that the National Forests are ecosystems, and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems” (National Forest Management Act, 1976).

The Sumter National Forest does not contain any Class I Wilderness Areas. The USDA Forest Service Class I areas within 120 miles are Cohutta, Linville Gorge, Shining Rock, and Joyce Kilmer – Slickrock Wilderness. These wildernesses are afforded special protection via the Clean Air Act. The Clean Air Act requires Federal Land Managers to identify Air Quality Related Values (AQRV), or resources important to the areas that might be affected by air pollution. For the Wilderness these include visibility, water quality and vegetation. The Great Smoky Mountains National Park (administered by the Department of Interior) is another Class I area located near the Sumter National Forest. In this analysis the term AQRV will apply to any resources within the National Forest boundary that might be affected by air pollution, including those resources on Class II lands.

This analysis has three primary purposes:

- Assess the existing state of air quality in and near the Sumter National Forest (hereafter referred to as: Forest),
- Estimate the future state (within the time horizon of the Forest Plan) of air quality within and near the Forest, and how emissions from activities on the Forest might affect air quality, and
- Estimate existing and future impacts of air quality on the natural resources (AQRV) of the Forest.

## Area and Scope

Unlike the analysis area for the Sumter Forest Plan, which only assesses national forest lands, this analysis encompasses two large areas. Due to the regional nature of air quality issues, it is imperative that a much larger area than just National Forest lands be analyzed. Therefore, two specific geographic areas have been selected:

- An area encompassing all lands within a 120 mile radius of the Forest and
- A second area encompassing all lands within a 30 mile radius of the Forest.

### Rationale for the two separate assessment areas

- *120 mile radius buffer* – A large analysis area is needed due to the regional transport of air pollutants and the chemical reactions that occur in the atmosphere, i.e. the conversion of “primary” pollutants (sulfur dioxide) into “secondary” pollutants (sulfates). This analysis area is consistent with the U.S. Environmental Protection Agency (EPA), which routinely analyzes air emissions over multi-State regions across the United States.

Broad-based emissions inventories, such as the EPA’s National Emissions Inventory (U.S. EPA, 2001), are commonly used to summarize the pollutant specific emission totals per county. The Southern Appalachian Mountains Initiative (SAMI) recently completed a large scale emissions inventory for 1990 and estimates of future emissions (after implementation of recent laws, rules and regulations) for the years 2010 and 2040. SAMI’s emissions inventories for 1990 and 2040 will be used in this analysis and the analysis area will include counties having a boundary within 120 miles of the Forest (Figure J-1).

- *30 mile radius buffer* – this smaller geographic area focuses on air quality monitoring data. There is some air quality monitors located on the Sumter National Forest. Therefore, to get an adequate sampling of air quality monitoring data near the Forest, an analysis area was established to obtain a reasonable sampling of air monitoring data. The area defined by the 30 mile radius from the Forest was deemed adequate to obtain a reasonable number of air quality monitoring stations to select among that may represent air quality on the Forest.

The 120 mile analysis area lies within the borders of six states: (1) Tennessee, (2) Kentucky, (3) Virginia, (4) North Carolina, (5) South Carolina, and (6) Georgia (Figure J-1). The 120 mile area is comprised of 216 counties, and 10 of those counties intersect with the Sumter National Forest. Air pollutant emissions within this area are considered to have the greatest impact on the AQRV of the Forest, while at the same time the analysis area encompasses all lands that may be affected by emissions from activities on Forest lands.

The 30 mile assessment area lies within the borders of four states: (1) North Carolina, (2) South Carolina, (3) Georgia, and (4) Virginia (Figure J-1). This region is being evaluated to obtain a reasonable amount of air quality data.

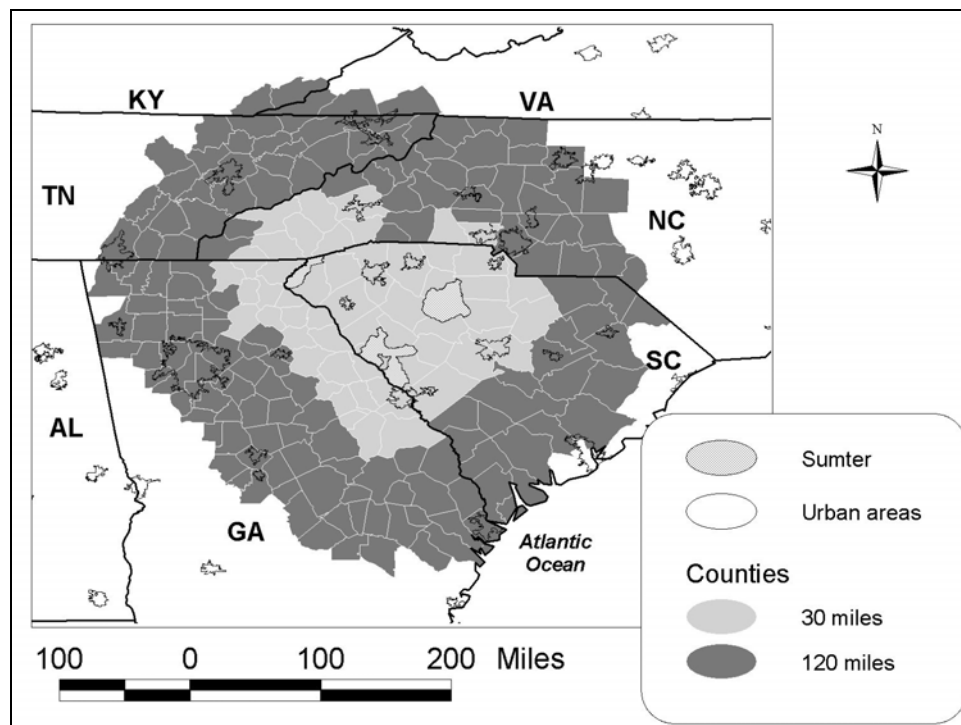


Figure J-1: Counties within 30 and 120 miles from Forest boundary

## DATA SOURCES AND METHODS OF ANALYSIS

This analysis compares numerical emission inventories, air quality monitoring data, meteorological data, and distances between sources and the Forest and Metropolitan Statistical Areas to make informed decisions regarding the current air quality. Air quality on and near the Forest will be assessed in relationship to the National Ambient Air Quality Standards (NAAQS), and in terms of effects on AQRVs. The following is a listing of information used in the analysis:

- Determine the location and extent of nonattainment areas within and adjacent to the analysis area (U.S. EPA, 2002a).
- Used the SAMI 1990 and 2040 emissions inventory for all source categories (SAMI, 2002). Analysis was conducted using both county level and point (individual) sources

and focused on those counties and individual sources that may most affect the Forest, i.e. within 120 miles of the Forest boundary, or conversely the area where activities on the Forest may affect air quality.

- Obtained the location and determined the suitability of ozone, wet and dry acid deposition, and visibility monitoring data within 30 miles (Figure J-2) of Forest (U.S. EPA, 2002b; IMPROVE 2002; and CASTnet, 2002).
- Gather monitored pollutant deposition and ambient pollutant concentration data for multiple years within the analysis area (IMPROVE 2002; and CASTnet, 2002).
- Gathered extrapolated wet sulfate deposition (Lynch and Grimm, 1997) for the Forest.
- Determine present and proposed air quality regulatory initiatives, which affect the status of air quality within the analysis area.

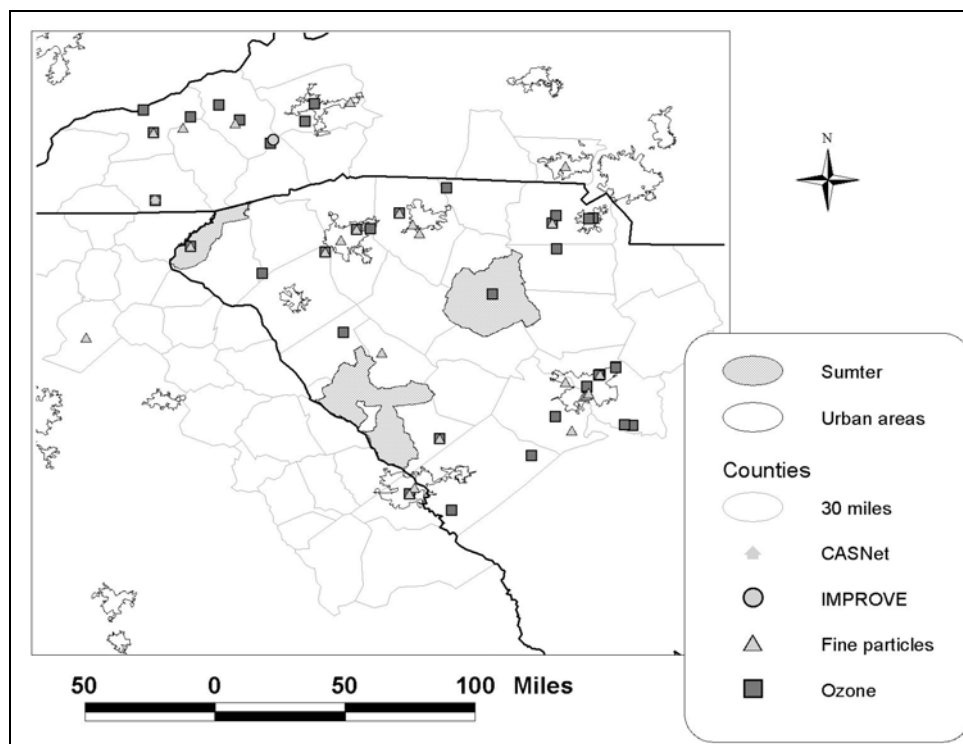


Figure J-2. Location of monitoring sites available to use in the analysis.

The data obtained for this analysis and the professional judgment of the author was used to answer the following questions:

- What were the 1990 primary pollutant emission levels in the analysis area and how much are they predicted to change by the year 2040?
- What is the current ambient air quality within the Forest, and how might air quality impact people who visit the Forest? How might air quality change by 2040 and what impacts will it have on people who visit the Forest and the Forest AQRV?
- How will future legislative and regulatory initiatives affect Forest management options?

## **AIR QUALITY ASSESSMENT**

### **National Ambient Air Quality Standards**

The Clean Air Act established six criteria air pollutants: sulfur dioxide, nitrogen oxides, ozone, particulate matter, carbon monoxide and lead. State, tribal, and local air regulatory agencies measure these pollutants in selected areas to monitor their levels. The National Ambient Air Quality Standards (NAAQS) are the concentration thresholds of these pollutants that indicate unsafe air quality conditions for human health and welfare. Those areas not meeting the NAAQS are designated as nonattainment. An area specific management plans must be written by each air agency having authority once EPA designates an area as nonattainment. These plans must be incorporated into the affected State, Local, or Tribal Implementation Plan. The goal of the Implementation Plan is to bring the affected areas back into attainment with the NAAQS.

For urban areas across the United States that fail to meet the NAAQS, the EPA and air regulatory agency normally classifies an entire “metropolitan statistical area” (MSA) as a nonattainment area. Such a classification is made if at least one air quality monitoring station, within a county that lies within an urban/metropolitan area, registers a specific exceedance for one, or more, of the NAAQS. For example, the entire Atlanta MSA area is classified as nonattainment for ozone, even though maybe not all monitors within the MSA exceed the NAAQS for ozone. Figure J-3 shows the location of the 16 MSAs within 120 miles of the Forest. The Augusta-Aikens MSA contains a portion of the Forest, while the Augusta, Charlotte-Gastonia-Rock Hill, Columbia, Greenville-Spartanburg, and Greenville-Spartanburg-Anderson MSA are adjacent to the Forest. Currently, Atlanta, Georgia is the only MSA classified as nonattainment and occurs within 120 miles of the Sumter National Forest (Figure J-4).



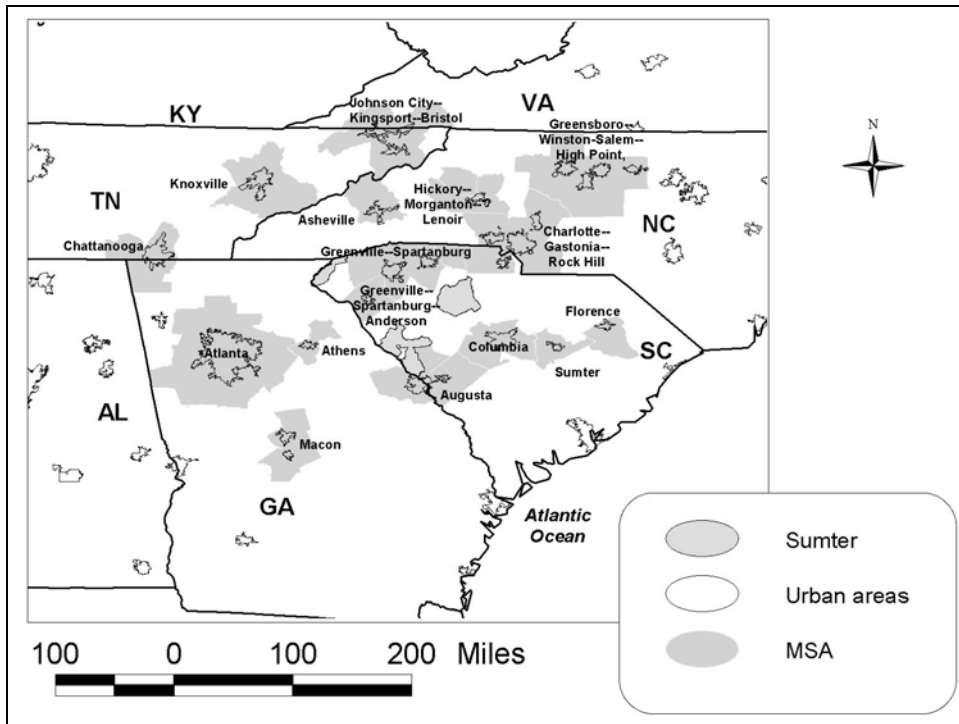


Figure J-3. The 16 Metropolitan Statistical Areas within 120 miles of the Sumter National Forest.

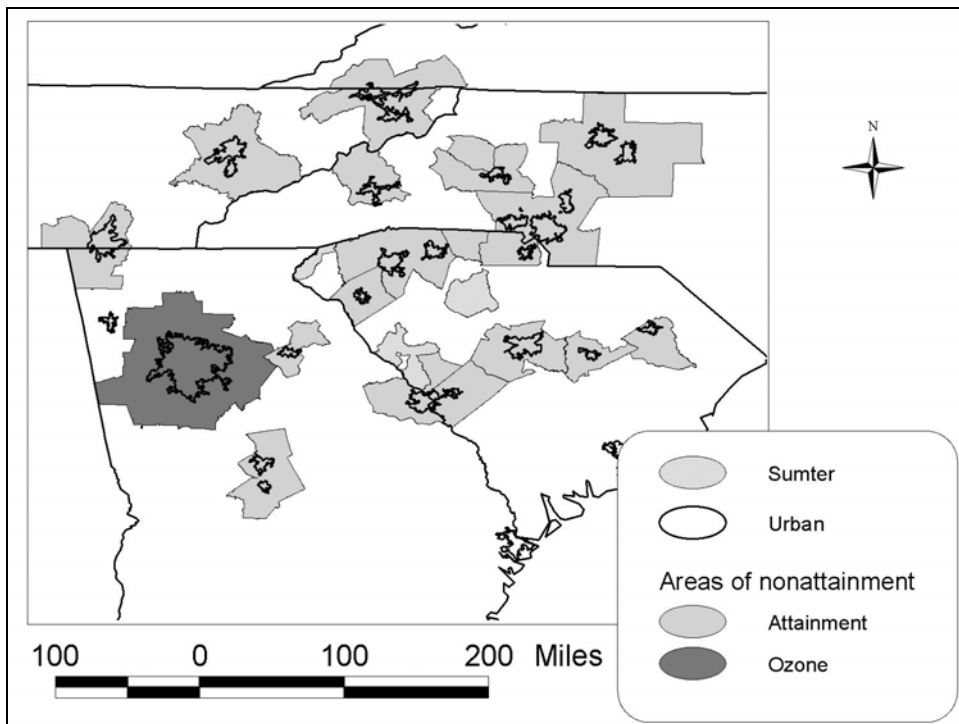


Figure J-4. Nonattainment Areas within 200 km of the Sumter National Forest.

It is important for the Forest to track air quality within and near the Forest boundary because the attainment status of specific areas can affect forest management activities. While automobiles used by Forest personnel, smoke produced from campfires, and other non-regulated combustion sources within the Forest may have an impact on the quality of air within the analysis area; smoke from managed prescribed fire is assumed to be the only Forest management activity to produce significant amounts of emissions. Aside from the nonattainment area already mention (Figure J-4); it is possible that numerous counties and metropolitan areas will be classified as nonattainment for the new ozone (8-hour) standard and PM<sub>2.5</sub> standard within the planning horizon of the Sumter NF Forest Plan Revision. This will be discussed under the appropriate pollutant sections.

## Background and Statistics of the Analysis Area

The Sumter National Forest is found within an area of the United States with an increasing population, which has had an increase demand for the combustion of fossil fuels to produce energy for electricity and transportation (SAMI, 2002). The Forest is within a day's drive of a large percentage of the United State's population and 27 urban areas and numerous towns are near the Forest. Three major cities, Atlanta, Charleston, and Charlotte are among the urban areas about 120 miles from the Forest (Figure J-5). A portion of the Forest, the Andrew Pickens Ranger District, is located within the rugged terrain of the Blue Ridge Province of the Southern Appalachian Mountains; while the other two Districts are within the Piedmont area of South Carolina.

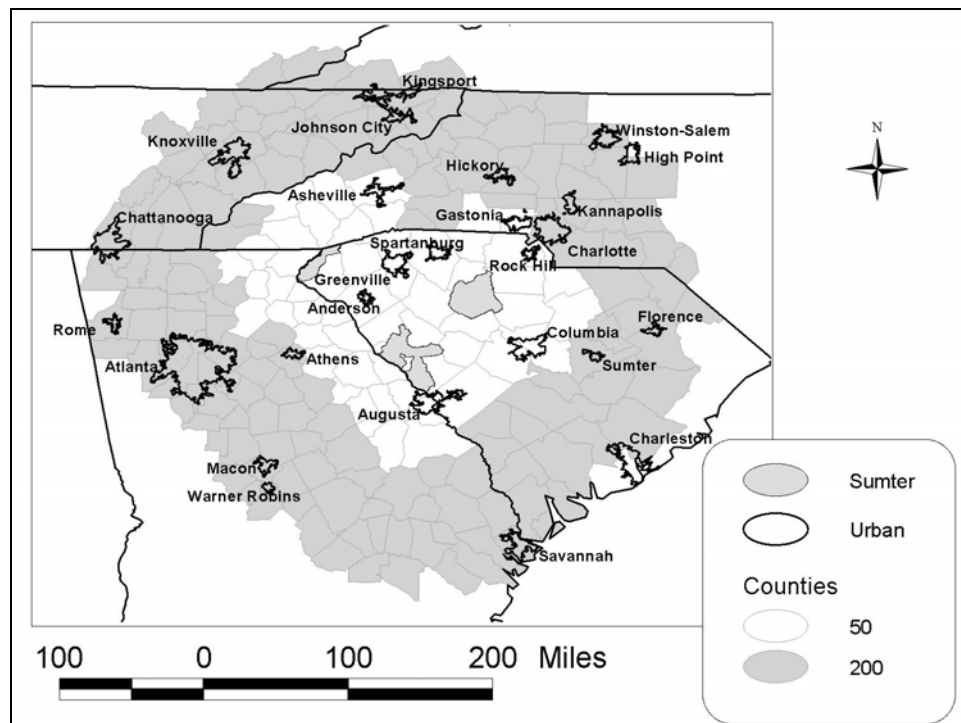


Figure J-5. Location of urban areas near the Sumter National Forest.

The effects of air pollutants on an area are not only related to levels of primary pollutant emissions within the area, but are also related to dominate weather patterns in the region. Weather conditions such as temperature, humidity precipitation and air mass pressure can dictate the formation of secondary pollutants (such as ozone), the pollutant's effects, and pollutant dissipation and dispersion from an area. Primary pollutants emitted in one area can travel to another via moving air masses, and the effects of the pollutants can be observed in an area far from the actual emission source. Similarly, pollutants emitted in an area can become trapped under an inversion layer or a stable high-pressure air mass, causing a build up of pollutants that are unable to dissipate, causing serious health risk in the region. For this reason, it is important not only to consider pollutant emissions when conducting an analysis of air quality in a given area, but also to consider predominant weather patterns. It must be stressed however, that pollutants can be transported from any direction. Therefore, the heaviest deposition or most serious ozone concentration episodes may occur at any time from any direction.

However, the SAMI (2002) analysis has shown that on the most polluted days (during hot summer days with air stagnations) if emissions of sulfur dioxide and nitrogen oxides were reduced in South Carolina the greatest reduction in fine particles and ozone will occur in South Carolina. Also, the reductions in South Carolina would provide some reductions in fine particles and ozone in neighboring states. This finding is similar for each of the states adjacent to South Carolina. In regards to wet acid deposition the largest reductions in South Carolina would occur if there were reductions of the air pollution precursors in Alabama and Georgia (SAMI, 2002).

## **Pollutants Considered**

Due to the complicated nature of air pollutant formation and transport, it is often difficult to discuss air quality issues in a simple format. The air quality in any region is impacted by exhaust from mobile sources such as automobiles, trucks, and aircraft; emissions from various point source industrial processes such as coal-fired power plants; dust from roads; biogenic emissions from natural processes such as wildfires and plant growth; as well as numerous other types of emission sources. While primary pollutant emissions can give an indication of the status of air quality, these primary pollutants can undergo reactions in the atmosphere to produce secondary pollutants. Often the secondary pollutants have the greatest impact on the AQRV of the Forest and impact the health of visitors to the Forest.

In attempt to present the information in a logical sequence the primary pollutants and their sources are discussed first in the *Primary Pollutants section*. Information on monitoring results for PM<sub>2.5</sub> is presented in this section as well. The secondary pollutants formed from the primary pollutants are mentioned in the primary pollutant discussion, but are not discussed in detail there. The *Secondary Pollutant* section contains a more detailed discussion of secondary pollutant formation and effects, as well as monitoring information.

Regional climate change resulting from emissions of carbon dioxide and other greenhouse gases is not discussed in this analysis. It is recognized that resources in the Forest could be susceptible

to climate change, as well as be an important source of removing carbon dioxide from the atmosphere. However, uncertainty concerning the nature of regional climatic changes and global aspects of the phenomenon place this issue outside the scope of the analysis.

## **Primary Pollutants**

Three primary pollutants were selected to be incorporated into this report. They represent three of the six “Criteria Pollutants” recognized by the EPA (U.S. EPA, 1995).

- Nitrogen oxides
- Sulfur dioxide
- Particulate matter, 2.5 microns and smaller (PM<sub>2.5</sub>)

The first two of these pollutants are precursors that form secondary pollutants suspected of having the most profound effects on the resources of the Forest and the Class I areas. These effects include visibility reductions and impacts to vegetation and aquatic ecosystems. Subsequent information presented on the primary pollutants includes the location and intensity of emissions relative to the Forest, as well as probable future trends. In this report, the secondary pollutants discussed are those most likely to affect Forest resources.

## **Nitrogen Oxides**

More than 95 percent of nitrogen oxide emissions are in the form of nitric oxide. In the presence of volatile organic compounds, warm temperatures, and sunlight, nitrogen oxides are rapidly converted in the atmosphere to ozone. Available evidence suggests that nitrogen oxides are a controlling factor in the formation of ground-level ozone in rural areas of the Southern United States (Chameides and Cowling, 1995). When trapped in sufficient quantities, nitrogen dioxide can be seen as a brownish haze. Secondary pollutants formed from nitrogen oxides also reduce visibility and contribute to acid deposition.

The counties containing the largest urban areas have the greatest emissions of nitrogen oxides from highway vehicles (Figure J-6) because of: 1) the large number of vehicles driven by people in these areas, 2) people are driving more miles each year since they live further from the location of their work, and 3) recently there has been an increase in purchase of vehicle types that have greater emissions than passenger vehicles and light duty trucks (SAMI, 2002). Examining the 1990 estimates for total nitrogen oxide emission there are other counties with large annual emissions because of large point sources (Figure J-7). Most of these point sources are coal-fired electrical generating units, but there are a few industrial sources (such as Tennessee Eastman Company near Kingsport, Tennessee) that also release large amounts of nitrogen oxides annually. Coal-fired power plants comprise 29 percent of the total nitrogen oxides within 120 miles of the Forest, whereas nitrogen oxide emissions from highway vehicles are greater (38 percent).

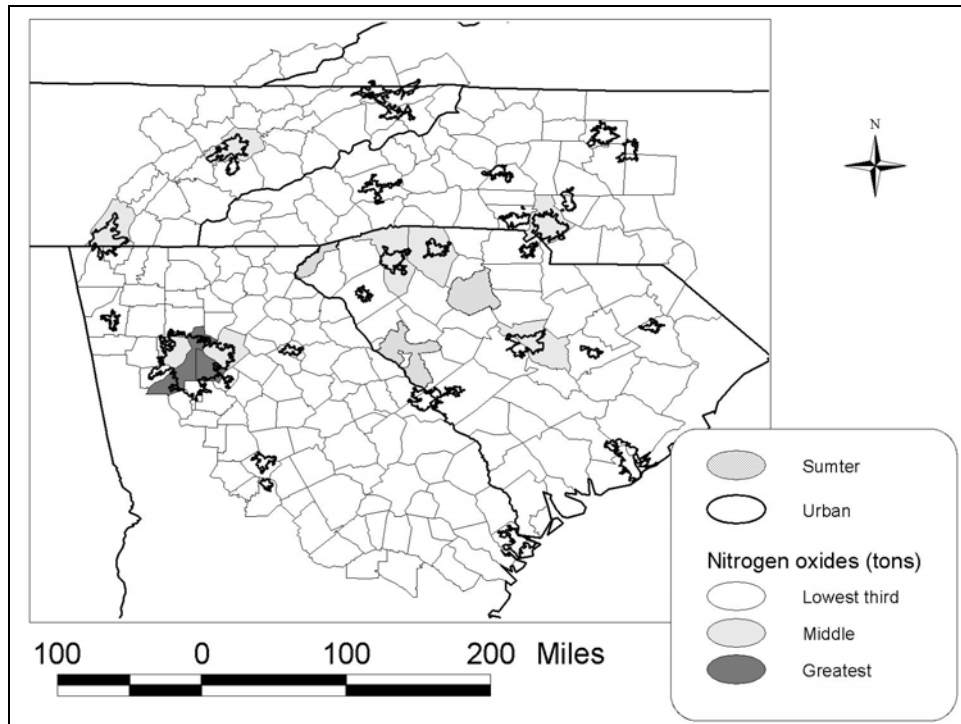


Figure J-6. Counties with the greatest emissions of nitrogen oxides (tons) from highway vehicles using a 1990 emissions inventory (SAMI, 2002)

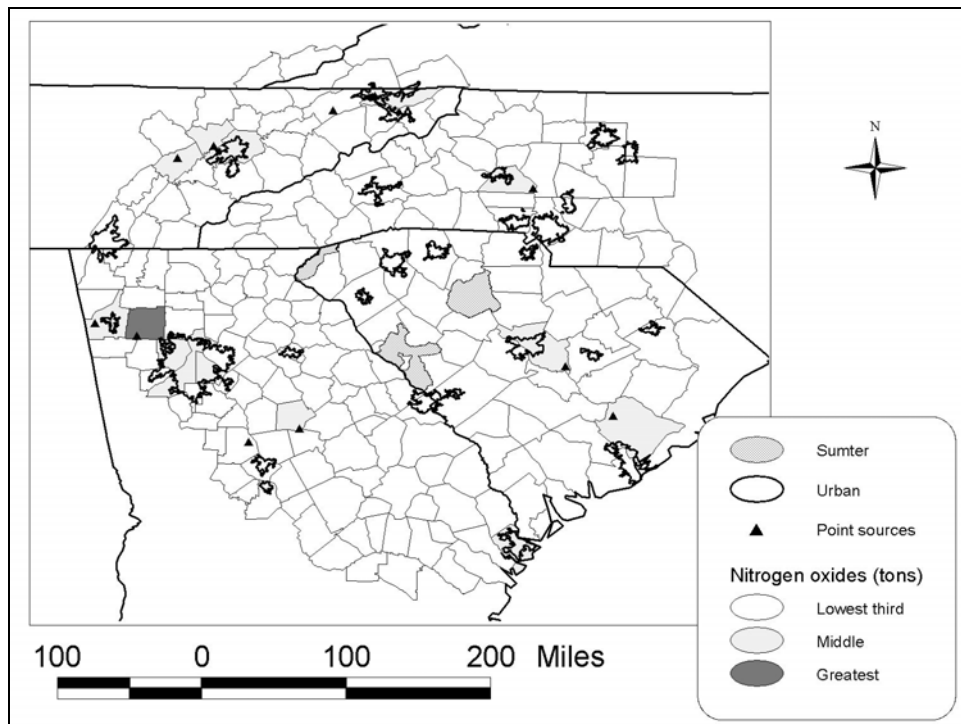


Figure J-7. Total nitrogen oxide emission (tons) in 1990 and location of point sources of nitrogen oxides greater than or equal to 10,000 tons per year (SAMI, 2002).

Though the population and energy demands are likely to increase in the future (SAMI, 2002) the emissions of nitrogen oxides are expected to decrease in many counties by the year 2040 (Figure J-8). Total nitrogen oxide emissions are predicted to decrease by 34 percent by 2040 in comparison to the 1990 emission estimates. The largest decreases will occur in those counties with coal-fired electrical utilities where pollution control devices were mandated by the Environmental Protection Agencies nitrogen oxide State Plan Implementation Rule. By 2040 the use of lower emission vehicles and reformulated gasoline (also called low-sulfur fuel) will also reduce nitrogen oxides from mobile sources. The SAMI results do not include all of the nitrogen oxides reductions currently planned by the Tennessee Valley Authority, or the implementation of North Carolina's Clean Smoke Stacks Bill (S 1078). The North Carolina legislation will reduce nitrogen oxides from coal-fired electrical utilities by about 70 percent from 1995 levels. There is also likely to be further decreases in future nitrogen oxide emissions as the eight states near the Forest implement pollution control strategies to meet the new 8-hour ozone standard.

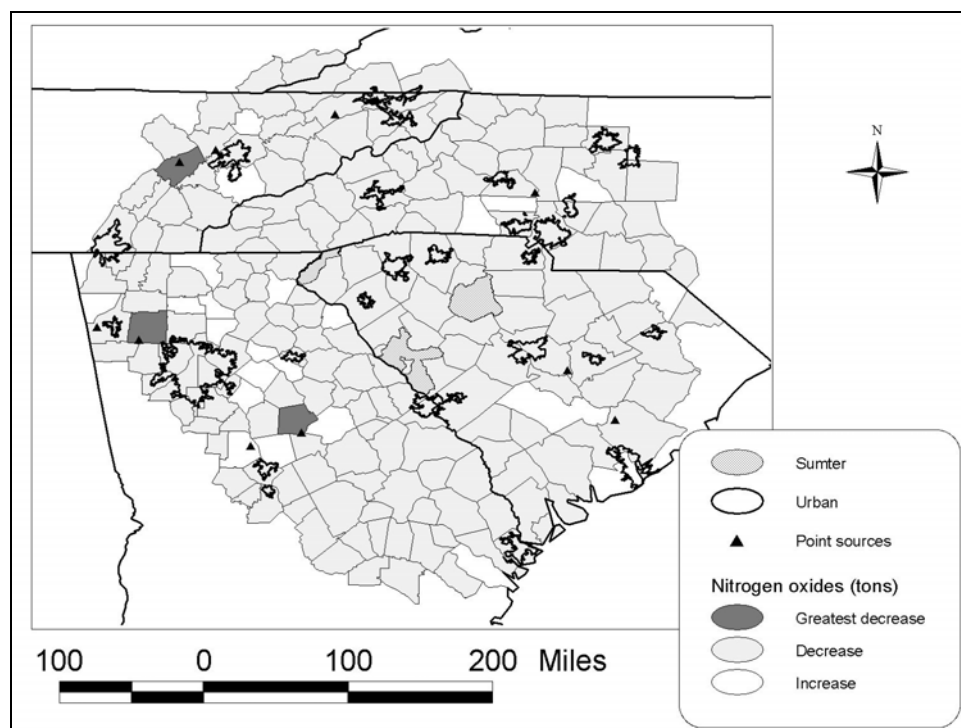


Figure J-8. Changes in total nitrogen oxide emission (tons) in 2040 and location of point sources of nitrogen oxides greater than or equal to 10,000 tons in 1990 (SAMI, 2002).

## **Sulfur Dioxide**

Sulfur dioxide is an important pollutant that can be transformed into fine particles that obscure visibility and impact human health, and is the main contributor to acidification of soils and streams in the southeastern United States.

Coal-fired electrical utilities are the largest source of sulfur dioxide emissions (75 percent) near the Forest. The most important coal-fired electrical units impacting the Forest include those operated by South Carolina Electric and Gas and units to the southwest operated by Southern

Companies (Figure J-9). Most of the coal-fired electrical facilities were built before 1980 (and therefore are “grandfathered” under the Clean Air Act Amendments) and do not have to reduce emissions unless there is a major modification at the facility, or the company plans to make reduction to fulfill the Title IV requirements of the 1990 Clean Air Act Amendments, or implementation of the Regional Haze Rules dictates reductions of sulfur dioxide emissions in order to improve visibility in the Class I areas. The results from the SAMI analysis indicate that by 2040 many of the large sulfur dioxide sources near the Forest will reduce emissions by about 60 percent. The largest emissions will continue to be emitted from facilities to the southwest of the Forest (Figure J-10). Further reductions in North Carolina are expected, in comparison to Figure J-10, since the SAMI results do not include the sulfur dioxide emissions anticipated under the Clean Smoke Stakes Bill (S 1078).

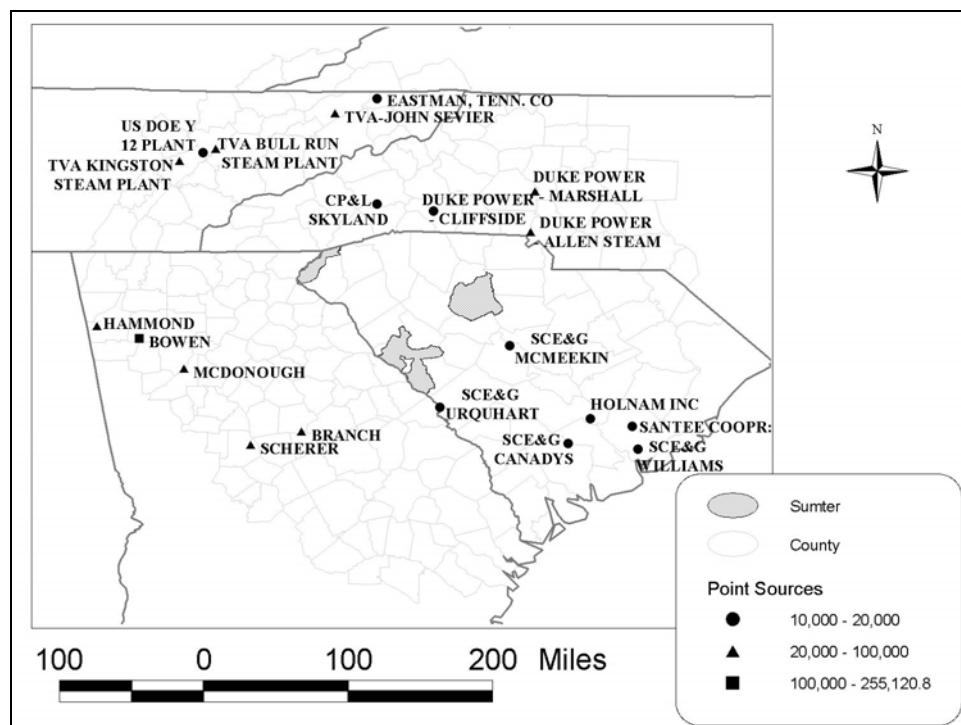
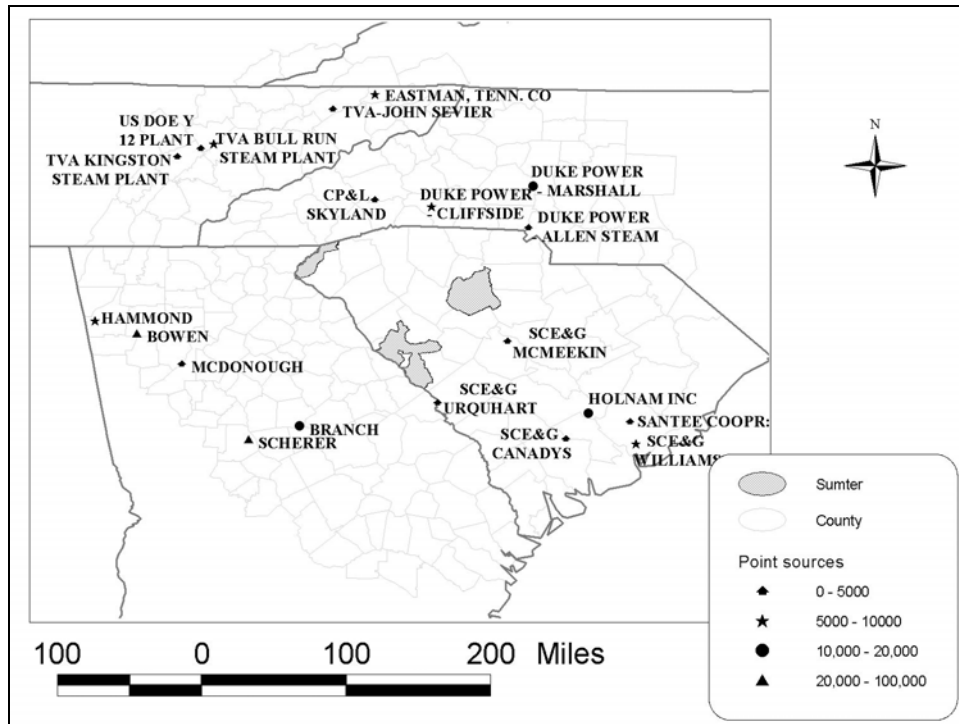


Figure 9. Location sulfur dioxide sources emitting greater than or equal to 10,000 tons in 1990 (SAMI, 2002).



**Figure J-10. Reduction in sulfur dioxide emission estimates (tons) for the year 2040 for sources with 10,000 tons or more of sulfur dioxide emission in 1990 (SAMI, 2002).**

### **Particulate Matter (PM<sub>2.5</sub>)**

Particulate matter (PM) is the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large or dark enough to be seen as soot or smoke. Others are so small they can be detected only with an electron microscope. PM<sub>2.5</sub> describes the "fine" particles that are less than or equal to 2.5 micrometers in diameter. "Coarse" particles refer to particles greater than 2.5, but less than or equal to 10 micrometers in diameter. PM<sub>10</sub> refers to all particles less than or equal to 10 micrometers in diameter. Particulate matter can result from primary emissions, and secondary atmospheric formation. "Primary" particles, such as dust from roads or elemental carbon (soot) from wood combustion, are emitted directly into the atmosphere. "Secondary" particles are formed in the atmosphere from primary gaseous emissions. Examples include sulfates, formed from sulfur dioxide emissions from power plants and industrial facilities; and nitrates, formed from nitrogen oxides emissions from power plants, automobiles and other types of combustion sources. The chemical composition of particles depends on location, time of year, and weather. Generally, measured fine particulate is composed mostly of secondary particles, and coarse particulate is composed largely of primary particles. This section will focus on primary particulate emissions; the formation of secondary particulates will be discussed under secondary pollutants. This section will also examine estimates of the amount of fine particulates measured in the atmosphere, which is a combination of both the primary and secondary particulates.



Primary fine particles come from many different sources, including industrial and residential combustion, coal-fired power plants, vehicle exhaust, and agriculture and forestry burning. Due to the wide range of fine particle sources, their compositions vary widely. Figure J-11 below shows the total primary, solid PM<sub>2.5</sub> emissions from all sources. The counties with the largest emissions (tons) in 1990 (SAMI, 2002) occur near the larger urban areas. It should be noted that there are large uncertainties when estimating primary particulate emissions (SAMI, 2002).

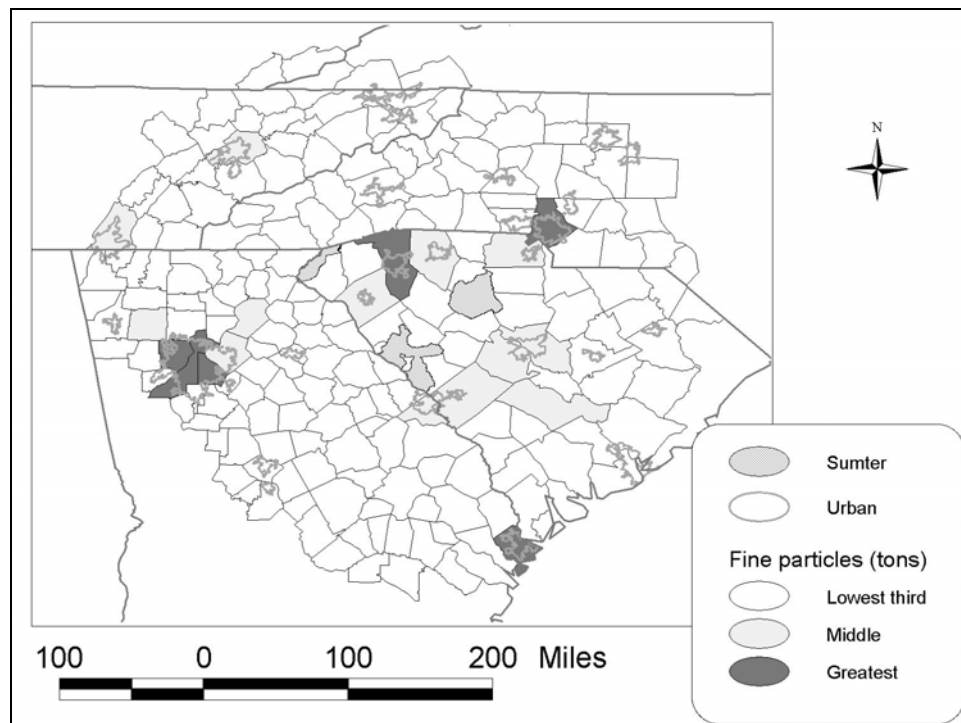


Figure J-11. Total fine particulate (PM<sub>2.5</sub>) emissions (tons) in 1990 (SAMI, 2002).

Collectively, fine particles can lead to deterioration of visibility in the National Forest and Class I areas, and are associated with significant respiratory and cardiovascular-related problems (U.S. EPA, 2000b). When inhaled, particles can accumulate in the respiratory system and are associated with numerous adverse health effects. Exposure to coarse particles is primarily associated with the aggravation of respiratory conditions, such as asthma. Fine particles are closely associated with increased hospital admissions and emergency room visits for heart and lung disease, increased respiratory disease and symptoms such as asthma, decreased lung function, and even premature death. Sensitive groups are at greater risk and include the elderly; individuals with cardiopulmonary disease, such as asthma; and children. For this reason, fine particle levels are monitored, and NAAQS have been set for this pollutant.

Both annual and 24-hour PM<sub>2.5</sub> and PM<sub>10</sub> NAAQS have been established. For PM<sub>2.5</sub>, the 3-year average for the annual arithmetic mean for all 24-hour sampling periods can be no more than 15 micrograms per cubic meter (ug/m<sup>3</sup>), or the 3-year average of the annual 24-hour sampling period 98<sup>th</sup> percentile can be no more than 65 ug/m<sup>3</sup>. Table J-1 indicates the annual average PM<sub>2.5</sub> is close to exceeding the NAAQS at the three monitoring sites closest to the Forest, while the 24-

hour average (please note the maximum values are presented and not the 98<sup>th</sup> percentile) NAAQS is unlikely to be exceeded when the data are averaged for three years. It should be noted there is a long monitoring record for PM<sub>10</sub>, and the NAAQS has not been violated in the past at sites near the Forest.

*Table J-1. Monitoring results for particulate matter 2.5 microns (PM<sub>2.5</sub>) and smaller in size for the year 1999 through 2001\*.*

<b>Location (County)</b>	<b>Site ID</b>	<b>1999 Maximum 24-hour (ug/m<sup>3</sup>)</b>	<b>1999 Annual Average (ug/m<sup>3</sup>)</b>	<b>2000 Maximum 24-hour (ug/m<sup>3</sup>)</b>	<b>2000 Annual Average (ug/m<sup>3</sup>)</b>	<b>2001 Maximum 24-hour (ug/m<sup>3</sup>)</b>	<b>2001 Annual Average (ug/m<sup>3</sup>)</b>
Edgefield	450370001	36.3	15.13	31.5	14.78	31.6	13.01
Greenwood	450470003	36.0	15.71	34.5	15.51	31.4	13.97
Oconee	450730001	33.9	13.42	32.7	12.63	42.7	11.82

\* The National Ambient Air Quality Standard is violated if the average of 3-years of annual means is 15 ug/m<sup>3</sup> or greater (multiple community oriented monitors can be averaged together), or the 3-year average of the 24-hour concentration for the 98th percentile (using the maximum population oriented monitor in an area) is the 65 ug/m<sup>3</sup> or greater.

If any portion of the Forest is designated nonattainment in the future then a State Implementation Plan is developed in attempt to bring the area back into attainment of the standard. This usually involves placing controls on various PM<sub>2.5</sub> sources to lessen or minimize their PM<sub>2.5</sub> emissions. The Forest will need to interact with the South Carolina Department of Health and Environmental Conservation to ensure that Forest prescribed fire emissions (and perhaps other Forest activities) are considered in the State Implementation Plan development, since 70 percent of the emissions from prescribed fires are fine particles.

It is of particular importance for fire managers to mitigate prescribed fire emissions, to the greatest extent practical, during those days characterized by existing or predicted high ambient particulate loads. Federal land managers utilizing prescribed fires are most interested in the 24-hour NAAQS, due to the short-term nature of prescribed fire. While prescribed fire emissions rarely affect the PM<sub>10</sub> NAAQS (150 ug/m<sup>3</sup>), it is more likely that fire emissions could affect the lower PM<sub>2.5</sub> standard of 65 ug/m<sup>3</sup>. The PM<sub>2.5</sub> standard may require fire managers to be even more vigilant to protect the health and welfare of citizens on and off Forest lands from the effects of PM emissions associated with prescribed fire.

## Secondary Pollutants

Three broad classes of secondary pollutants are considered in this report because they are most likely to have the greatest impact on the Forest AQRV:

- Sulfur and nitrogen deposition as they contribute to acid deposition,

- Ozone (O<sub>3</sub>) and its effects on vegetation,
- Fine particulate (PM<sub>2.5</sub>) and its effect on visibility (regional haze).

Primary pollutants emitted from stationary and mobile sources undergo transformations in the atmosphere and are converted to secondary air pollutants (CIRA 1999). Sulfates and nitrates are “the main contributors” to regional haze and contribute to acid deposition. These secondary pollutants can be transported hundreds of miles. However, based on numerous Agency sanctioned modeling studies, those pollution sources within 120 miles of any given area appear to have the most significant impact on that area’s resources.

### **Acid deposition - sulfur and nitrogen deposition**

The secondary pollutants forming sulfur and nitrogen compounds are of great importance due to their combined contribution to acid deposition and regional haze. Acid deposition refers to acid compounds that are deposited from the atmosphere in the rain, cloud, snow, fog, or dry deposition (seen as visibility impairment). Typically, elevations above 2624 feet (800 meters) elevations have the greatest deposition because of these areas receive frequent high concentrations of acid compounds from cloud cover (NAPAP, 1991). Only small portions of the Andrew Pickens Ranger District have land above 2624 feet elevation that could be impacted from cloud deposition.

Healthy forest ecosystems have the ability to recycle the nutrients, so losses are minimal. For example, calcium is an essential element for the formation of cell walls. Each year there are leaves, as well as some branches and dead trees that fall to the ground. Microbial and other biological activity break down the dead tissue and release a portion of the calcium into the soil. The calcium has a positive charge and can attach to the negatively charged soil particles. The vegetation can once again use the calcium when it absorbed through the fine roots. However, some calcium is released into the soil water solution and carried into the stream where it can be used by the aquatic biota for growth (especially internal or external skeletal growth). Calcium and other base cations are replaced in the soils as there are released from weathered rocks, or deposited from windblown soil.

Throughout the Forest there are many soils which have developed from rocks that are low in base cations and have a high or moderate sensitivity to acid deposition. Current deposition of sulfur and nitrogen compounds is having some impact to the AQRV of the Forest. Sulfur compounds in particular are of concern because adverse impacts are occurring to some high elevation ecosystems in the southeastern United States because the amount of sulfur in the soil has been increasing since the soils have the ability to retain the sulfur. Sulfur in rainfall is deposited as sulfuric acid (H<sub>2</sub>SO<sub>4</sub>). As the sulfuric acid moves through the soil it will disassociate into two hydrogen ions (which can reduce the pH of the soil) and a negatively charged sulfate particle. Once the sulfate particle is in soil solution it will maintain an ionic balance by attaching to an equivalent amount of positively charged base cations. The long-term impact of excessive sulfur deposition is a depletion of base cations essential for vegetation growth, as well as the inability of headwater streams to buffer the inputs of acid compounds. For streams system this buffering capacity is measured as the acid neutralizing capacity, or ANC. Typically, it is desirable to have streams systems with an ANC value of 50 micro-equivalents per

liter or greater in order to protect the aquatic biotic found in cold mountain streams from the unhealthy impacts of episodic acidification.

Rainfall with little to no air pollution from the combustion of fossil fuels is naturally acid with a pH of about 5.6. Forested ecosystems, especially conifer types, do naturally acidify soils at a slow rate from biological processes and the naturally acidic rainfall. However, the excessive amounts of acid deposition have accelerated the rate of soil acidification. As was mentioned previously, there are two hydrogen ions released when sulfuric acid comes in contact with the soil. As the hydrogen ion concentration of the soil increases then the pH of the soil will decrease. If the soil pH drops below 4.5 then aluminum, an abundant element normally bound in the soil, will become released. High concentrations of aluminum can interfere with the uptake of base cations needed by the vegetation for growth. Also, at high concentration it can kill the fine roots, which leads to less area for water and nutrient uptake, which is essential for good health. Aluminum can also become mobilized and released into the soil water solution and reach high concentration in some streams. Toxic levels of aluminum can kill fish and other aquatic organisms needed for a healthy and biological diverse aquatic ecosystem.

Nitrogen deposition for many ecosystems (especially lower elevations) is beneficial since nitrogen availability is usually a limiting factor for vegetation growth. The nitrogen deposited can be in the form of ammonia ( $\text{NH}_3$ ), nitric acid ( $\text{HNO}_3$ ) and/or nitrate ( $\text{NO}_3$ ). High elevation ecosystems that have cooler temperatures, lower microbial activity, and thin soil with low base cation availability can be sensitive to nitrogen deposition, such as is found with some spruce-fir ecosystems (which do not occur on the Forest). Too much deposition of nitrogen compounds can remove base cations needed for biological growth, as well as interfere with winter “hardening off” with red spruce trees.

### ***Data and Analysis***

Current, wet and dry deposition of total sulfur and nitrogen has been estimated at a CASNet monitoring site near the Forest. The site is at the Coweeta Hydrologic Laboratory (1770 feet elevation, source: <http://www.epa.gov/castnet/sites/cow137.html>) and is about 20 miles northwest of the Andrew Pickens Ranger District (see Figure J-2). Another data set to estimate wet sulfate deposition was also used. Researchers have used data collected throughout the region from wet deposition monitors, rainfall data, and elevation to predict wet sulfate deposition across the landscape (Lynch and Grimm, 1997). Water samples were also collected in the years 2000 and 2002 at 10 randomly selected streams above 1500 feet elevation on the Andrew Pickens Ranger District (Figure J-12). The areas were selected because it was believed the forest soils and streams would have the greatest risk of adverse impacts from acid deposition. The water from each of the 10 streams was sent to a water chemistry lab that performed an analysis to determine the stream ANC.

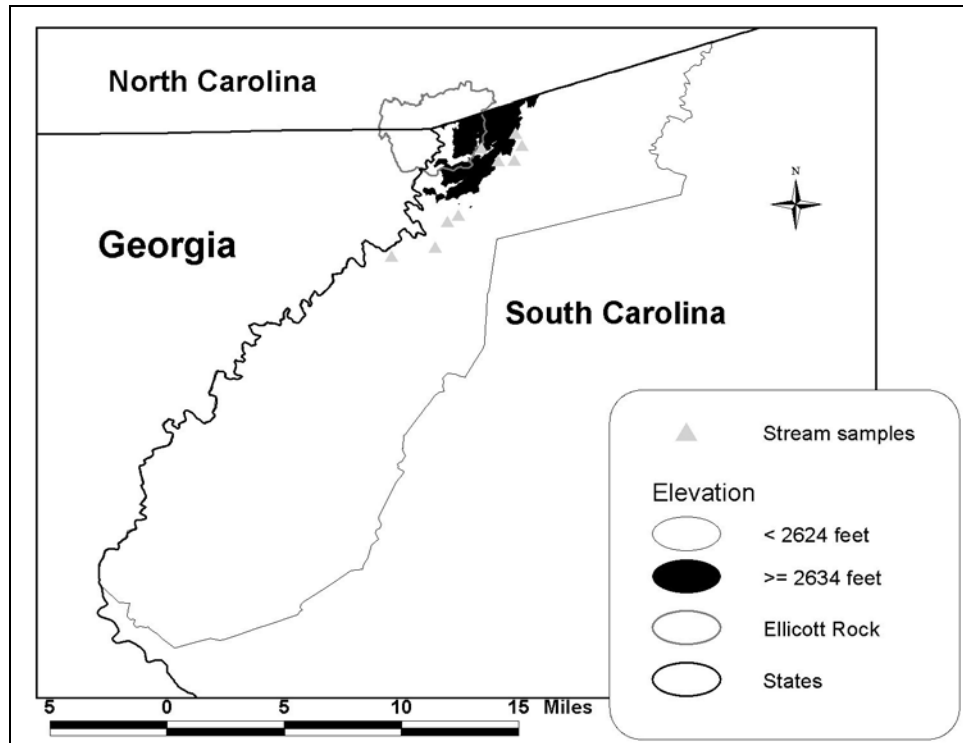


Figure J-12. Locations of stream samples taken on the Andrew Pickens Ranger District and location of areas that could be impacted by deposition of acid compounds, including clouds [greater than or equal to ( $\geq$ ) 2634 feet].

### ***Current and Future Deposition***

The range in total nitrogen annual deposition at the Coweeta site is between 4.7 and 6.6 kilograms per hectare per year examining data between the year 1990 and 2000. Deposition of nitrogen compounds (nitrates and ammonia) is likely to be greater at elevations above 2624 feet elevation due to the deposition from clouds. Some scientists have estimated acid deposition from clouds can be twice the levels of wet plus dry deposition. If this assumption is true then elevations above 2624 feet elevation on the Andrew Pickens Ranger District (Figure J-12) could be receiving a total of 9.4 to 13.2 kilograms per hectare of nitrogen deposition. Measurements from a high elevation site known to be suffering from nitrogen saturation (Noland Divide, approximately 4350 feet elevation) in the Great Smoky Mountains National Park had an average total (wet plus dry plus clouds) nitrogen deposition of 32 kilograms per hectare per year (SAMI, 2002), which is far greater than the estimates for the highest elevations of the Andrew Pickens Ranger District.

Deposition of sulfur compounds can be as sulfur dioxide ( $\text{SO}_2$ ), or wet or dry sulfates ( $\text{SO}_4^{2-}$ ). The annual sulfur deposition at the Coweeta site is estimated to be between 5.3 and 9.1 kilograms per hectare and about 85 percent of the sulfur deposition is deposited as wet deposition. The results of a statistical modeling technique (Lynch and Grimm, 1997) provide estimates of the 1983 through 1999 average wet sulfur deposition. Adjusting for the portion that could be dry deposition then the lower elevation sites on the Andrew Pickens Ranger District had an average total sulfur deposition of 8.2 (range: 5.6 to 12.7) kilograms per hectare per year;

while the Enoree and Long Cane Ranger Districts had an average total of 6.1 (range 5.3 to 6.8) kilograms per hectare per year. At the higher elevation on the Andrew Pickens Ranger District the average total sulfur deposition (including cloud deposition) is estimated to be 22.0 (11.8 to 25.7) kilograms per hectare per year. The Great Smoky Mountains National Park is estimated to have a total sulfur deposition of 43 kilograms per hectare (SAMI, 2002), which is far greater than the highest estimates for the Sumter National Forest.

Water sample collected at all 10 sites in the year 2000 had water quality (ANC range: 59.8 to 113.1 micro-equivalents per liter) classified that brook trout could be supported, but may be sensitive to episodic acidification in the future (Bulger et al., 1995). In the year 2002, nine of the streams remained in the same category, but one of the streams was classified as the brook trout being potentially sensitive to chronic and episodic acidification (Bulger et al., 1995). Continued sampling of streams should be conducted periodically on the Andrew Pickens Ranger District to see if the ANC values fall to levels that could adversely impact the aquatic biota.

Review of the seasonal nitrate and sulfate deposition demonstrates the spring and summer seasons produce higher deposition in the southeastern United States. The trend in sulfate over the last ten years shows a general decrease in the levels of deposition. This decline in sulfur deposition at monitoring sites is consistent with the decreases in utility sulfur dioxide emissions brought about by Title IV of the Acid Rain Program incorporated into the 1990 Amendments to the Clean Air Act. The trend for nitrate deposition shows a fairly constant rate of deposition at sites in the southeastern United States (U.S. EPA, 1999). Implementation of the EPA mandated Nitrogen Oxide State Implementation Plan (also known as the “NO<sub>x</sub> SIP Call”), it is expected to decrease nitrogen oxide emissions from coal-fired power plants and nitrogen deposition reductions are anticipated in the year 2007.

The sulfur and nitrogen reductions currently being implemented will benefit the Forest aquatic ecosystems. Figure J-13 shows the results from the SAMI (2002) analysis for the stream closest (about 11 miles northwest) to the Andrew Pickens Ranger District. If our society had not made significant emissions reductions in the precursors to acid deposition then the rate of ANC depletion would have been greater between the years 1995 and 2100 than the current predicted trends. However, the future trend in ANC is likely to continue to decrease in the future for the streams on the Forest (Figure J-13).

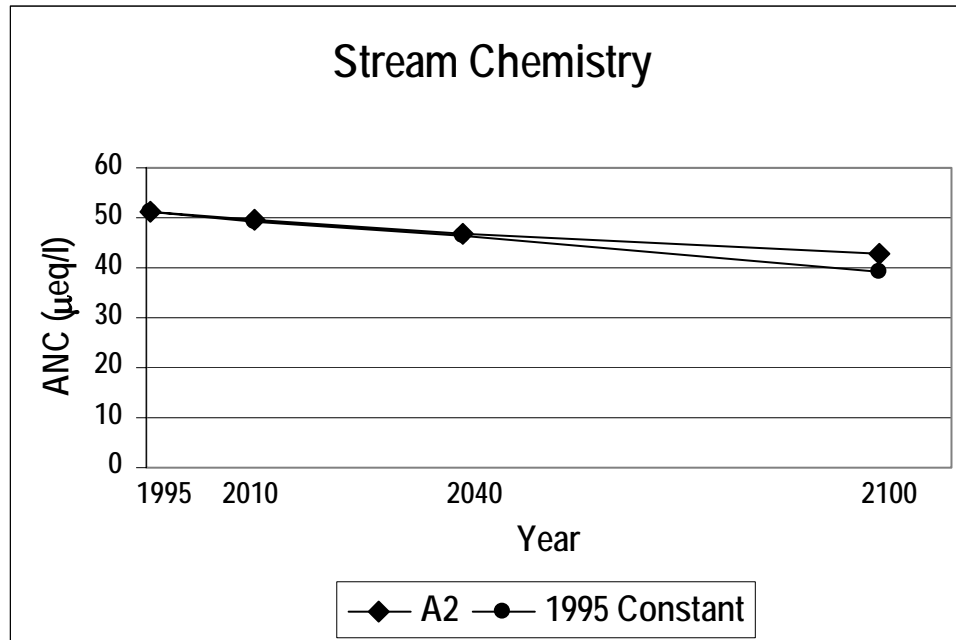


Figure J-13. Predicted trend acid neutralizing capacity (ANC) with implement-tation of current laws, rules, and regulations (A2) and if the Title IV rules of the Clean Air Act had not been implemented in 1990 (1995 Constant). The stream is identified as 2A07834 from the National Stream Survey (SAMI, 2002).

Numerous studies and assessments have shown headwater streams in the Southern Appalachian Mountains are being affected by historic and current levels of acid deposition (Webb et al., 1994; Bulger et al., 1998; and SAMI, 2002). These studies also show significant reductions in acid deposition, beyond those already scheduled by the Title IV Clean Air Act Amendments of 1990, will be necessary to maintain the current water chemistry let alone improve ANC in those streams already showing signs of acidification. A major reason for this apparent lack of response is because of the high levels of sulfates retained by soils at the high elevations. Most likely, it will take hundreds of years for the stream ANC to recover in many aquatic systems, unless mitigation with appropriate fertilizers high in base cations is applied to the watersheds.

## Ozone

Ground-level ozone is a naturally occurring compound found in the atmosphere. In the upper atmosphere the ozone protects us from the sun's ultraviolet radiation. The production of ozone occurs when nitrogen oxides and volatile organic compounds (trees are the major emission source) go through a chemical reaction on warm sunny days. The highest ozone concentrations in South Carolina occur between April and October when atmospheric conditions are conducive for ozone formation. The ozone molecule is composed of three oxygen molecules ( $O_3$ ), and is less stable than the oxygen we breathe ( $O_2$ ). The unstable ozone molecule reacts with the tissues inside a human lung and can be a serious health problem for the elderly, children with developing lungs and any other person with lung disease, such as asthma. People involved in vigorous outdoor activities, such as hikers and Forest Service employees doing field work, can also have unhealthy impacts from high ozone exposures. .

Ozone concentrations vary across the landscape. The greatest concentrations are typically found in large metropolitan areas, like Atlanta, where ozone can be at levels that are unhealthy for people (see Figure J-4). At rural low elevation sites the ozone exposures will be less than large urban areas. Figure J-14 shows a typical urban pattern found at the Edgefield County site (about 581 feet elevation) and the average ozone exposures for each hour begins to increase about 7:00 A.M. and the maximums occur in the afternoon between 12:00 and 5:00 P.M. Ozone concentrations build during the daylight hours as the temperature and solar radiation increases. During this same time period the nitrogen oxide emissions increase from vehicles as people go to work and conduct other daily activities; and coal-fired power plants increase electrical generation to meet the increased demand to cool businesses and people's homes on hot days. Another increase in nitrogen oxide emissions occurs in the early evening as people return to their homes for the night. However, the nitrogen oxides released in the evening and at night will react with (i.e. remove) the ozone and decrease the ozone concentration into the early morning hours. Ozone is not formed during the night because the temperatures decrease and there is no sunlight to initiate the chemical reactions. Conversely, in the early evening and nighttime the nitrogen oxides are not released in large quantities at the high elevations (such as the Oconee County site, about 2158 feet elevation) so there is not a decrease in ozone during the night and into the early morning hours (Figure J-14). Actually, the highest ozone exposures at high elevations typically occur between 10:00 P.M. and 3:00 A.M. since ozone produced downwind of urban areas and coal-fired power plants are transported to the rural high elevation sites. Consequently, vegetation at the higher elevations of the Andrew Pickens Ranger District is exposed to more ozone during the growing season than vegetation growing elsewhere on the Forest.

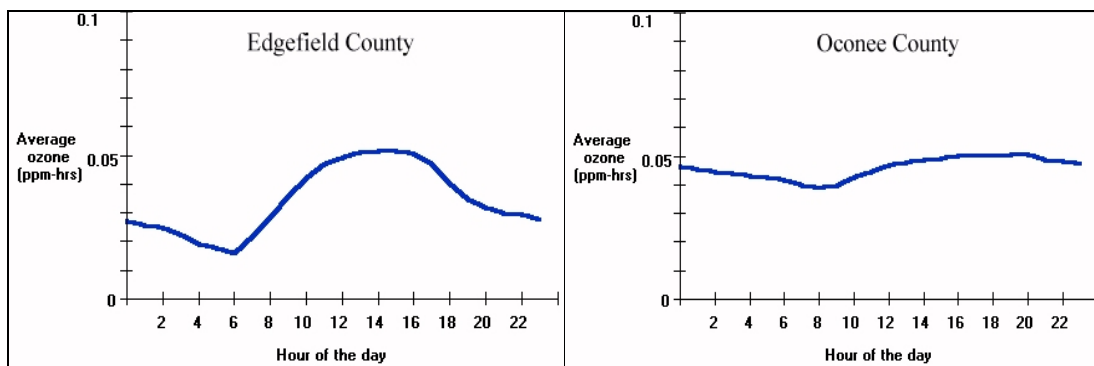


Figure J-14. Average ozone exposure for each hour of the day during April through October 1998. The monitoring site at Oconee County shows the high elevations are receiving greater ozone exposures than the lower elevation (Edgefield County) portions of the Forest.

### **Data and Analysis**

There is an abundance of ozone monitoring sites within 30 miles of the Forest, especially in the urban areas (see Figure J-2). Twenty-one of the 36 ozone sites were chosen to be included in the analysis (Figure J-15) because ozone data was available for the years 1998 through 2000. The ozone data were obtained from the Forest Service Natural Resource Information System (NRIS)



website and SAMI (SAMI, 2002), and the data analysis was accomplished using the Ozone Calculator. The NRIS data and the Ozone Calculator software can be found at:

1. Data: [http://webcam.srs.fs.fed.us/calculator/US/us\\_regions.htm](http://webcam.srs.fs.fed.us/calculator/US/us_regions.htm)
2. Software: [http://webcam.srs.fs.fed.us/calculator/technical\\_support.htm](http://webcam.srs.fs.fed.us/calculator/technical_support.htm)

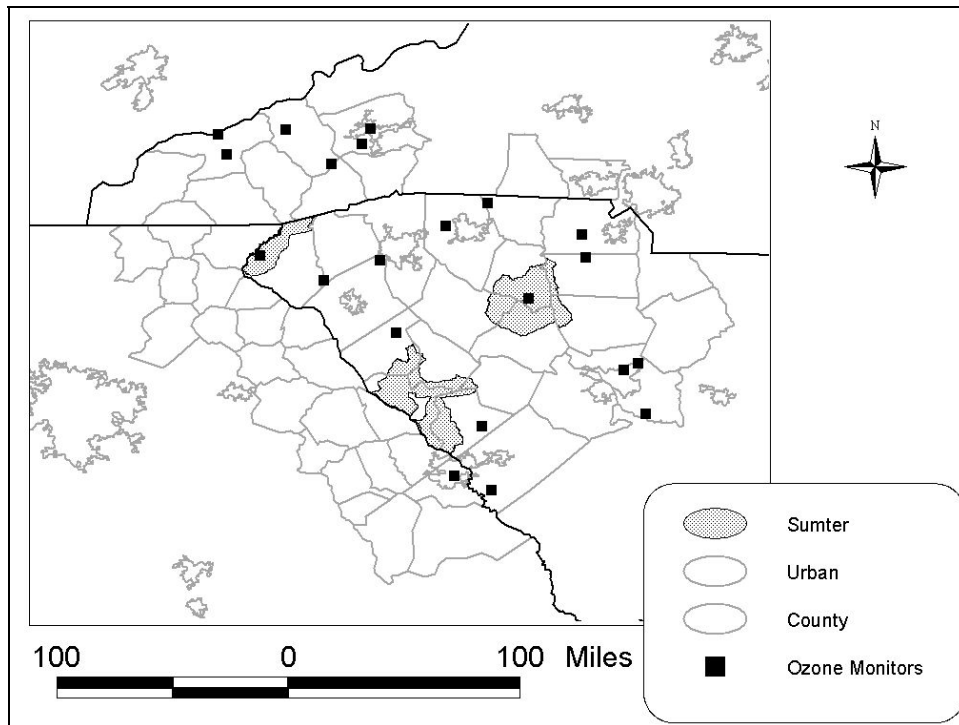


Figure J-15. Location of ozone monitors sites where the data is considered to represent the Forest and available in the years 1998 through 2000.

Twenty-one sites were used to examine if the ozone NAAQS has been exceeded within or near the forest. These 21 sites also included four sites thought to represent the air quality on the Forest, as well as data from sites where any portion of the MSA was within 30 miles of the Forest boundary. The Forest effects analysis was conducted using 4 sites and two other sites included in the SAMI analysis: Dawsonville and Table Rock. Also, the SAMI data (for the years 1993 through 1995) was examined to see how ozone exposures and NAAQS at this site may change in the future with decrease emissions of nitrogen oxides.

### ***Potential Ozone Nonattainment Areas***

Eighteen ozone monitoring sites used in this analysis exceeded the current ozone NAAQS (Figure J-16). The ozone NAAQS is based upon a three year average of the 4<sup>th</sup> highest daily 8-hour running average, and if the average is 0.085 ppm or higher the site is considered to have exceeded the ozone NAAQS. There could be numerous areas within 30 miles of the Forest Boundary that could be designated as nonattainment, as is shown in Figure J-16. The reader should be cautioned though the official nonattainment designations will be proposed by the

Governors of South Carolina, Georgia, North Carolina, and Tennessee; however, it is the EPA that will determine the areas designated as nonattainment. The EPA could designate a larger area as nonattainment than what is currently shown in Figure J-16. Designation of nonattainment areas is most likely to occur in the year 2004. The results in Figure J-16 also suggest that on hot sunny days the ozone concentrations are probably unhealthy for some people who are involved in vigorous outdoor activities on the Long Cane and Andrew Pickens Ranger Districts.

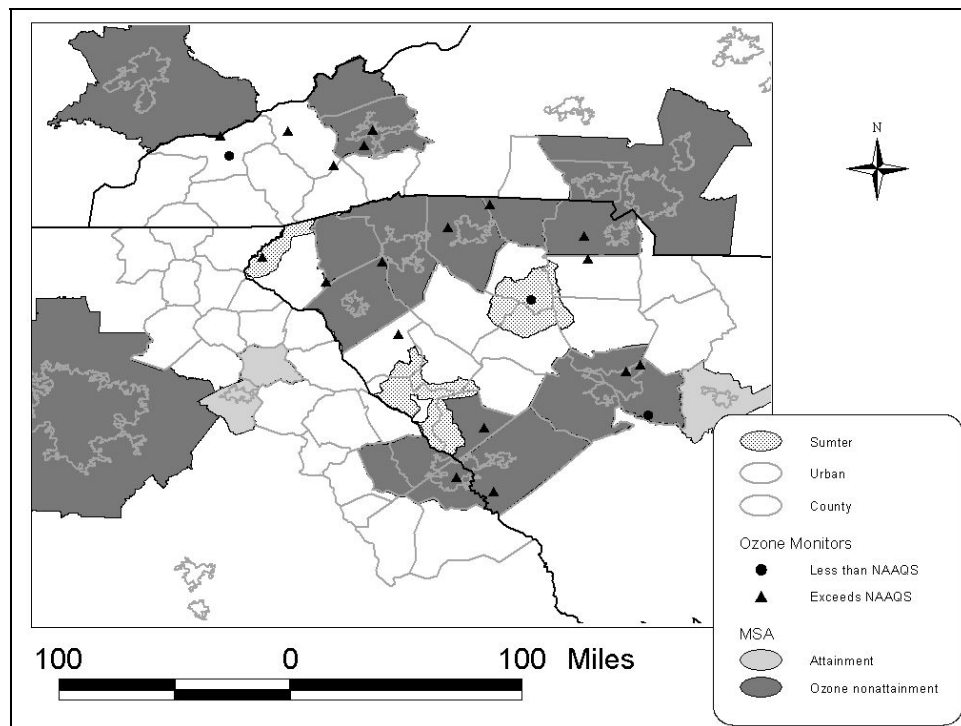


Figure J-16. Area that could possibly be designated nonattainment for the 8-hour ozone standard based upon using 1998 through 2000 data.

The nonattainment designation will have serious implications for the Forest's management activities. Any project proposed in an area designated as nonattainment, (Oconee, Edgefield and Abbeville Counties), must be approved by the South Carolina Department of Health and Environmental Control before the Forest Line Officer can approve the project. Projects that emit above 100 tons per year of nitrogen oxides or 250 tons per year of volatile organic compounds will be subject to these General Conformity Rules. This will be especially important for any activities where combustion of fossil fuels will occur and/or prescribe fires occur in the months of April through October.

The Forest can expect some decreases in the ozone exposures in the future. The 3-year average (1993 through 1995) of two sites used in the SAMI analysis (SAMI, 2002) does indicate the anticipated nitrogen oxide reductions (see Figure J-8) will reduce the 4<sup>th</sup> highest daily 8-hour average. The 3-year average for the Dawsonville site was below the NAAQS with a value of 0.079 ppm, and the Table Rock site had a value of 0.081 ppm. If the SAMI estimated nitrogen oxide reductions are realized then both sites may have the 4<sup>th</sup> highest values reduced 8 to 13

percent by 2040. Assuming similar type of reductions at the Oconee, Edgefield and Abbeville monitoring sites then there is a high likelihood of attaining the ozone NAAQS by the year 2040 at these three sites. The air pollution control agencies near the Forest will be developing and implementing State Implementation Plans to bring areas into attainment of the ozone NAAQS before the year 2040 and the reduction will reduce ozone exposures on the Forest.

### ***Ozone effects to forest vegetation***

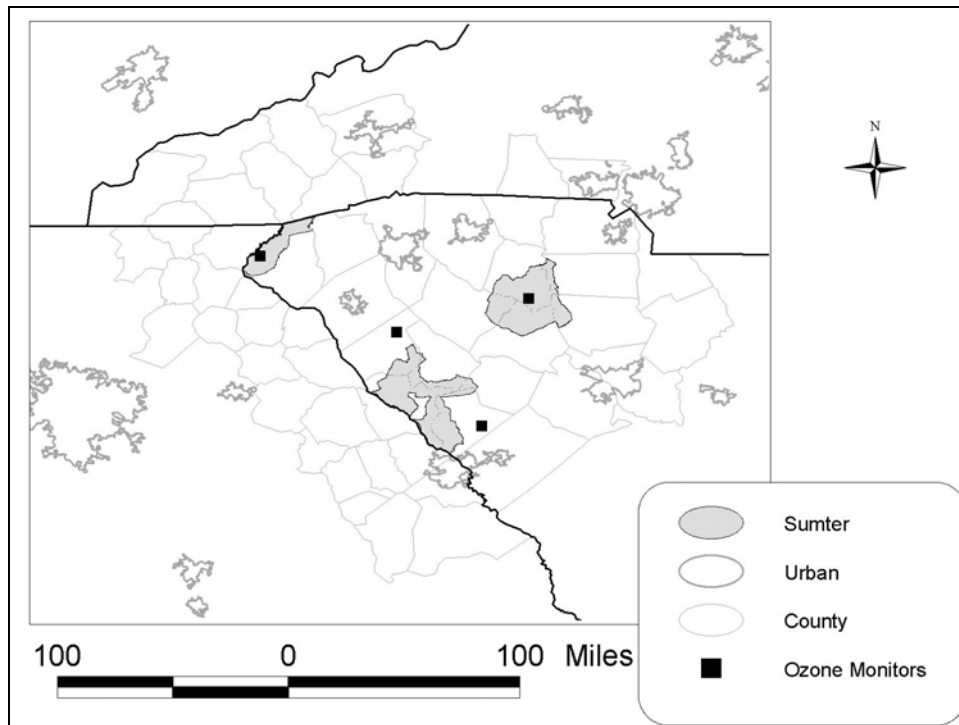
Ozone can impact herbaceous plants, shrubs, trees, and agricultural crops. Most ozone effects research has focused on agricultural crops because of the documented large economic losses; however, some work has been done relating ozone exposures to effects on forest tree species. In the SAMI analysis (2002) there were seven trees species where enough data were available to use in their regional analysis. However, it should be recognized there are at least 100 trees species in the southern Appalachians and most of these tree species (along with herbaceous plants and shrubs) sensitivity to ozone has not been tested using controlled experiments. Therefore, there is uncertainty in regard to the extent of ozone impact to vegetation on the Forest.

Under good soil moisture and nutrient conditions there are cells (called stomata) in the leaf which open and allow carbon dioxide to enter. In the chloroplasts (these make a leaf green) the carbon dioxide, inorganic salts, and water combine with the aid of sunlight to produce food in the form of simple sugars. These sugars can be used by the trees as energy to assist with repairing damage to cells in the tree, and also are stored in the roots to assist with the next seasons growth. Trees that have adequate food reserves in the roots may be able to out-compete neighboring trees if they can grow larger in crown area, in height, and the amount of area where fine roots can absorb water and nutrients. A tree that is taller and larger in crown width will have more leaves receiving sunlight so it can produce more food to be used in the future. Therefore, a large dominant tree out-competes adjacent smaller trees for the resources necessary to survive.

Ozone enters through openings into the leaf just like the carbon dioxide. Once inside the leaf the plant may expend energy to produce biochemicals that neutralize the ozone. For other species the ozone kill numerous chloroplasts and this can result in less simple sugars produce by the plants. There is a range of responses of vegetation to ozone exposures and the death of the chloroplasts. Some species consistently exhibit symptoms on the upper leaf surface and have been used as “bioindicators”, which indicates ozone exposures are causing a physiological response to the individual and/or species. Other species may or may not have ozone symptoms, but there is a reduction in the total amount of biomass produced by the tree, so the tree is not as competitive with neighboring trees. Also, there are areas of the United States where the ozone exposures are so high the trees are weakened by the ozone and bark beetles attack and kill the weakened trees, such is the case in the San Bernardino Mountains adjacent to Los Angeles, California. Ozone effects within and between species does vary and perhaps the largest concern for the Forest, especially in the areas designated as wilderness, is reduction in biological diversity and abundance of ozone sensitive species.

The presence of ozone symptoms is not an accurate indicator of how much growth loss has occurred to a sensitive plant from ozone exposure. Therefore, some air resource specialists rely upon measurements taken with ozone monitoring equipment to predict if growth (i.e. biomass)

reductions have occurred. The ozone monitors used in this assessment (Figure J-17) were used to assess if growth reductions could be occurring to sensitive tree species found on the forest. The data were summarized for eight ozone monitoring sites using hourly average ozone concentrations from April through October. Researchers and technical specialists have examined ways to estimate growth loss to vegetation, with the use of exposure indices, based on those hourly values.



*Figure J-17. Location of ozone monitors where the data was used to estimate vegetation effects on the Forest.*

Among Forest Service air quality specialists there are two important statistics used in combination to estimate growth loss to vegetation when summarizing data from ozone monitors (FLAG, 2000). The first is called the N100 and it is the number of hours the measured ozone concentration is greater than or equal to 0.100 parts per million (ppm). Experimental trials with a frequent number of peaks (hourly averages greater than or equal to 0.100 ppm) have been demonstrated to cause greater growth loss to vegetation than trials with no peaks in the exposure regime (Hogsett et al., 1985; Mussleman et al., 1983; and Mussleman et al., 1986). The second statistic is a means to summarize the cumulative (seasonal) ozone exposure and it is called the W126 (Lefohn and Runeckles, 1987). The W126 was developed as another biologically meaningful way to summarize hourly average ozone data. The W126 index places a greater weight on the measured values as the concentrations increase. Thus, it is possible for a high W126 value to occur with few to no hours above 0.100 ppm. Therefore, in order to more accurately estimate growth suppression due to ozone exposure, it is also necessary to determine the number of hours the ozone concentrations are greater than or equal to 0.100 ppm. It should also be noted that the lack of N100 values does not mean ozone symptoms will not be present when field surveys are conducted.

Black Cherry and Yellow Poplar are among the species that suffer the greatest growth suppression from ozone exposure. Factors that affect the actual dose of ozone that enters the leaf to cause growth loss include soil moisture availability, soil nutrient availability, the amount of leaf resistance to ozone penetration, and other micrometeorological conditions (Lefohn, 1998). For example, during times of drought, leaf stomata do not allow as much ozone to enter the leaf as during times of normal precipitation. However, it should be noted that during periods of prolong drought there could be severe growth reductions, but these reduction are probably not attributable to ozone even if the concentrations are very high.

The Ozone Calculator using a series of equations (Lefohn, 1998) to estimate the maximum amount of biomass loss that could occur for a species using the W126 and N100 values at a site. The percent growth loss is probably greatest for the Long Cane Ranger District, but some years there is probably growth loss to the most sensitive species on the other two Districts (Figure J-18). The values shown in Figure J-18 are conservative and most likely overestimate the biomass reductions, especially since soil moisture, nutrients, and microclimatic conditions are not considered in the analysis. Loblolly pine has also been shown to have some sensitivity to high ozone exposures. The SAMI (2002) analysis indicates some growth losses could be occurring, but other studies indicate that there needs to be hundreds of hours for the N100 – a condition that does not occur near the Forest – before growth losses will occur (Lefohn, 1998).

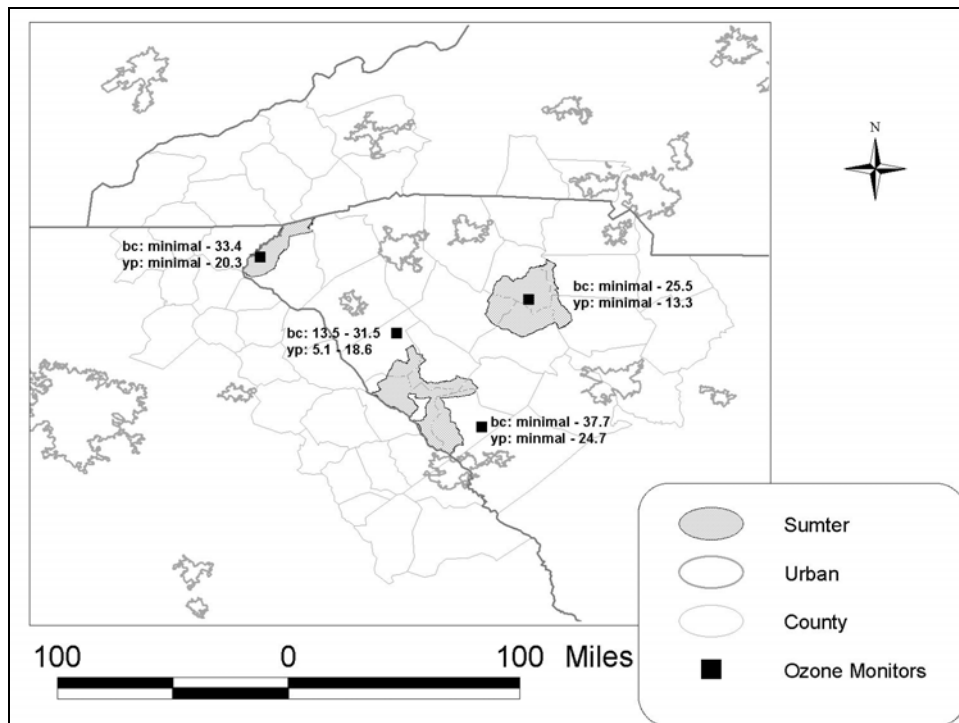


Figure J-18. Estimated annual range in maximum black cherry (bc) and yellow-poplar (yp) biomass reductions using 1998 through 2000 data. Note: the biomass reductions will be less during periods of drought or low soil moisture.

SAMI addressed the changes likely to occur in ozone exposures and changes in forest stands using several emission management scenarios (SAMI, 2002). Reductions by the year 2040 in nitrogen oxides are likely to reduce the number of hours the concentrations are greater than 0.050 ppm, especially the N100 values. The reduction in the cumulative (W126) exposures and the N100 is likely to cause a shift in competition between species within forest stands (SAMI, 2002). Total basal area in forests in the SAMI region (including the Forest) is not likely to change even if ozone concentrations are reduced, but there is likely to be changes in the basal area among species within a forest stand. This is especially true cove hardwoods and possibly loblolly pine—hardwood stands. Forest types are unlikely to shift in abundance, and tree mortality in direct response to ozone is not expected. However, SAMI showed that current levels of ozone may be having an adverse impact to natural processes in the Class I areas (and possible other wildernesses across the region). Individual species did show a positive response to reductions in ozone (SAMI, 2002).

### **Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>) and Regional Haze**

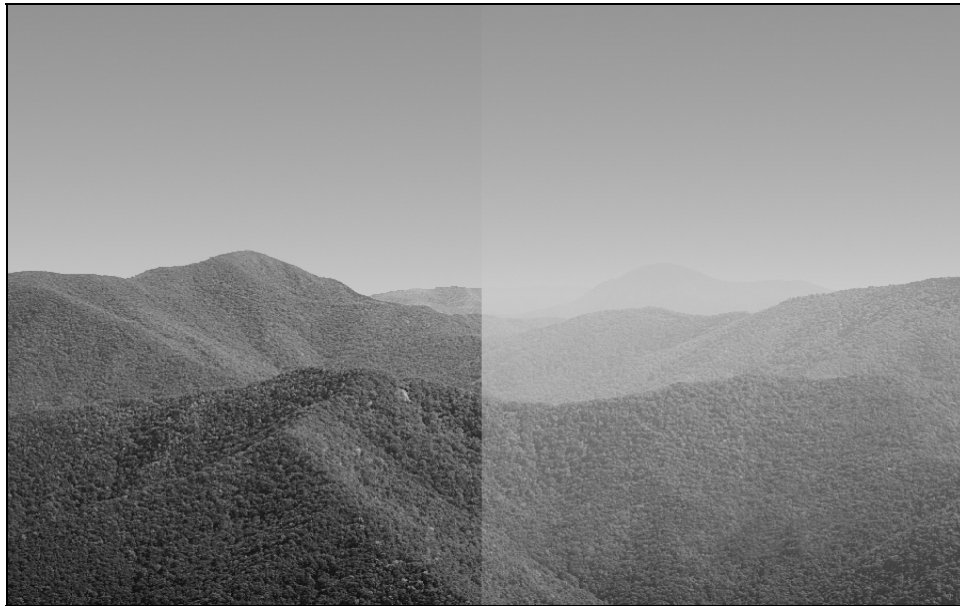
The beautiful mountain scenery is one of the main reasons tourists visit the Sumter National Forest and other areas in Appalachia (Appalachian Regional Commission, 1970). During the last four decades, the Eastern United States has seen a significant, regional reduction in visibility, brought on by a corresponding increase in ambient levels of PM<sub>10</sub> and PM<sub>2.5</sub> (IMPROVE, 2002). This regional reduction in visibility is called regional haze. The estimated natural background visibility for the eastern United States is 93±28 miles (NAAP, 1991). However, there has been a significant reduction in how far a person can see distant views, as well as how clearly a person can see the mountains. Secondary fine particles (PM<sub>2.5</sub>) are primarily responsible for the visibility impairment. Secondary fine particles are formed when combustion gases are chemically transformed into particles. In the eastern United States it is sulfate particles (transformed sulfur dioxide) from coal-fired power plants that comprise most of the measured fine particle mass (IMPROVE, 2000). Seventy-five percent of the sulfur dioxide emissions within 120 miles (see Figure J-9) of the Forest are released from coal-fired power plants. Furthermore, the sulfates particles can cause even greater amounts of visibility impairment when the relative humidity is high. A humid atmosphere alone does not result in visibility reductions. Sulfate particles grow in size when they attached to water molecules in the atmosphere and they become the perfect size to cause visibility impairment by scattering the sun's light (Malm, 1999).

### ***Data and Analysis***

The Inter-agency Monitoring of Protected Visual Environments (IMPROVE), a national network of particulate monitors established for the protection of Class I Wilderness Areas, has monitored the constituents of regional haze for more than two decades at some sites. The location of one IMPROVE monitor, Shining Rock Wilderness (July, 1994 through May, 1999 data), near the National Forest is shown in Figure J-2. Also, data were used from the SAMI analysis (1991 through 1995) for Shining Rock Wilderness to examine how visibility is likely to change in the future (SAMI, 2002). Visual analysis was accomplished using the WinHaze program (<http://webcam.srs.fs.fed.us/win haze.htm>).

### *Fine particle impacts to visibility*

On the days (with a relative humidity of 80 percent) classified as having the lowest fine particle mass (2.26 micrograms per cubic meter) the estimated visibility is 92 miles, but on the highest mass (17.57 micrograms per cubic meter) days the visibility is reduced significantly to 18 miles (Figure J-19). The days with the poorest visibility are most likely to occur starting in May and continue through September (Air Resource Specialists, 1995) during the time when most people are visiting the Forest. Throughout the year, people are most likely to see a uniform haze – like a white or gray veil – obscure the beautiful mountains (Air Resource Specialists, 1995). Sulfates are the most important fine particles contributing to visibility impairment. On the low mass days they comprise 48 percent of the total mass while on the highest mass days the sulfates are 71 percent of the total. Organics (released primarily from vegetation as volatile organic compounds) are the second most important fine particles measured and if organics were to most abundant then there would be a bluish cast to the mountains – hence the name Blue Ridge Mountains.



*Figure J-19. Visual representation at Shining Rock Wilderness using the 1994 through 1999 IMPROVE data. The image on the left shows visibility on a low fine particle mass day (92 miles), while the image on the right shows a high fine particle mass day (18 miles). Relative humidity was set at 80 percent when using the WinHaze model.*

The results from the IMPROVE monitors indicate regional haze, caused by elevated particulate loading, is heavily impacting the Forest. It is important to note the pollutants associated with regional haze have also been associated with acid deposition and respiratory health issues. Thus, it can be concluded high, primary sulfur dioxide and nitrogen (nitrogen deposition and ozone) emissions can have a significant impact on the forest resources, as they are transformed into their secondary forms.

The EPA's Acid Rain Program, established under Title IV of the 1990 Clean Air Act Amendments, calls for major reductions in emissions of sulfur dioxide and nitrogen oxides, the pollutants that cause acid rain and contribute to visibility reductions. The program uses market incentives to achieve a nationwide limit on sulfur dioxide emissions more cost effectively than traditional regulatory methods. The Acid Rain Program requires a two-phased tightening of restrictions on fossil fuel-fired power plants, resulting in a permanent cap on sulfur dioxide of 8.95 million tons nationwide, half the amount emitted in 1980. Phase I of the sulfur program ran from 1995 through 1999 and affected roughly 440 of the larger, higher emitting utility units, primarily in the Eastern United States. Phase II began in 2000 and extends to all Acid Rain sources throughout the country (over 2,000 units nationwide) (U.S. EPA, 2001b).

Sulfur dioxide is expected to decrease by at least 60 percent by the year 2040 in the counties within 120 miles of the Forest (see Figure J-10). Further reductions by coal-fired power plants in North Carolina and possibly the Tennessee Valley Authority are likely to contribute to further reduction than what SAMI (2002) estimated for the year 2040. SAMI did estimate what visibility may be like between the 1991 through 1995 average and the year 2040. For Shining Rock Wilderness the annual average visibility was estimated to be 18.3 miles, but with the current laws, rules and regulations in place the average is expected to improve to 26.1 miles. Summertime visibility is worst with an average of 10.9 miles. The SAMI (2002) estimates for summertime visibility are expected to improve by the year 2040 to 19.5 miles. Similar patterns are also expected for Class I areas in the southern Appalachians.

## **Management Constraints and Regulatory Mandates**

The USDA Forest Service is mandated, as are all federal land management agencies, to follow the directives of the Clean Air Act and the National Environmental Protection Act in mitigating the effects of Agency activities on the health and welfare of surrounding communities, as well as to Agency resources. Those areas not meeting NAAQS are designated as nonattainment, and an area specific management plan to demonstrate what emissions reductions will take place must be written by each air agency having authority. These plans must be incorporated into the affected State Implementation Plan. The goal of the State Implementation Plan is to bring the affected areas back into attainment with the standards. If any part of a Forest is within a nonattainment area, the Forest must conduct a Conformity Analysis to determine if its activities conform to the State Implementation Plan.

Wildland fire is the primary activity on the Forest that will produce large amounts of air pollution. The smoke associated with wildland fire produces particulate matter and lesser amounts of other pollutants, including nitrogen oxides. Nitrogen oxide emissions are quite small for each ton of vegetation consumed and are unlikely to affect ozone attainment, unless frequent fires or large fires are conducted during April through October. However, particulate emissions are much greater and will be of concern to state and local air regulators because of the possibility of affecting the PM<sub>2.5</sub> attainment status of the Forest or adjacent areas. No part of the Sumter National Forest is presently within a nonattainment area.



The revised NAAQS for ozone and particulate matter (PM<sub>2.5</sub>) will most likely bring nonattainment status to several areas in South Carolina (see Figure J-4) and may include the Andrew Pickens Ranger District and portions of the Long Cane Ranger District. Nonattainment designation is also likely for area adjacent to the Forest such as: Asheville, Atlanta, Charlotte, all of the Great Smoky Mountains National Park, and certain areas above 4000 feet elevation in western North Carolina. If the EPA designates these areas as nonattainment for ozone there may be a greater interest in emissions from managed prescribed fires within the time span of the revised Forest Plan.

It will be critical for the Forest staff to work with the State and local air pollution control agencies and any regional air quality consortiums. The current model (such as SAMI) to solve air quality problems is to bring all interested parties together to gather ideas on how to solve the problems. The Forest must be ready to participate in these groups to articulate why prescribed fire is needed as tool for forest management. Also, the Forest needs to continue evaluating what impact air pollution may cause to people on the Forest. Finally, the Forest needs to work with the State and local air pollution control agencies, and other interested parties to seek ways air pollution emissions can be reduced, so adverse impacts no longer continue to the Forest AQRV.

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## APPENDIX K

### PROBABLE ACTIVITIES BY ALTERNATIVE

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#### PROBABLE ACTIVITIES FOR THE FIRST 10 YEARS (AVERAGE ANNUAL)

Resource	Unit of Measure	Alt. F (Current)	Alt. A	Alt. B	Alt. D	Alt. E	Alt. G	Alt. I
<b>Prescribed Burning includes woodland sav.</b>	Acres	19,379	19,573	33,031	20,054	33,185	10,355	23,527
<b>Harvesting Trees</b>								
Even-aged regeneration	Acres	4,506	4,305	2,211	3,911	2,739	1,814	2,667
Uneven-aged harvest	Acres	103	48	277	23	75	183	241
Thinning	Acres	3,000	2,000	5,000	2,062	2,645	2,000	3,320
Thinning woodland sav.	Acres	276	723	1,378	680	2,274	367	1,470
Riparian harvest <sup>2</sup>	Acres	(included above)	70	350	70	350	0	300
<b>Site preparation</b>								
Handfell/H' side	Acres	699	1,296	1,186	668	853	800	1,144
Drum Chopping	Acres	3,807	2,609	425	2,843	1,486	814	1,523
<b>Stand improvement</b> (precom. thin, release, etc)	Acres	4,759	3,261	531	3,554	1,858	1,018	1,904
<b>Roads</b>								
Constructed	Miles	1.1	.8	1.0	.8	.7	.5	.9
Reconstructed	Miles	43.4	34.0	39.3	31.9	28.9	21.7	34.2
Total	Miles	44.5	34.8	40.3	32.7	29.6	22.2	35.1
Maintenance	Miles	835	845	835	845	835	835	845
Road Closure	Miles	6	6	6	6	6	6	6
<b>Maintenance/ (Construction) Trails</b>								
Hike only	Miles	72 (+0)	72 (+0)	72 (+0)	72 (+0)	72 (+0)	72 (+0)	72 (+0)

<b>Resource</b>	<b>Unit of Measure</b>	<b>Alt. F (Current)</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. D</b>	<b>Alt. E</b>	<b>Alt. G</b>	<b>Alt. I</b>
Hike and Mtn. Bike only	Miles	24 (+0)	119 (+9.5)	24 (+0)	24 (+0)	119 (+9.5)	24 (+0)	109 (+8.5)
Hike and Equestrian only	Miles	21 (+0)	21 (+0)	21 (+0)	21 (+0)	21 (+0)	21 (+0)	21 (+0)
Hike, Mtn. Bike and Equestrian only	Miles	57 (+0)	117 (+6.0)	57 (+0)	57 (+0)	117 (+6.0)	57 (+0)	97 (+4.0)
OHV/Motorcycle, Mnt. Bike and Hike	Miles	46 (+0)	106 (+6.0)	46 (+0)	46 (+0)	106 (+6.0)	46 (+0)	86 (+4.0)
Paddle sports	Miles	125 (+0)	125 (+0)	125 (+0)	125 (+0)	125 (+0)	125 (+0)	125 (+0)
<b>Portage (for paddle sports)</b>	<b>Miles</b>	2 (+0)	2 (+0)	2 (+0)	2 (+0)	2 (+0)	2 (+0)	2 (+0)
<b>Interpretive (will be on existing trails)</b>	<b>Miles</b>	NA	(+2.5)	(+1.0)	(+0)	(+2.5)	(+1.0)	(+1.0)
<b>Total</b>	<b>Miles</b>	347 (+0)	562 (+21.5)	347 (+0)	347 (+0)	562 (+21.5)	347 (+0)	512 (+16.5)
<b>Maintaining/ (Constructing) Dev Rec. Facilities</b>	<b>PAOTS</b>	3107 (+0)	3387 (+28.0)	3107 (+0)	3107 (+0)	3387 (+28.0)	3107 (+0)	3107 (+0)
<b>Wildlife or Linear Openings</b>								
Constructing/ Fertilization	Acres	389	208	35	215	291	20	164
Maintaining (burning or mowing)	Acres	2450	2200	2400	2200	3000	1950	2200
Maintaining/ Fertilization (cultivating)	Acres	650	500	550	500	800	450	500
<b>Soil and Water Improvements</b>								
Stabilization or Restoration	Acres	150	175	250	175	150	125	150
<b>Improve Soil Productivity</b>								
Fertilization	Acres	1000	820	780	720	750	500	700
<b>Water Bird Habitat Development Construction</b>	<b>Acres</b>	60	40	60	0	110	0	60
<b>Invasive plant Control (hand/herb)</b>	<b>Acres</b>	50	500	1250	500	250	250	750
<b>Mid-story control</b>	<b>Acres</b>	30	50	250	50	250	50	250

<b>Resource</b>	<b>Unit of Measure</b>	<b>Alt. F (Current)</b>	<b>Alt. A</b>	<b>Alt. B</b>	<b>Alt. D</b>	<b>Alt. E</b>	<b>Alt. G</b>	<b>Alt. I</b>
<b>Hand/herbicide<sup>3</sup></b>								
<b>Canebrake Restoration</b>	Acres	0	50	300	50	100	400	200

1 Acres of loblolly pine conversion are included in the acres of even-aged regeneration.

2 Riparian area harvest, such as for canebrakes or canopy gaps, is not included in other harvest acres shown above. These acres are for Riparian dependent species.

3 Control of weedy species such as sweetgum in woodlands.

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## **APPENDIX L**

# **RESPONSE TO PUBLIC COMMENTS**

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## **INTRODUCTION**

The Proposed Sumter National Forest Land and Resource Management Plan, and the Draft Environmental Impact Statement for the Proposed Plan were published and released for public review and comment on February 7, 2003. The Forest received over 1000 letters and emails by the July 3, 2003 deadline.

Comments from these letters and e-mails were summarized into approximately 650 public concerns by the Content Analysis Team in Salt Lake City. Each comment within a letter that provided factual information, professional opinion, or informed judgment relating to the DEIS and Forest Plan was entered into a data base. The letters and comments are part of the process records located in the Supervisor's Office.

Everyone who commented is listed in this appendix. Following this section you will find for each public concern our response organized by the following chapters:

Chapter 1 – Process, Planning, Policies, and Laws  
Chapter 2 – Alternatives  
Chapter 3 – Environment  
Chapter 4 – Transportation  
Chapter 5 – Recreation  
Chapter 6 – Special Designation/Lands  
Chapter 7 – Natural Resource Management  
Chapter 8 – Social and Economic Values  
Chapter 9 – Environmental Protection Agency

## **COMMENTS' NAMES**

LAST NAME	FIRST NAME	ORGANIZATION	LETTER #
ABERNETHY	ROBERT	NATL WILD TURKEY FEDRN	3135

ABERNETHY	H MITCHELL		2320
ADAMS	DOUG		724
ADAMS	DOUG		792
ADAMS	BROOKS		1149
ADAMS	DOUG		1784
ADAMS	DUDLEY		3125
ADAMS	DOUG		3707
ADAMS	DOUG		3784
ADDIS	PATTI		796
AITKEN	MILTON		2250
AITKEN	MILTON		2512
ALEXANDER	THOMAS	SEN OF SC	2283
ALEXANDER	DOUG		3743
ALKIRE	DONNY		1471
ALLEN	MYRON		1127
ALLEN	PATSY		1669
ALLEN	MAXINE		2511
ALPERIA	ALEXANDER		994
ALSPAUGH	WEBB		429
AMICK	BETTY		3965
AMMON	MATTHEW		881
ANDERSON	ELIZABETH		162
ANDERSON	WILLIAM		1771
ANDERSON	LANI & KYLE & IAN & DYLAN		2295
ANDERSON	LES		2399
ANDERSON	H KYLE		3702
ANDERSON JR	WILLIAM		725
ANDERSON JR	WILLIAM		789
ANON			385
ANON			945
ANON			1514
ANON			1765
ANON			2214
ANTHONY	MIKE	GA ST	1722
ANTHONY	WILL		1723
ARMSTRONG	JERRY		1705
ARNOLD	JOHN		974
ARNOLD	GEORGE		2646
ARTHUR	SALLIE		2259
ASBELL	O DAVID		3769
ASHLEY	JOE		221
ATKINSON	DOUGLAS		1018

ATKINSON	DONNA		1130
ATKINSON	DON		3725
ATYAS	JOEL		426
AUSTIN	TATE		522
AUSTIN	JANE		3793
BAARCKES	JOHN		2309
BAILEY	MARION		1139
BAILEY	ROGER		1522
BAIRD	VANCE		82
BAIRD	VANCE		95
BAIRD	VANCE		2654
BAKER	SUZANNE		1652
BALLAL	MATT		3457
BALLARD JR	HENRY		3816
BANKER	MARK	RUFFED GROUSE SCTY	3691
BANKS	MARVELL & JOKABED		2657
BANNISTER	KERRY		2499
BARBOUR	STEVE		3417
BARRON	NICK		1747
BASS	DONALD		2323
BATES	MICHAEL		966
BEATY	DOROTHY		952
BEATY	DOROTHY		3438
BEBBER	TONY	SC DEPT OF PARKS, REC & TOURISM	3447
BEDENBAUGH	COL KENNETH		3415
BEDNAR	RYAN		1749
BEELE	ANNETTE		297
BEELE	TODD		2297
BEEM	MICHAEL		532
BEHRENS	BRIAN		2517
BELK	DAVID		1651
BENKO	TOM		178
BENKO	TOM		1227
BENNETT	JOHN		597
BENNETT	BOB		960
BENNETT	DOUG		2265
BENNETT	JOHN		2394
BERG	CHRISTOPHER		3963
BERRY	LAURIE ANN		2287
BERRY JR	J		2232
BETENBAUGH	DONNIE & CRYSTAL & BAILEY		1136

BETENBAUGH	DON		1653
BETENBAUGH	MARGARET		3739
BILL	LISA		827
BIRCH	RON		3731
BLACK	ERICA		3122
BLAIR	CARL & MARGARET		2492
BLANTON	PATTY		2241
BLED SOE	JAMES HENRY		3467
BLISS	RACHAEL		3758
BLOCH	ELIZABETH		526
BLOSS	STEVEN		594
BODIE	WILLIAM OTHA		3141
BOGAN	JOHN F & AGNES		2395
BOGAN	DUPRE & MABEL		2397
BOLEN	JEANNE		831
BOND	CHRISTINE		2655
BOOKER	SAM		3466
BOONE	HOWARD		786
BORS	THOMAS & KAREN		799
BOSTAIN	ADDISON		828
BOTSFORD JR	ROBERT		1509
BOURNE	JENNY		1188
BOWERS	BARBARA		989
BOWERS	RICHARD		2725
BOWLER III	JOSEPH		985
BRADSHAW	KEN	GA CNCL OF TROUT UNLTD	1231
BRADSHAW	KEN	GA CNCL OF TROUT UNLTD	1232
BRADSHAW	KEN	GA CNCL OF TROUT UNLTD	3147
BRADSHAW	JOHN		2310
BRADSHAW	JOHN		3429
BRAME	SCOTT		3462
BRAMLETT	VICTOR		1449
BRAMLETT	ROZELLE		1523
BRANHAM	DAVE		1748
BRDAY	ROBERT		562
BREARD	NANCY		979
BREHME	DENNIS		998
BREITHAUP T	CHARLES		2727
BREITHAUP T JR	CHARLES	RABUN CHPTR TROUT UNLTD	1205
BRESNAHAN			2223
BREWER	BRAD		1447
BRIDGMAN	HOWARD		3796
BRIGHT	CARLOS		1546



BRINN	MICHELE		2516
BROUN	PAUL		877
BROWN	MARGARET		300
BROWN	AL		824
BROWN	THOMAS		1147
BROWN	MATT		1781
BROWN	BUFFORD		2717
BROWN	J ALLEN		3774
BROWN	THOMAS		3804
BRUEHL	BILL		2314
BUNN	CINDY & TOM		1176
BURCH	STEVE		2400
BURGESS	ROBERT		592
BURRELL	KYLE		457
BURTON	PERRY		465
BURTON	CLAYTON		1012
BURTON	WAYNE		2503
BURTON	CLAYTON		2507
BUTLER	JOHN		533
BUTLER	F		950
BUYS	MATT		1770
CAIN SR	WILLIAM		3414
CAMPBELL	JASON		1766
CAMPBELL	DENNIS & KATHY		2308
CAMPBELL	AARON		2486
CARR JR	SARAH FRANCISCO & DAVID	STHRN ENVIRON LAW CTR	3485
CARTER	JIMMY		564
CARTER JR	GEORGE		741
CASE	OLIVER		2710
CATHEY	SAMUEL		468
CHAMBERLAIN	KATHERINE		3140
CHAMBERS	NANCY		815
CHANDLER	BRAD		1528
CHAVEZ JR	SIMON		2515
CHESNEY	LARRY		3734
CHILES	BILL		588
CHRISTOPHER	TOM		3787
CHURCH	BOB		73
CIEGLER	JANET		2228
CLANTON	SYLVIA		1466
CLAPP			993
CLARK PHD	CORY		1675

CLARKE	DON	1009
CLAYTON	ELEANOR	3432
CLEMENTS	LINDA	826
CLINE	PAUL	1440
COBOS	BRIAN	3813
COLBURN	KEVIN	3709
COLEMAN	CLINTON	1548
COLEMAN	CHARLENE	2723
COLEMAN	CHARLENE	3146
COLEMAN	CHARLENE	3484
COLSON	FRED	1656
CONELLY	GRAY	1189
CONRAD	GARY	814
COOK	JOHN	806
COOK	HARDY	878
COOK	DANIEL JOSPEH	3469
COOKE	MATTHEW	3428
COREY	TODD	1741
CORLEY	VICKI	1164
CORN	DENNIS	425
CORN	KIM	1121
COTTRELL	DUNCAN	2266
COUBURN	KEVIN	1736
COX	MICHAEL	1465
COX	ANDREW	3745
CRAFT MD	JEFF	2390
CRAFTS	BRAD	2487
CRAIG	KIN	527
CRAIN	KATHY	2219
CRAVEN	MARY RUTH	2642
CRAYCRAFT	STEVEN	627
CREECH	CARSE	3442
CREWS	JANE	803
CRISP	FRED	1670
CRISSINGER	LINDA	1125
CROCKER	MICHAEL	1537
CROCKER	JIMMY	1543
CROCKER	CYNTHIA	1655
CROFT	CATHARINE	1549
CROTWELL	PATRICIA	1175
CROW	HAMPTON	181
CROW	HAMPTON	1454
CROW	ANDY	1719

CROWDER	FRANK		69
CROWDER	FRANK	SC SIERRA CLB	3450
CRUCE	MIKE		295
CRUM	C		3764
CRYANE	PHILLIP		2478
CUBINE	MARGARET		981
CUMMINS	MICHAEL		626
CUNNINGHAM	BILL		1146
CURRY	TIM		1745
DACUS	LINDSAY	STHRN BLUE RDG BCKCNTRY HRSMN	2420
DAHLIN	DEBRA		1212
DAMM	KEVAN		1777
DAVENPORT	TOM	PAC RIV CNCL	3449
DAVENPORT	CHRIS & CATHY		3123
DAVENPORT	WILLIAM		3138
DAVIDSON	GENE		883
DAVIDSON	ERIC		1772
DAVIS	DONALD		45
DAVIS	STVEN		427
DAVIS	DEBORAH		1171
DAVIS	RANDALL		2248
DAVIS	HARRY		2319
DAVIS	JAMES		3970
DAVIS-SMITH	DIANE		961
DAWSON	RUTH		1160
DAY	TIM		521
DEBRUHL	RAY		2716
DEES	MARK & MICHEL		2230
DEPREE	GARY		1510
DETTMAN	JUANITA		3433
DIAMADUROS	SAMMY		1142
DIAMADUROS	HOPE		1529
DICKERT	LEE		2245
DICKSON	WILLIAM		794
DIXON	AMY		3786
DODGE	JAMES		1010
DODGE	JAMES		1011
DODGEN JR	HILTON		3474
DODSON	CAROL		986
DOERNER	PAUL		1724
DOVE	RONNY		46
DOWDLE	MARION		3923

DOWDLE	EILEEN		3968
DUDLEY	TOM		901
DUGGER IV	JAMES		624
DUKE	DAVID		2522
DUMIN	DAVID		247
EANES	JAMES		726
EASLER	E		377
EDDLEMON	KIRK		1743
EDENS	DAVID		47
EDENS	DAVID		879
EDGERTON	ALLEN		1200
EDGERTON	ALLEN		2224
EDWARDS	JANICE		954
EDWARDS	EMILY		1463
EGELAND	BILL		3755
EGGLETON	KIM		523
EICHORN	JOHN		620
ELLIOTT	SID		1005
ELLIOTT	SID		2321
ELMORE	RANDY		882
ELSON	ROBERT		68
ELSON	ELLEN		72
ENG	DONALD		43
ENG	DONALD		44
ENG	DONALD		62
ENG	DONALD		2403
ERDMAN	JOAN		1167
ERICKSON	SUE		1192
EURE	DR WHITNEY		2317
EVERETT PHD	JEAN		2491
EWING	CAROLINE		958
FALLAW	SCOTT		1439
FANT JR	MARION		3798
FARBER	STEPHEN		1775
FARLEY	KEITH		161
FARR	TONY	UNION CNTY CNCL/PLNING & DEV	1123
FARR	MARY VANDERFORD & NED & LAURA		2255
FARRELL	MICHAEL		622
FAULCONER	NANCY		531
FAULKNER	BOBBY	LATCHETT LOGGING INC	3480
FAULKNER	NEAL		1763
FAY	BOB		1742
FERGUSON PHD	DIANNE		2505

FERRIS	NORMAN		428
FEW	ED		732
FEW	ED	CHATTOOGA RIV CHPTR TROUT UNLTD	1230
FIACCO	L		1550
FINGER	DAVID		3443
FISH	WAYNE		1015
FISH	STANLEY		1017
FISHER	R		3805
FITZPATRICK	JULIE		788
FORD II	DR ERWIN		623
FORRESTER	MICHAEL		2407
FOSTER	SHARON		687
FOSTER	POWELL AND SHARON		2304
FOWLER	ABBY & STEVE		2222
FOWLER	DON		3434
FOXWORTH	TERRY		1672
FOYE	JOSEPH		1516
FRAMPTON	JOHN	SC DEPT OF NTRL RESCRS	885
FRANKIS	ROBERT		2273
FREEDMAN	DAVID		1193
FROLIX	CASSANDRA		996
FRON	JIM		2510
FULLBRIGHT	SAMUEL		1527
FULLER	KIM		3967
GAAR	H		1768
GALBAY	JOHN		800
GALBREATH	NATHAN		1740
GALES	STEPHEN		813
GALLIVAN	H MILLS		2406
GALLMAN	DOT		1650
GARDZALLA	RON		1534
GARRIS	JEANNE		988
GARY	BILL		534
GATES	MAX		2724
GATINS	JOSEPH		2713
GEDEKOH	ROBERT		1199
GEHARD	CHRIS		1730
GEORGE	LAVINIA		2242
GERHARDT	DAVID	MEADWESTVACO	3468
GHOLSON	SID		81
GIDDINGS	MICHAEL & ELISE		1752
GILBERT	CAROLINE		812
GILBERT	NANCY		2489

GILTNER	LINDA		1677
GIST	CARLA		1525
GIST	CARL & MABLE		2729
GLASSCOCK	ROBERT		74
GLASSCOCK	HATTIE ANN		77
GLITZENSTEIN PHD	JEFF	SC NTV PLANTS SCTY	3692
GOINGS	SHANE		1132
GOLDBERG	JENNIE		3697
GOLDMAN	STEPHEN		460
GONZALEZ	DANA		3427
GOODWYN	E		972
GOOT	KAREN		3811
GORDON	MARIETTA		1182
GORDY	CHRISTOPHER		3475
GOTSHALL	CHRIS		57
GOULD	ROBERT		467
GOULD	ROBERT		876
GOUSER	COLLEEN JUD		163
GRADY	JONI		2709
GRANT	GARY		951
GRANT	PAT		1201
GRANT	GORDON		2414
GRAY	STEPHEN		3815
GREEN	LAURIE		1004
GREEN	NORMA		1165
GREEN	DAVID		1751
GREEN	HALCOTT	UNION CNTY LK PROJ CMMTE	3708
GREINER	JOE		2494
GRIER	JON		1168
GRISWOLD	STEVEN		1526
GRODE	JIM		628
GROVER	GREG		900
GRYDER	TERESA		1517
GUESS	ALICE		2647
GUILBAULT	RICH		3696
HAGAN	PHILLIP		1134
HAGAN	JOEY		1783
HALL	JULIA		2274
HAMMOND	JOANNE & FRANK		1155
HAMMOND	CHARLES		1459
HANNAH	RAY		1229
HANSEN	DARLENE		1169
HARE	ELEANOR		3762

HARE	ELEANOR		3763
HARE	ELEANOR		3765
HARE	BILL		3766
HARE	ELEANOR		3768
HARE	BRUCE		3961
HARMON	RHONDA		1521
HARPER	DOUG		1173
HARPOOTLIAN	PAMELA		2225
HARRIS	BOB		681
HARRISON	WILLIAM	TROUT UNLTD OCONEE RIV CHPTR	743
HART	AMELIA		2398
HART	FRANK		3789
HARTLEY	KRISTINA		833
HARTWIG	ERIKA		830
HARVEY PHD	ALEX		2270
HARVEY PHD	ALEX		2271
HARWELL	JAMES		3735
HARWOOD	LEONARD		3713
HASELTON	DEANNE		183
HASSELL	WILLIAM		1181
HASSON	DAN		975
HATCHER MD	JEFFREY		3800
HAUGEN	KRIS		2483
HAWK	KAREN		466
HAWKINS	J MARK		2260
HAYDEN	AUBREY		1178
HAYES	CINDY		1475
HAZARD	STARR		795
HEARN	TIM		378
HECKMAN	STEVE		2504
HEDRICK	BOB		621
HEISNER	BEVERLY		955
HELMS	CURTIS & KATHY FKEXICO & BOBBY & BECKY		2393
HENDERSON	DONNIS		3761
HENS	CHRIS		590
HENS	PETER		1022
HENSLEY	DAVID		3924
HENSON	DANNY		302
HENSON	STEVE	STHRN APPALACHIAN MULTI USE CNCL	2413
HENSON	JOSH		2402
HERBERT	TERI LYNN		2268

HERBERT	AMY & GEOFF		3742
HERBERT IV	WILLIAM		1513
HERNANDEZ	DR MARIA		1203
HERNANDEZ	JAMES		2269
HERTZ	KRISTIE		977
HESSION	TOM		2322
HICKS	ANITA & ROBERT		1544
HIGGINS	SUSAN		1531
HILL	MARY		172
HILL	LEE		2327
HIPP	TRES		3720
HOBBS	ELAINE		3772
HODGIN	JAY		682
HOGUE	GREGORY	DEPT OF INTR/OFC ENVIRON PLCY & COMPLNCE	1206
HOLCOMB	GLENN		458
HOLLEMAN	FRANK		2513
HOLLEMAN III	FRANK		3959
HOLLENBECK	LEANNA		1215
HOLLIDAY	ROGER		525
HOLLIFIELD	CLYDE		48
HOLLINGSWORTH	G		1000
HOLLINGSWORTH	RHONDA & TERRY		3740
HOLT	BERNICE		164
HOLT	ALBERT		175
HONEA	KELLY		1021
HONEA	ASHLEY		1023
HONER	STEPHEN		2466
HOOPER	F		3422
HOOPER III	F		3418
HOPPER	RAY		3425
HOWARD	HAL		432
HOWELL	JANN		978
HOY	KEITH		684
HOYT	DEBORAH		2217
HUCKABEE	ANNA	SC DEPT OF NTRL RESRCS	188
HUDSON	MARIE		1541
HUDSON	JOSEPH		1714
HUDSON	LARRY		2329
HUNTER	CURTIS		3759
HUS	DAVE		1760
HUTCHINSON	SAUNDER		1658
INGOLD	IRENE MORRAH		2495



INGRAM	S		2306
IRWIN	MARK SHELLEY & HUGH	STHRN APPALACHIAN FRST COALTN	3150
IRWIN	JAMES		3459
JACKSON	SIDNEY		462
JACKSON	ANDREW JOSHUA		2240
JACKSON	R JUNIOR		2244
JACKSON	SAMANTHA		2246
JACKSON	MARY JEAN		2247
JACKSON	LISA		2261
JACKSON	LESLIE		2262
JACKSON	CINDY		3756
JACOBSON	BRIAN		2519
JAMARIK	PAMELA		1462
JAMES	MARK		1014
JAMES	STAN & MARY		1726
JASCOMB	JERRY		1446
JENKINS	DAVID	AMERICAN CANOE ASSOC INC	3482
JESTER	JO		174
JETER	BOB		1733
JFERLAUTO	JERRY		957
JOERGER	BILL		2312
JOHNS	KAREN FINCHER		3917
JOHNSON	JEN		165
JOHNSON	TARA		529
JOHNSON	RUSSELL		1144
JOHNSON	VIRGINIA		1194
JOHNSON	RUSSELL		1456
JOHNSON	GLENN		1732
JOHNSON	STEVE		2291
JOHNSON	MATT		2404
JOHNSON	JENNIE		2490
JOHSON	DAVID		744
JOLLY	FRANCES		1441
JOLLY	JAMES		1530
JOLLY	BARBARA & BEN		1734
JOLLY	JOSPEH		2392
JOLLY	STAN & ANITA & JOSEPH & KIMBERLY & AMY		2718
JONES	JAMES		818
JONES	MAX		1739
JONES	DEANA		2227
JONES	JULIE	UNION CNTY DEV BD	1122

JORDAN	MATT		1721
JUDAY	ERIC		1511
KAFSKY	JENNIFER		2524
KAUFMAN	LEE		1435
KEARSE JR	CHESTER	SCTY OF AMERCN FRSTRS/SC DIV	3136
KEENER	CONNIE & BRIAN		3754
KEENEY	MARISA		983
KEILMAN	KEVIN		2484
KEITH	JASON		1769
KELLY	CHRISTOPHER		1524
KEMPTON	CHRIS		1460
KEMPTON	CHRISTOPHER		3969
KENGLA	DONALD		2518
KENNEDY	BARHAM		1666
KIES	JOHN		49
KIES	JOHN		1209
KILLAM	NEAL		1738
KILLIAN	JOAN		970
KING	KAYE		948
KING	JOHN		1187
KING	WILLIAM		3922
KING	WILLIAM		3925
KINGSLAND	GRAYDON		96
KINGSLAND	GRAYDON		493
KINGSLAND	GRAYDON		494
KINNEY	MARY BETH		1750
KINSER	DONALD		1665
KINSER	DONALD		3728
KINSER	ALISON LEIGH		3817
KIRBY	PETER		2316
KIZER	EDWARD		3960
KLARAS	DOUG		1744
KLEIN	JOHN & GRETCHEN		2221
KNIGHT	LEA		1186
KNIGHT	KYLE		2251
KNODE PHD	STEVE		2480
KOHL	GEOFF		2481
KOLARICH	BETTY		176
KOLARICH	STEVE		180
KOLARICH	BETTY		1207
KRAKE	STEPHEN		1126
KRAMER	MANFRED & JANE		946
KRAMER	JANE		3444

KRECH	EDWARD		3139
KRISPYN	HUGO		787
KRUCKE	KURT		829
KRUEGER	MARY	ESTRN FRST ACTION CTR/THE WLDNRSS SCTY	3684
KUSTAFIK	KAREN		3718
LACKEY	SUSAN		1150
LAFLEUR	KAREN		999
LAMB	ARNOLD		1006
LAMBIE	COREY		1764
LANCASTER	MONTE		1539
LANCASTER	JAMES C & SHIRLEY		2506
LANCIANESE	RICHARD		75
LANDRETH	TOM		897
LANDRITH	HORACE		729
LASH	DAVID		3808
LAWDAHL	RICHARD		2474
LAWRENCE	P		1474
LAWSON	CAROL		810
LAWSON	DOYLE		1133
LAWSON	JAMES & DORIS		1434
LAWSON	HAROLD D & BOBBIE JEAN		2509
LAWSON	NANCY		3744
LAWTHER	J		816
LEA	SALLIE		184
LEAGUE	HELEN		3423
LEAHY MD	EDWARD		2243
LEAPHART	MALCOLM	SC CNCL TROUT UNLTD	1019
LEE	MIKE & PHYLLIS		2253
LEHNER	BETTY		1185
LEONARD	ASHLEY		3791
LEVISEN	MARTIN		790
LEWIS	CALVIN		591
LEWIS	KEVIN		2721
LILES	KELLY		1779
LINDNER	GARY		1725
LIPSCOMB	BETH		3792
LITTLEJOHN	ROBBIE		1727
LOESEL	JAMES	CTZNS TASK FRCE ON NATL FRST MGMT	3687
LOMAX	ELENI		2523
LONG	SALLY		836

LOTT SR	CHARLES	1135
LOUKO	KEN	3726
LOWE	ROY	880
LOWE	PATRICIA	1225
LOWRY	BERNARD	167
LOWRY	MARY ROSE	186
LOWRY	MARY ROSE	1453
LOWRY	BERNARD	2279
LUCAS	LYNNE	1177
LUINSTR	DAVID	595
LUINSTR	DAVID	1154
LUPER	STEPHEN	3727
LYCAN	SPENCE	1437
LYLES	JOSEPH	962
MACALUSO	LYNDA	2416
MACALUSO	LYNDA	3424
MACDERMOT	ALAN	825
MACKENZIE	CLARA	492
MACKENZIE	CLARA	969
MACMILLAN	GLEN	2469
MADDOX	DAVID	3748
MADDREY II	E	3446
MAJORS	JAMES	70
MAKELA	KATHI	3117
MALLARD	JED	1547
MALONE	JEANIE	1520
MALONE	PAUL	2293
MALPASS	LARRY & LINDA & PAULA & TARA	2482
MANCINI	DAVID	949
MANDELL	BETTY	997
MANLEY MD	KAREN & MICHAEL	92
MANN	DAVID	1158
MANNING	THOMAS	185
MARCINAK	C FRED	730
MARKEL	FLEMING	3413
MARKS	CHARLES	589
MARLEY MD	MICHAEL	2231
MARQUES	ANA	2656
MARTIN	MICHAEL	530
MARTIN	WES & PHYLLIS	1214
MARTIN	CATHERINE	2216
MARTIN	DORA	3802

MASCIO	BRYAN		1782
MASON	JOANN		1138
MASTEN	BILL		1668
MATHERS	MICHAEL		3736
MATLOX	MICHAEL		1197
MAXWELL	ROBERT		655
MAXWELL	BOB & BARBARA		1174
MAY	JANICE		2641
MAY	DAVE		3779
MAZUR	ROBERT		1198
MAZUR	ROBERT		2805
MCABEE	THOMAS		819
MCABEE	MARION		2286
MCABEE	DONALD		3456
MCADAMS	RICHARD		793
MCADAMS	RICHARD		3142
MCADAMS	LISA		3439
MCAFEE	COREY		3716
MCANALLY	BOB		3767
MCCALL	GENE		1436
MCCASKILL	VON & LINDA		1163
MCCLURE	HERBERT		491
MCCLURE	DINVER		1448
MCCOOK	SYBIL		805
MCCORMICK	KATHRYN		980
MCCUBBIN	JAMES		1661
MCCULLOCH	JAMIE		1210
MCCURRY	JOHN		1470
MCDANIEL	JANET		470
MCDANIEL	BRUCE		1166
MCDEED	KATHRYN	SC FRST WATCH	3149
MCDEED	ANN		3431
MCDONALD	DEBBIE		463
MCDUGAL	PATRICK		3958
MCGEORGE	SHELLEY		1196
MCGINNIS	KELLY		2508
MCGUCKIAN	DEBORAH		963
MCINNIS	THOMAS		2272
MCKAY	HENRY		3711
MCKINNON	BRIAN		3479
MCLEAN	NANCY		971
MCQUIDDY	GAYLE		3421
MCRAE	STEVE		2521

MEADOR	LUCILLE	3780
MEADOR	FELDER	3782
MEANA	LARRY & ROBERTA	797
MEANA	LARRY	1202
MEDFORD	RANDY	1649
MEEKS	LINDSAY	168
MELEKOS	MARIA	1180
MERCHANT	JIM	1443
MESSICK	ROBERT	3470
METZGER	HARRISON	1532
MICHI	EMILY	171
MIHALAS	MIKE	2302
MIKELL	J THAMAS	306
MILLARD	MATTHEW	1148
MILLER	JUNE	1533
MILLER	KEVIN	3771
MILLS	JAMES	3472
MIMS	ROBERT C & MARY LOUISE	3130
MITCHELL	HEATHER	2229
MONROE	MARIANNE	1195
MOORE	STEVE	727
MOORE	BOBBIE	802
MOORE	WILLIAM	2732
MOORE	L	3118
MORELLI	PATRICK	1007
MORGAN	EILENE	811
MORGAN	VICKI	2391
MORIN	EVA KNOX	3753
MORROW	MICHAEL	1223
MOSER	DAVE	430
MOSS	GENE	2720
MOSS DMD	CATHY	821
MUIR	MATTHEW	3453
MULDER	DAVID	976
MUNN	SCOTT	1774
MURER	GLENN	3478
MURER	GLENN	3487
MUSIELAK	KAI	524
NADEAU	DONNA	3957
NELSON	BEN	1676
NEWELL MD	ROBERT	2409
NEWMAN	LEON BOYD	433

NEWMAN	A		563
NEWMAN	LEON BOYD		2215
NEWMAN	BETSY		3119
NICOLL	MARY		3430
NIXON	JIM		1461
NODINE	JIM		3751
NOLAND	BLANTON		2471
NORELL	DAVID		1432
NORRIS	GEORGE		2396
O'KEEFE	THOMAS		3710
OLIVE	JOHN		434
OLSON	SHERRY		1152
OLSZOWY	MARK		3471
O'NEILL	ROBERT		733
OSBORNE	DOROTHY		1785
O'SHIELDS	EDWARD		1663
O'SHIELDS	CORNELIA		1664
O'SHIELDS	SARAH		2307
OTEY	KIRK	NATL LDRSHP CNCL OF TROUT UNLTD	723
OWENBY	CAROL		1540
OWENS	BARNEY		798
OXNER	KRIS		1131
PADGETT	FLOYD		832
PAGE	WILLIAM		2501
PAINTER	WILLIAM		3921
PALMER	MERRILL		2288
PALMIERI	CHARLES		991
PANNELL	JOE		2218
PANTALONI	MATILDA		1472
PARKER	KEN		98
PARKER	WILLIAM		973
PARKER	GREG		1660
PARTINGTON	TOM		383
PAUL	FRANK	TROUTBECK FLY & ROD	94
PAYNE	MARTY		3809
PAYNE MD	ROBERT		745
PEAHUFF	JASON		1129
PEAHUFF	MICHELLE		1718
PEARSE	EMMA LOUISE		1515
PEARSON	BARBARA		298
PEELER	B		984
PEEPLS	DABNEY		3435

PEEPLS	BETHANY		3698
PERDUE-SHUPE	DIANE		1161
PERLMAN	SUSAN		2238
PERRIN	DAVID		2415
PERRIN	DAVE	NANTAHALA OTDR CTR	2773
PERRIN	DAVE	NANTAHALA OTDR CTR	3703
PERRY	J		1674
PESCHIO	DAN		2326
PETTY	JACKIE		1452
PFISTER	ROBERT		1535
PHILLIPS	HARRY & CARTER		3416
PIZZUTO	THERESA		3124
PLACKE	NIENNA		965
PLATT	MARGARET		1224
POLK	GEORGE		173
POLK	S JANE		182
POLK	GEORGE		791
POLK	S JANE		2280
POLLARD JR	ROBERT	POLLARD LMBR CO	2239
POOLE	JOHN		1191
PORTER	PHIL		380
POSTLES	BARBARA		990
POSTMA	SARA LYNN		1020
POWELL	DENISE		528
POWELL	STEPHEN		964
POWELL	DON		2497
POWERS	MARY		1124
PRATER	BENJAMIN	STHRN APPALACHIAN BIOVRSTY PROJ	3971
PRIESTER	ASHLEY		2649
PRINCE	AMANDA		1450
PRIVETT	DONALD		1208
PROTHRO	JEAN		2644
PULLIAM	JOE		1141
PURSE	ADAM		93
QUINN	DICK		785
QUINN	VANCE		1731
RAEBER	STEPHEN		884
RAEBER	STEPHEN		3806
RAESIDE	JOHN		1001
RAKEY	LINDA		1024
RASMUSSEN	ERIK		1758
RAY	JOHN		1156



RAY	JOHN	3441
REAVES	FORREST	3797
REED	PHILIP NEILL	1172
REESE	HILDA	1157
REEVES	JOHN	2475
REEVES	ANITA	3956
REICHARD III	W THOMAS	654
REIGHARD	GREG	1662
REINHOLTZ	C	968
RESIDENT		956
RESIDENT		1757
RESS	PAUL	1519
REYNOLDS	BENJIE	1716
REYNOLDS	B	1717
RICE	NENA POWELL	899
RICE	RODNEY	1737
RICE	DALANE	2311
RICHEY	BRYAN & JUDY	310
RICHMOND MD	LEA	596
RIPPY	CRYSTAL	3699
RITZEL	MAUREEN	303
RIVERS	TERRY	1016
ROACH	EDWARD	3788
ROBERTS	MARK	3420
ROBESON	BEN	3144
ROBEY	JAMES	804
ROBINSON	RICK	1128
ROBINSON	MARTY & MELINDA	2258
ROBINSON	JEANNE	3437
RODRIGUEZ	SHANNON	982
ROGAN	FRAN	3955
ROLARICH	STEVE	3134
ROMINE	RON	3803
ROSE	SHAN	728
ROSENFELD	CARL	2233
ROSSETTI	DAVID	653
ROWE	MIKE	1759
ROYER	ROBERT	97
ROYSTER	KENNETH	2256
ROZIE	JEN	80
RUBY	BOB	459
RUBY	BOB	783
RUDD	BENNETT	76

RUDD	PAT		79
RUDD	BENNETT		1179
RUEBSAMEN	RICKEY	US DEPT OF COMMRC/NATL OCNC & ATMOSPHERIC AD	246
RUSHTON	MICHAEL		3464
RUSHTON	MICHAEL		3465
RUSSELL	DENNIS C & BARBARA		2477
RYAN	ALEICIA		1767
SALLEY	MARK		817
SANDERS	VIRGINIA		820
SANDERS	DONALD		3962
SANDIFER III	WILLIAM	ST OF SC HSE OF REPS/DIST 2	381
SANSBURY	CHESTER		3461
SAUNDERS	VERLA		1003
SAUNDERS	STEPHANIE		3799
SAUSSY	PATRICIA		3419
SAVARESE PHD	PAUL		1228
SCARBOROUGH	DOUG		1153
SCHARIN	LISA		2648
SHELL	CHRIS		1776
SCHENCK	JOHN		944
SCHLENKER	BROOKE		2220
SCHMELL	STACY BAKER & HANK & LADONNA & KATY		1542
SCHMID	JEROME		2299
SCHMOEKEL	KRISTI		3814
SCHOOLEY	WILLIAM	APPALACHIAN PADDLING ENTHUSIASTS	2328
SCHOOLEY	WILLIAM	APPALACHIAN PADDLING ENTHUSIASTS	3807
SCHROADER	JOHN		1762
SCHWITTERS	SCOTT		3463
SCOTT	ROBERT		1444
SCOTT	ROBERT	SC FOR ASSN	469
SCOTT-WAGNER	VALERIE		3790
SCULL	HERBERT		2275
SEAL	LIBBY		1473
SEEHORN	TERRY		2514
SENER	HERMAN		166
SENER	HERMAN		2645
SERMONS	KATHRYN		3445
SERMONS	CHRIS		3778
SHAPIRO	HAROLD	CATAWBA RGNL	3137

SHARP	NORM		2236
SHAW	ED		3966
SHELBURN	BILL		686
SHETLEROE	MICHAEL		78
SHEPPELL JR	WILLIAM		1545
SHERARD III	WADE		2500
SHERBERT	TOM & JANET		3801
SHERBY	RYAN		1442
SHETLEY	CRYSTAL		2387
SHICK	ART		2285
SHICK	ART		3704
SHIELDS JR	BOBBY		431
SHMIDT	DAVID		3701
SHORT	TOMY		1013
SHOULTZ	JARED		834
SHUCKER	PAMELA		3738
SHUFELDT	PATRICIA		169
SIMMONS	HAYWARD		220
SIMMONS	DONA		293
SIMMONS	HAYWARD		386
SIMONSON	THOMAS		3964
SINGLETON	BLAINE		1753
SISK	DUDLEY		1219
SISK	DUDLEY		3207
SISSON	REID		3741
SIZEMORE	KENNETH		1137
SLOVIC	RANDY		2485
SMALL	RICHARD & PAULA		1218
SMALLWOOD	MAGGIE		1162
SMITH	DALE		1159
SMITH	RACHEL		1190
SMITH	HARLIN		1204
SMITH	JEFFREY		1457
SMITH	EVERETTE		2237
SMITH	RICKY E & WENDY		2257
SMITH	RACHEL		2263
SMITH	OLIVIA		2643
SMITH	BRIAN		3121
SMITH	HARLIN		3132
SMITH	JIMMY	UN SOIL & WTR CONSERV DIST	2284
SMITH	MICHAEL	TROUT UNLTD	3458
SMITH	DEBRA	HCR MNR CARE	3916
SMOLEN	T		2264

SMOLEN	T		2386
SMOLKA	JAMES		3477
SMOLKA	JAMES		3712
SMOLSKI	KATHERINE		2650
SNYDER JR	THEODORE		3143
SOMERS	ALBERT		2520
SORROW	CHARLES		2300
SPANGLER	CHADWICK		3706
SPARKS- BREITHAUPH PHD	KATHY		2714
SPARROW	HENRY	ADLT EDUC UNION CNTY SCHLS	2419
SPEAR	DEBRA		2468
SPEARS	JIM		1654
SPENCER	CAROL		2638
SPLAWN	FAYE		2235
SPROTT	KEWPIE		807
SPROTT	JEANNE		808
STAFFORD	MICHAEL		2226
STAHL	THOMAS		809
STALNAKER	DUANE		2479
STANCIL	BILLIE		688
STANDRIDGE	NOAH		3757
STEAGALL	BEN		2408
STEED	MIKE		535
STEGE	KATHRYN		2493
STENHOUSE	ROBERT & JAN		2488
STEPHAN	JOHN		1780
STEPHENSON	MARGARET		170
STEPHENSON	WILL		179
STEWART	ANGELIA		296
STEWART	KAREN		3747
STINE	CRAIG		3775
STOCKMAN	EDWARD		187
STOVER	MARK		1671
STRAUSBAUGH	SCOTT		875
STRIBLING	JOE		1226
STRICKLAND	JAMES		1773
STRICKLAND	KEN		2267
STRICKLER	BETH		2028
SULLIVAN	DONNA		2498
SULLIVAN	MARK		3730
SULTON	DANNY	MEANSVILLE RILEY WTR CO INC	3133
SUTHERLAND	MITCHELL		987

SUTTON	BOB		379
SUTTON JR	DOUGLAS		2731
SWARTZ	LINDA		301
SWIGLER	JANET		943
TAFT	LINDA		177
TALAKKOTTOR	JULIA		1217
TALBERT	BRIAN		1755
TALLMAN	JEFF		1518
TANGUAY	TRISH		3455
TANSIL	GEORGE		3460
TARTAGLIA	BRENDA		2278
TAYLOR	NATHAN		1464
TAYLOR	APRIL		1729
TAYLOR	GEORGE & LINDA		2249
TAYLOR	MARY		2292
TERRY	JOEL		1451
TERRY	CLAUDE	SOUTHEASTERN EXPDTNS	2711
THIES PHD	MARK		2281
THIES PHD	MARK		2651
THRIFT	GREG		1512
THRIFT	JOEL R & TERRY	THRIFT BROS LMBR CO INC	2736
THURLOW	G		3746
THURMOND	CLAUDE		3145
TISDALE	CHARLEE		1002
TJAARDA	JOHN		801
TOWNSEND JR	JAMES		835
TRAFICANTE	FRANK		1508
TRAVIS	ANDY		1433
TROUTMAN	ANNE		947
TULP	SHIRLEY		1170
TUMKIN	A		1216
TUMLIN	BETTY		1211
TURNER	ROY		1213
TURNER	DAVID		2388
TWITTY	BILL		3732
URBEN	LEAH		299
VAN DEN BERGH	WILKO		1145
VANDERFORD	GEORGE		967
VANDERFORD	STANLEY		2405
VANDERSTAR	BEV		731
VANHEULE	TIM & CAROLINE		784
VARNER	MICHAEL		294
VARNER	RUBY		2715

VAUGHAN	RAY	WILDLAW	3148
VEAD	MIKE		1438
VINEY	ANGELA	SC WILDLIFE FEDRN	495
VINEY	ANGELA	SC WILDLIFE FEDRN	3919
VOELZ	LAURA		3920
VONKOLNITZ	CHRISTINE		2289
WADE	ROGER		2728
WADE	C DANELL & ROGER	WADE'S EMPLMNT AGCY	2730
WAGNER	DEAN		3737
WAGNER PHD	LISA		2277
WALBRIDGE	CHARLIE & SANDY		2252
WALKER	LARRY		683
WALKER	STEPHEN		685
WALKER	DAVID		823
WALKER	PATRICIA		3724
WALL	HEATHER		1458
WALL JR	W VIRGIL		3473
WALLACE	JAMES		3752
WALLER	DAVID	GA DEPT OF NTRL RESRCS	2652
WALTERS	CAROL		3426
WARD	CAROL		1183
WARNER	JACK		625
WATERS	PEGGY		3440
WATES	LYNN		2640
WATKINS	GREG		2467
WATKINS	W		2470
WATSON	SHARON		953
WATSON	NIGEL		1143
WATSON	CRAIG	ATL CST JNT VENTURE	3452
WEST	ALVIS		1538
WEST	PAUL		3120
WESTERMEYER	MICHELE		3749
WHALEN	KIM		2234
WHARTON	CHARLES		2254
WHITE	BILL		1222
WHITE	CRYSTAL		2639
WHITE	SUSAN		3722
WHITE JR	THOMAS	SCHL DIST OF UNION CNTY	1735
WHITE JR	THOMAS	SCHL DIST OF UNION CNTY	3127
WHITEHURST	JODY		1756
WHITENER	WILLIAM		2389
WIER	DIANE		898
WILDER	JEAN		1468

WILLETT	PAT		384
WILLIAMS	MARK		1455
WILLIAMS	MARK		2301
WILLIAMS	MARY ELLEN		3781
WILLIAMS	JEANNE		3783
WILLIAMS	MIKE		3794
WILLIAMS JR	ROBERT		740
WILLIAMS JR	ROBERT		3436
WILLIAMSON	MEG & JOEY		992
WILLIS	EDWARD		2298
WILMOT	ED		71
WILSON	RICHARD		822
WILSON	LOWRY		2305
WILSON	TERESA		2411
WILSON	FRANKLIN		3750
WINN	MARSHALL		3131
WINTER	CINDY		3760
WISE	JACK	WILDWATER LTD	2290
WITHERSPOON	BARRY		2502
WOOCKMAN	ROBERT		1778
WOOD	WALLACE		2726
WOODARD	TRACI		423
WOOSLEY	GREG		2410
WRIGHT	GENE		304
WRIGHT	JENNIFER HUTCHERSON		2734
WRIGHT	TROY		2735
WYCHE	BRAD	UPSTATE FORVR	2712
WYCHE	GEORGE SCHACKEL & C THOMAS	NATURALAND TRST	3451
WYKES	LOUISE		959
WYLIE JR	WILLIAM		536
YANICK	JUNE		1467
YASINSAC	ANDY		1469
YOOK	STEVE		3483
YORK	DAVID		2719
YOUNG	SHAWN		1184
YOUNG	RYAN		1746
YOUNG	SUSAN		2496
YOUNG GALLAGHER	CAROL		3777
YOUNGBLOOD	PRUDENCE		2313
YOW	GARY WESLEY		2417
ZDENEK	JOSEPH		1220
ZDENEK	JOSEPH		1221

ZIMMERMAN	RICHARD		382
ZIMMERMAN	DEREK		995

## CHAPTER 1 – PROCESS, PLANNING, POLICIES, AND LAWS

### **1-1. Public Concern: The Forest Service should recognize that the PRLMP places too much emphasis on project level analysis.**

The Forest Plans are strategic documents that make decisions on desired conditions, goals, objectives, standards, management prescription allocations, land suitability, monitoring requirements, establishing an Allowable Sale Quantity, making recommendations for Wilderness Study Areas and Wild and Scenic Rivers, and where applicable, consenting to oil and gas leasing. Any further decisions on how to meet this strategic plan direction is best addressed at the project level.

### **1-2. Public Concern: The Forest Service should establish a realistic time period for revising the forest plan.**

While we were on a tight time frame to make changes between the Draft and Final, time was allocated to make the changes that were needed in the documents, as well as any reanalyses (such as rerunning the Spectrum model) that were needed.

### **1-3. Public Concern: The Forest Service should ensure that forest plan goals and standards are tied to issues.**

The flow of wood products from the Sumter NF is a result of managing for the desired conditions described for each management prescription. The goal for wood products is one of many goals in the Sumter LRMP and must be viewed in the context of the other goals, as well as the objectives and standards in the plan, and the desired conditions of the management prescriptions. Effects on the environment are addressed in the EIS. The response to concern 7-127 addresses ASQ concerns.

### **1-4. Public Concern: The Forest Service should revise and release for comment the PRLMP and DEIS before the publication of the final revised plan and EIS.**

The process laid out in the National Forest Management Act implementing regulations (36 CFR 219) and the National Environmental Policy Act and its implementing rules do not require a second draft EIS. A supplemental EIS may be issued if the agency decision-makers feel that substantially new information has been identified. No significant new information has been found in this case.



**1-5. Public Concern: The Forest Service should not make any changes to the Sumter National Forest Plan.**

Changes between the draft and final eis are not unusual; in fact, they are expected as the decision-making process works through all of the public comment and analyzes the factors involved.

**1-6. Public Concern: The Forest Service, as required by NFMA and the Endangered Species Act, should proceed with formal consultation with the U.S. Fish and Wildlife Service.**

1) We have consulted with the Fish and Wildlife Service. Consultation was initiated on October 2003. We received written concurrence on our findings for 11 species. 2) There is no requirement in the National Forest Management Act to consult with the Fish and Wildlife Service. 3) We have complied with requirements for management and recovery. "Consultation" is a process for which Federal agencies review their proposal(s) with the Fish and Wildlife Service. It may either be informal for formal for each species depending on the findings of the Biological Assessment completed by FS biologists. The consultation process is completed when the FS receives a concurrence or a biological opinion for that species. It is important to note that the consultation with the Fish and Wildlife Service is conducted for each species in a proposal, not the entire proposal.

**1-7. Public Concern: The Forest Service should not allow industry groups to dictate National Forest System lands policy.**

The responsible official (in the case of a Forest Plan this is the Regional Forester) must consider comments from all interested agencies, tribes, groups, organizations, and individuals. The decision, which is documented in the Record of Decision, must be based on a determination of the Net Public Benefit of the action. The "Rationale for the Decision" documents the decision.

**1-8. Public Concern: The Forest Service should provide meaningful opportunities for citizen involvement in National Forest System lands management decisions.**

The Forest provided many opportunities for this involvement by making available the draft documents, taking comments for at least 90 days, holding meetings, and analyzing all comments.

**1-9. Public Concern: The Forest Service should have better informed the public in Georgia of the proposal to allow boating above the Highway 28 Bridge.**

The Sumter NF held an open house on Saturday August 24, 2002 in Laurens, SC where alternatives to the boating closure were broadly discussed. The Draft Plan and EIS went out for comment early in 2003. Following that, a series of public meetings were held across South Carolina on April 8, 10, 28 and 29 where the alternatives to the boating closure were discussed in

detail.

**1-10. Public Concern: The Forest Service should have better involved the public in the forest plan revision process.**

Same as response to PC 1-8.

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**1-11. Public Concern: The Forest Service should have better integrated public input from the August, 2002 public meetings into the preferred alternative.**

Comments allude to the Forest "ignoring" public comments received during the earlier planning process. This was not the case. The public meetings held in August of 2002 were very helpful to the Forest planning process. In the final decision, all input was considered in balancing the final decisions about the Plan.

**1-12. Public Concern: The Forest Service should explain why drastic changes were made to the draft forest plan without public input.**

The changes referred to as "drastic" were made before the Draft EIS was released. Technically, there is no public review draft until the actual DEIS is released. The earlier, publicly-released, versions were not required under the NEPA. Changes between the draft and final eis are not unusual; in fact, they are expected as the decision-making process works through all of the comment and analyzes the factors involved.

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**1-13. Public Concern: The Forest Service should require a new comment period if there are significant changes from the draft plan to the final plan.**

A new comment period, and a supplemental EIS may be required if the responsible official decides that significantly new information is unearthed or if changes in the decision are outside the range of the alternatives already considered in the draft EIS. In this case, no new information is being presented and the range of the alternatives presented in the draft EIS encompasses the decision which is being made.

**1-14. Public Concern: The Forest Service should extend the comment period.**

Same as response to PC 1-13.

**1-15. Public Concern: The Forest Service should collaborate with interested parties to resolve National Forest System lands issues.**

The Forest has carried out a collaborative process in determining what the public wants to see in this plan. Issues were discussed openly and debated at a variety of times and places.

**1-16. Public Concern: The Forest Service should collaborate with state agencies to further aquatic conservation goals.**

The Forest Service does collaborate with state agencies to further aquatic conservation goals.

**1-17. Public Concern: The Forest Service should complete the inventories and assessments required to inform this planning process.**

The necessary inventories and assessments were completed to allow us to disclose the environmental effects in the FEIS and define the appropriate management direction in the Forest Plan.

**1-18. Public Concern: The Forest Service should base the draft forest plan on sound science.**

The selected alternative is the result of our best efforts to resolve the multiplicity of issues this plan is attempting to address. Many of those issues conflict with each other, so efforts were made to find the “middle ground” where we could best address multiple issues at the same time. Efforts to define this “middle ground” were dependant upon sorting through the best scientific information available, interdisciplinary team interactions, public input from the various public meetings held throughout this whole planning process, meetings with our various partners, etc. This is no single “source” of information or single “viewpoint” that “drove” this decision. See the Record of Decision for more information on the rationale behind selecting Alternative I.

**1-19. Public Concern: The Forest Service should ensure that maps are easy to read.**

Comment noted. Detailed Alternative I maps have been added to the Forest Plan that contain additional information that will make the maps easier to read and enable readers to locate areas of interest.

**1-20. Public Concern: The Forest Service should improve the “textures” of polygons in GIS maps.**

The Forest used the best mapping capability it had available at the time. In the future we expect that better maps will be produced. We appreciate the comments concerning the quality of our maps.

**1-21. Public Concern: The Forest Service should be under the jurisdiction of the Department of the Interior and not the Department of Agriculture.**

While this view is appreciated, it is not something within the purview of the Forest Land and Resource Management Plan or the Agency's authority.

**1-22. Public Concern: The Forest Service should put Knutson Vandenberg fund money into wildlife programs.**

Knutson-Vandenberg funds may be collected on individual timber sales for eligible site specific projects including wildlife management. These are based on project decisions in the context of Forest Plan direction.

**1-23. Public Concern: The Forest Service should ensure that the appropriate funding is in place to implement the PRLMP.**

The Forest Service has limited discretion in setting budgets for LRMP implementation. The Forest identifies annual funding needs at several constraint levels, each reflecting a different level of plan implementation. An unconstrained level of funding is used to identify the full funding needs for the highest level of plan implementation. Actual funding ultimately is the purview of Congress and the President. Funding is a recognized limiting factor that controls the degree and speed to which the planned goals and objectives can be accomplished.

**1-24. Public Concern: The Forest Service should seek additional funding to conduct monitoring.**

Funding is clearly a limiting factor for monitoring as well as any other activity of forest management. Funding needs for the monitoring of this plan will be assessed and planned on the Forest in the initial year of implementation and for each subsequent year. Funding needs will be reported to the President for agency budget formulation. Funding levels ultimately are the purview of Congress and the President.

Additional actions that are being taken and continually explored to stretch available funds and provide for monitoring needs include:

- Application of remote sensing, geographic information systems and expanded data analysis capacity
- Utilization of information provided by other agencies
- Partnerships with agencies, universities and professional organizations
- Utilizing qualified volunteers to supplement the agency workforce

Monitoring Task Sheets will be developed to utilize these resources to extend the agency capacity to monitor the effectiveness of the plan. Annual review and adjustment to the

Monitoring Task Sheets will provide for changes needed due to technological advances, shifts in funding and priorities, workforce changes, and new opportunities for cooperation. Research needs will be identified and updated each year for additional effectiveness and validation needs that exceed the monitoring program itself.

**1-25. Public Concern: The Forest Service should specify, in the final forest plan, the effects of the current administration's outsourcing initiative.**

The initiative is a competitive sourcing could eventually have impacts on the Forest; however, no scenarios have been developed to predict these. Other than reasonably foreseeable budgets, administrative process is not considered in land and resource management planning or the NEPA that is required to accompany it.

**1-26. Public Concern: The Forest Service should better integrate the different disciplines within the agency.**

Planning Teams, supported by the Regional Office supplied many different disciplines. The Interdisciplinary process is, by regulation, an integrated process. Specialists in all major resource areas must work cooperatively on jointly developed direction for the plan.

**1-27. Public Concern: The Forest Service should conduct natural resource education programs for the public.**

This is a good suggestion and one which is carried out on every National Forest to some degree. Environmental education is a very valuable tool for National Forest management and can be done to the extent that budgets allow. Land and resource management planning does not normally address environmental education and, in the case of this and the other Southern Appalachian forests, it is not included. Other programs on the forests do address environmental education.

**1-28. Public Concern: The Forest Service should use clear language in planning documents.**

We agree and have made every attempt to accomplish this while still meeting our NFMA and NEPA requirements.

**1-29. Public Concern: The Forest Service should make recommended editorial/technical changes to the documents.**

We appreciate you bringing many of these to our attention and corrections will be made in our final planning documents.

**1-30. Public Concern: The Forest Service should specify research needs, as recommended in Appendix I.**

The National Forest Management Act, through its implementing regulations, requires, in Section 36 CFR 219.28, that such research needs be identified in forest planning. The Regulation also states that “particular attention should be given to research needs identified during the monitoring and evaluation...” One commenter supplied a list of some suggested areas of research for consideration. We have considered these. Most are questions that will be addressed through monitoring and evaluation under the plan. Most research on national forests is done through Forest Service’s research branch and in response to monitoring. Chapter 5, of the Forest Plan, addresses research needs associated with the plan.

**1-31. Public Concern: The Forest Service should include, in Appendix I, a listing of research needs.**

See response to PC 1-30.

**1-32. Public Concern: The Forest Service should tailor the language in Appendix B to reflect the process used in developing the five Southern Appalachian Forest Plans.**

There are some sections in Appendix B where the Forests used similar write-ups, but for the most part, each Appendix B was written to reflect the analysis process used on each Forest.

**1-33. Public Concern: The Forest Service should ensure that the PRLMP is consistent with national and regional guidance.**

The development of the Revised Forest Plans for the National Forests in the Southern Appalachian (with the exception of the Nantahala-Pisgah NFs) involved a high level of coordination between the Regional Office and the five forest planning revision efforts. This coordination started with the development of the Southern Appalachian Assessment, the issuance of the Notice of Intent, and then the identification of the “common” issues to be addressed. Regional guidance was provided in such things as the regional old growth guidance, guidance on determining the roadless area inventory, guidance on evaluating the roadless areas for possible wilderness designation, guidance on watershed analyses, a common set of Management Prescriptions, common “themes” for the alternatives, a common set of “design criteria” for developing Alternative I, and common outlines for the Forest Plan and the EIS. In addition to this guidance, teams were set up which included individuals from both the Forests and the Region to develop a common approach to developing Forest Plan direction and environmental impact analyses. These teams included one for addressing fisheries and wildlife issues, one for addressing recreation/wilderness/scenery issues, one for addressing riparian/watershed issues, and

another informal team to address forest management issues. Lastly, all the Southern Appalachian Planners met periodically to work on coordination/consistency issues. All this was used to develop a regionally consistent framework for developing revised forest plans in the Southern Appalachians. However, there were also “local” issues, concerns, publics, situations, circumstances, that needed to be addressed. So while there was the “regional framework” for conducting planning, the Forests could vary within that framework to meet local needs.

**1-34. Public Concern: The Forest Service should include a field guide or implementation guide as appendices to the forest plan.**

Management direction in the original Forest Plan in the 1980s included both standards and guidelines for management actions. Current regional agency practice is to include only management direction meeting the definition of a standard in the Revised Forest Plan. (Standards are specific resource management directions and often preclude or impose limitations on management activities or resource uses, generally for environmental protection, public safety, or to resolve an issue.) Some items were suggested during the planning process that are essentially the “how to’s” of implementing the Forest Plan. These guides for implementation may take the form of field guides or handbooks and will be kept separate from the Revised Forest Plan.

**1-35. Public Concern: The Forest Service should incorporate the general direction of the revised planning rule in the Region 8 forest plan revisions.**

There are many good concepts presented in the proposed planning rule of 2002, and where those concepts were consistent with the 1982 planning rule, we attempted to implement those concepts. However, since the “revised” planning rule is still draft and subject to change, we cannot implement something that is draft and we have to follow the rule that is in effect, which is the 1982 planning rule.

**1-36. Public Concern: The Forest Service should ensure that regional consistency takes precedence over the autonomy of individual forest plans.**

Throughout the planning process for the National Forests in the Southern Appalachians, efforts have been made to meet both regional consistency concerns as well as providing the flexibility to address local concerns. Often times, efforts to address regional consistency would be in conflict with meeting local needs, and visa versa. In order to address these often mutually exclusive efforts, the strategy was developed where there would be a common framework for the Revised Plans and EISs (in terms of such things as a set of common issues, a common set of management prescriptions to choose from, and common approaches to conducting various planning analyses). However, within this common framework, the individual Forests could make adjustments to meet their local situation (this included “localizing” the desired condition statements, goals,

objectives, standards and management prescription allocations).

**1-37. Public Concern: The Forest Service should use consistent formants across the five forest plans.**

To the extent that it was possible consistent formats were used for the forest Plans and EISs. We felt that this was important since the plans would come under intense public review and we wanted that review to go smoothly and make it possible for cross-forest comparisons.

**1-38. Public Concern: The Forest Service should coordinate management of the Chattooga River Watershed.**

The Sumter and Chattahoochee National Forests worked together to ensure a coordinated approach to management in the Chattooga River management. The management of the Chattooga Wild and Scenic River features prescriptions that are the same across the river. The shared roadless area, Big Mountain, is also in the same prescription, 12A.

**1-39. Public Concern: The Forest Service should comply with NEPA.**

The NEPA process has been followed in the development of the EISs that accompany the Revised Forest Plans.

**1-40. Public Concern: The Forest Service should consider that the PRLMP and accompanying DEIS violates provisions of NEPA.**

- By not considering the alternative of returning forests of the region to their natural dynamics

See response to PC 2-4.

- By basing decisions on arbitrary decisions

The alternatives and desired conditions were not arbitrary. Alternative C considered, but not in detail, a custodial level of management that essentially allows the forest to be shaped by natural disturbances. Alternative G provided large acreages late successional forest. Naturally generated disturbances cannot be relied upon for the desired timing, size, and distribution needed for regeneration and openings in other alternatives. See responses to the following comments: 7-149, 7-195, 3-568, 3-652, 3-653, 3-737, 2-009, 2-011, 2-016, 7-128, 2-036, 2-037.

- By not adequately analyzing cumulative impacts

The DEISs disclose the environmental effects, including cumulative effects of the proposed programmatic alternatives commensurate with the Forest Plan stage of decision making. Forest Plans do not generally make final irreversible or irretrievable decisions.



- By having the content analysis team in salt lake city analyze the comments

Comments were read, sorted, catalogued, and grouped by the Content Analysis Team—the responses were made by the Forests and Regional Office ID Team members and specialists.

- By not analyzing all viable alternatives

The range of alternatives is adequate. See responses to the following comments: 6-2, 6-10; 2-4; 2-9; 7-77; 3-126.

- By not providing a full and fair discussion of significant information

The commenter does not explain what information was omitted or discussed unfairly or insufficiently.

- By not disclosing significant information from the agency’s own records

There is no requirement to include discussions from all proponents of theories on the genesis of current forest conditions or to incorporate the data they claim as supporting.

- By not taking a “hard look” at the environmental consequences of agency actions

The teams did consider the information available concerning the natural processes that occur in the Southern Appalachians. Acres in many of the Management Prescription allocations do not have scheduled entries to create successional forests, and instead rely primarily on natural processes.

- By failing to disclose or respond to the opposing evidence and analysis presented by an employee of the agency

See response to the two preceding subtopics.

- By not addressing the uncertainties and risks associated with the succession-based management approach

The management activities contemplated under the alternatives are not new and uncertain practices. The effects of these activities at a programmatic level are disclosed in the EIS. Site-specific effects will be analyzed at the project level. See previous three responses.

- By not including all relevant information in the documents

There is no requirement that all information in the process record be in the DEIS or that all theories and information reviewed be included in the record. NEPA documentation was not intended to be encyclopedic. See responses to preceding sub-topics.

- By not using good data and relying on speculation

The first part of this comment lacks specificity as to any information or data that the commenter claims was not good. With respect to the Biological Opinion, in accordance with USFWS procedures, the Biological Opinion is issued when the ROD is issued. NatureServe is a reputable contractor we used to create a database on species and their habitats.

- Because the DEIS fails to identify and analyze impacts in many areas

See response to comments 3-126 and 3-132.

**1-41. Public Concern: The Forest Service should consider that the PRLMP violates provisions of the National Forest Management Act.**

- By failing to disclose records and studies relevant to the revision process.

See the response to PC 3-144.

- By not fully involving the public in the planning process.

In addition to many one-on-one discussions with groups or individuals, the forest has held numerous public meetings to engage the public in our process. These were the following:

Prior to the publication of the DEIS a public meeting was held on August 24, 2002.

After the DEIS was published and released for public review in February 2003 the following public meetings were held to explain the documents:

April 8, Ramada Inn, Clemson

April 10, Clemeson Extention Meeting Facility, Union

April 28, Savannah Lakes Resort and Marina, McCormick

April 29, Forest Headquarters, Columbia

**1-42. Public Concern: The Forest Service should ensure consultation with the National Marine Fisheries Service if agency activities adversely affect any listed fisheries species or their habitat.**

In a letter in the files dated September 26, 2003, the National Oceanic and Atmospheric Administration concurs with the USFS that there are no effects to the endangered shortnose

sturgeon and candidate Atlantic sturgeon due to revision of the National Forest Management Plan. The reason, as stated in their letter, is that there at least 11 dams located between the Atlantic Ocean and the SNF which impede the ability of the sturgeons to migrate to the SNF.

**1-43. Public Concern: The Forest Service should consult with the U.S. Fish and Wildlife Service in order to comply with the Endangered Species Act.**

See response to PC 1-6.

**1-44. Public Concern: The Forest Service should recognize that the PRLMP is in violation of the Data Quality Act.**

The Data Quality Act (DQA) is an attempt by Congress to ensure that federal agencies use and disseminate accurate information. The DQA requires federal agencies to issue information quality guidelines ensuring the quality, utility, objectivity and integrity of information that they disseminate and provide mechanisms for affected persons to correct such information. Congress enacted the DQA primarily in response to increased use of the internet, which gives agencies the ability to communicate information easily and quickly to a large audience. The comments that led to this Public Concern Statement point to the Forest not providing alternatives to large scale burning programs. This is a process question and not one that turns on providing accurate and complete information.

**1-45. Public Concern: The Forest Service should ensure compliance with the Eastern Wilderness Areas Act.**

See responses to PC's 6-10, 6-13 and 6-45.

## **CHAPTER 2 – ALTERNATIVES**

### **2-1. Public Concern: The Forest Service should continue to use the design criteria to guide the formulation of alternatives.**

The “design criteria” was used only for the process of developing Alternative I. The other alternatives were developed to meet the “themes” of those alternatives.

### **2-2. Public Concern: The Forest Service should evaluate a no commercial logging alternative.**

Numerous comments were made about the desire to have the National Forests managed under Alternative C, which is an alternative with “minimal human intervention”, or to have an alternative with “no commercial timber harvesting”. These two concepts are closely related and the responses to these concepts are therefore also similar. The rationale for not analyzing these alternatives in detail is described in Chapter 2 of the EIS under “Alternatives Considered But Eliminated From Detailed Study”.

Alternative C was an alternative developed and considered, but after additional analysis and developing more alternatives, it was determined that the other alternatives would better meet the purpose and need, and do a better job of addressing all the issues. So it was decided we did not need to continue analyzing this alternative any further.

The purpose and need of revising the forest plan is to address the changing conditions that were identified in the Southern Appalachian Assessment, the Forest’s Analysis of the Management Situation, and the changing public values as represented by the 12 common issues and 2 local issues. Alternative C would not address all these needs. The Multiple-Use Sustained Yield Act states that the Secretary of Agriculture should “develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained there from” (Section 2). Alternative C does not accomplish this. Additionally, in the regulations implementing the National Forest Management Act, the requirement to “maintain viable populations of existing native and desired non-native vertebrate species in the planning area” (36 CFR 219.19) would not be met.

Many comments argue that no commercial harvesting is needed to protect watersheds and wildlife. But there are hundreds of different species of wildlife on the national forest, and “human intervention” is needed to provide or enhance the habitats for some of those species. In all the alternatives, the percentage of the forests in “mid- to late-successional” habitats ranges 63% to 83% of the total forest acreage. Also the riparian corridor prescription is applicable in all the alternatives except Alternative F, and this management will protect the Forest’s aquatic resources. Elsewhere in the Plan, protective measures are in place to protect the watersheds in the Forest.

Providing for recreational opportunities is a key component of every alternative, and two of the issues to be addressed with the Forest Plan involve providing for recreational opportunities and managing the forests to protect their scenic resources.

Some argue that commercial logging costs the taxpayer or is a subsidy to the timber industry. But having a contractor implement the management actions needed to meet the desired conditions, and returning money to the US Treasury in the process, is often the most cost-effective way to accomplish meeting those objectives.

### **2-3. Public Concern: The Forest Service should consider a wider range of wilderness and roadless area recommendations.**

The alternatives in the EIS provide a range of wilderness recommendations from 100% of the total roadless area acreage being recommended in Alternatives B and G to 13% of the roadless area acreage being recommended in Alternatives D, F and I. Alternative C, which was an alternative considered, but not in detail, had all of the roadless areas being recommended for wilderness. Every roadless area is recommended for wilderness designation in at least one alternative considered in detail. Also, in Alternatives B, G, and I 100% of the acres in the roadless areas will have their roadless character maintained.

### **2-4. Public Concern: The Forest Service should revise the DEIS to consider a full spectrum of reasonable alternatives.**

For the question of providing an adequate range of alternatives for wilderness recommendations see the response to PC 2-3.

- Including an alternative that eliminates commercial logging
- Including an alternative that emphasizes ecological restoration without commercial logging

See the responses to PCs 2-2 and 2-9 (see below).

- Including a reasonable range of alternatives for Proposed Endangered or Threatened Species/ Management Indicator Species monitoring

See the response to PC 3-126.

- Including an alternative that addresses the monitoring of locally rare species

See the response to PC 3-122.

- Including an alternative to prescribed burns and even-aged management

The alternatives presented in the EIS provide a range of levels of prescribed burning. (See Chapter 2 of the EIS, Comparison of Alternatives, under the Forest Health Issue.) See the

response to PCs 7-299, 7-305, 7-306, 7-321, 7-333, and 7-358 for a description of the reasons why some level of prescribed burning is needed.

In terms of even-aged management, the level of management in each alternative is a function of the actions needed to meet the desired conditions of the management prescription allocations. Chapter 2 of the EIS in the Comparison of Alternatives, shows the range of management prescription allocations. See also the responses to PCs 7-89, 7-91, 7-92, 7-93, 7-94, 7-96 on Early Successional Habitat and Even-Aged Management) for a description of the reasons why some level of even-aged management is needed.

- Including alternatives C, H, E, and G

The EIS in Chapter 2, under Alternatives Considered But Eliminated From Detailed Study, describes the rationale for why Alternatives C and H were not analyzed in detail. See also the responses to PCs 2-2 and 2-9. Alternatives E and G are viable alternatives that were considered in detail. The Record of Decision documents the rationale for why Alternative I was selected over the other alternatives.

**2-5. Public Concern: The Forest Service should incorporate the Chattooga Conservation Plan as the preferred alternative.**

The Chattooga Conservation Plan was considered in the development of alternatives to the Revised Land and Resource Management Plan.

**2-6. Public Concern: The Forest Service should not provide additional analysis for Alternatives C and G.**

We assume the commentor meant Alternatives C and H since Alternative G was developed in detail. We are glad the commentor agrees with our rationale that these two alternatives did not need to be analyzed in detail.

**2-8. Public Concern: The Forest Service should have analyzed Alternatives C and H.**

See response to PC 2-2.

**2-9. Public Concern: The Forest Service should reinstate and analyze Alternative C.**

See response to PC 2-2.

**2-10. Public Concern: The Forest Service should implement Alternative D or F.**

The Regional Forester looked at all of the alternatives and chose Alternative “I”. Other alternatives were considered and not chosen. The Rationale for this decision is listed in the Record of Decision

**2-11. Public Concern: The Forest Service should not implement Alternatives A and B.**

Alternative selection is displayed in the Record of Decision.

**2-12. Public Concern: The Forest Service should recognize the wildlife values in Alternatives B,G, and I.**

Highlights of each alternative, including wildlife values, recognized and evaluated by the Forest planning team are briefly described in Chapter 2 of the EIS.

**2-13. Public Concern: The Forest Service should implement Alternative A.**

Alternative selection is displayed in the Record of Decision.

**2-14. Public Concern: The Forest Service should not implement Alternative D.**

Alternative selection is displayed in the Record of Decision.

**2-15. Public Concern: The Forest Service should consider that Alternative E did not receive serious consideration.**

See response to PC 2-10. Although this concern is centered on another alternative, the same response applies.

**2-16. Public Concern: The Forest Service should consider that Alternative G did not receive serious consideration.**

All alternatives received consideration by the responsible official. The Rationale for the decision to choose Alternative “I” is contained in the Record of Decision. Reading the Record of Decision should give commenters a better understanding of why one Alternative was chosen and why another was not.

**2-17. Public Concern: The Forest Service should implement Alternative G.**

See response to PC 2-16.

**2-18. Public Concern: The Forest Service should clarify whether the comparison between the Preferred Alternative and the 1985 Plan is a comparison with the 1985 Plan as implemented or as projected.**

Alternative F represents a continuation of the original Forest Plan. It includes projections of what could happen in meeting the desired conditions, goals, objectives, standards, and management prescription land allocations identified in the original Forest Plan. It is true that the implementation of the original Forest Plan has not met the original projections because of budget limitations, lawsuits, administrative changes in priorities, etc. Just as actual implementation of the original Forest Plan did not meet projections, it is just as likely that the actual implementation of the Revised Forest Plan will not meet projections. This is why projections of outputs are not the decisions made in a Forest Plan. A Forest Plan only makes decisions on desired conditions, goals, objectives, standards, and management prescription land allocations. The projections are only used to provide some estimates of what the environmental effects might be as a result of management activities to meet those desired conditions, goals, etc.; and to provide a comparison of alternatives. In order to make all alternatives comparable, the “no action” or “current management” alternative also needs to be based on “projected” outputs, so it is based on the same set of implementation assumptions as all the other alternatives.

**2-19. Public Concern: The Forest Service should explain how Alternative I came to be the preferred alternative.**

The rationale for why a particular alternative is chosen is not something that is a part of an environmental impact statement (EIS). An EIS is not a decision document, it discloses the effects of alternative courses of action. At the “Draft” stage, a “preferred alternative” is identified to help facilitate public comment and review. Following that public comment and review, the information in the EIS is updated and a decision is made as to which alternative to select. The rationale for choosing the selected alternative is then documented in the Record of Decision.

**2-20. Public Concern: The Forest Service should implement Alternative I.**

We agree and the rationale for this decision can be found in the Record of Decision.

**2-21. Public Concern: The Forest Service should not implement Alternative I.**

- Because the Forest Service ignored much of peer-reviewed research available through the agency’s research branch
- Because the alternative was overly influenced by environmental groups
- Because it violates the Organic Act of 1897 and the multiple-use Sustained-Yield act of 1960
- Because the proposed plan goes well beyond known natural resource science and jumps into speculative, subjective areas of human values and visions
- Because the alternative violates a number of environmental laws

Alternative I was developed to address a multiplicity of issues, and many people, groups, and organizations were involved in its development. It was developed through iterations of working and meeting with our various publics, and we consulted with our partners in research throughout



the process. The USFWS has also worked with us throughout the process and they will issue their Biological Opinion prior to the Record of Decision being signed (they do not go through the formal consultation process on draft documents).

Alternative I is consistent with the Multiple-Use Sustained-Yield Act and the Organic Act. As for the question on NFMA, the estimates on the methods of logging are found in Appendix H of the Forest Plan. For the question on the National Historic Preservation Act, goals and objectives for managing Heritage Resources are found in Chapter 2 of the Forest Plan, along with standards for protecting those resources. There is also the existing Forest Service policy, manual and handbook direction for protecting archeological sites that did not need to be repeated in the Forest Plan.

The Forest Plan is designed to avoid and minimize effects on aquatic resources through the forest standards and the riparian corridor management prescription. Concerns about recognizing the importance of transportation are addressed in Chapter 2 of the Forest Plan as well (see the section on Facilities, Roads, and Access) where goals, objectives, and standards are identified. However, a Forest Plan does not make site-specific decisions on how each road in the transportation system should be managed. It is true that there will likely be an increase in temporary roads over what has occurred in the past few years, but this will be less than the level associated with the original forest plan. Also there are numerous mitigating measures that are put in place to ensure that temporary roads minimize their environmental effects.

## **2-22. Public Concern: The Forest Service should not implement Alternative I.**

- Because the alternative does not provide the active management necessary for forest and wildlife health
- Because the focus of the preferred alternative is human compromise and consensus rather than forest health and science-based natural resource management

The nature of forest planning is such that compromises have to be an integral part of developing a forest plan. If all the publics and all the scientists agreed on what is the “right” way to manage a forest, then developing a Forest Plan would be considerably easier. However, scientists do not agree, and the public has a wide range of wants/needs/concerns with respect to the management of the national forests, as is evidenced by all the comments received.

A major emphasis of Alternative I is to manage the forest ecosystems to meet the needs of the wide variety of wildlife habitats found on the national forest. This often includes active management to create those conditions. Forest health is another key component of this alternative. Within this alternative, 259,313 acres have been classified as “suitable for timber production” and periodic, scheduled harvesting activities will take place on these lands. For a majority of the other lands, “unscheduled” and “unplanned” harvesting activities may still take place in order to address forest health needs.

## **2-23. Public Concern: The Forest Service should modify Alternative I.**

Comment noted.

**2-24. Public Concern: The Forest Service should justify the reduction of wilderness recommendations between the current Alternative I and the draft Alternative I released six months ago.**

Prior to the release of the Proposed Plan changes were still in process. Bee Cove Roadless Area was not recommended for inclusion into the Wilderness Preservation System in the Proposed Forest Plan. Several alternatives in the Draft Environmental Impact Statement do recommend this area for wilderness.

**2-25. Public Concern: The Forest Service should implement Alternative I.**

We agree and the rationale for this decision can be found in the Record of Decision.

## **CHAPTER 3 – ENVIRONMENT**

### **3-1. Public Concern: The Forest Service should protect forests and the environment.**

The Revised Forest Plans address 12 common issues and other local issues that include the wide range of desires, wants, needs, and concerns that have been expressed by the users of the national forests. Often times, meeting one set of needs/concerns is in conflict with meeting other needs/concerns. The challenge is to try to find the appropriate level of management that will best address all these issues. The Record of Decision explains how the Selected Alternative is the alternative that does the best job of trying to meet the public's demands while protecting the resources.

### **3-2. Public Concern: The Forest Service should conduct site specific analysis and review scientific data.**

A Land and Resource Management Plan (LRMP) establishes a framework for managing a National Forest in terms of goals, objectives, standards, management prescription allocations, and monitoring requirements. However, a LRMP generally does not make decisions pertaining to site-specific activities. A NEPA-compliant analysis still needs to be accomplished before making any site-specific project decisions. It is at the project level that this site-specific analysis will occur and any new science or new data is considered with respect to the project being proposed. Project scoping includes public and internal specialist scoping in order to address both site specific and scientific review.

### **3-3. Public Concern: The Forest Service should provide greater protection of soils.**

Draft Forest plan recognizes the importance of soils and provides descriptions of soil characteristics in the draft EIS'. Standards are developed to provide protection for planned management activities. Soils standards are found in various resource sections of the draft plans and forest wide standards. Site-specific analysis will be conducted at the project level and further protection provided as needed.

### **3-4. Public Concern: The Forest Service should prepare quality and detailed soil inventories, baseline conditions, and site specific analysis and mitigation measures.**

Forest Draft EIS' provide general soils descriptions. Detailed soil inventories, baseline conditions, site-specific analysis and additional mitigation measures will be developed as needed for projects as they are developed in Environmental Analysis. The forest will also employ direction in the Forest Service manual and handbooks, R8 Soil and Water Conservation Practices Guide (2002) and other references in support of protecting soil productivity.

### **3-5. Public Concern: The Forest Service should clarify FW-9 by specifying the degree of disturbance requiring stabilization.**

Any activity causing over the 15% exposure of soil as listed in FW-3 would require the use of stabilization or erosion control techniques. The intent is to develop and maintain full soil cover and stability through the use of mulch, vegetation and other methods.

**3-6. Public Concern: The Forest Service should develop tangible standards, guidelines, and monitoring requirements for soil conditions and quality.**

Regional Soil Quality Standards and Regional Forested Soil Productivity Tolerance Factor "Forested T" are applied to maintain soil quality.

**3-7. Public Concern: The Forest Service should modify FW-38 to restrict the use of mechanical equipment on slopes and explain what “sustained slopes” means.**

FW-38 in the DEIS essentially limited the use of mechanical equipment to slopes less than 35 percent. The reference to sustained slopes eludes to those times when the terrain undulates, and although the slopes are over 35 percent in general, there are enough areas less than 35 percent slope that mechanical equipment can be used on designed routes contained within the area. The standard was changed to allow some equipment uses up to 40 percent slopes and to take out the wording about the sustained slopes. The equipment use referenced will be dispersed and carefully placed when working on steep slopes, and will with other soil disturbances requirements not cumulatively disturb over 15 percent of project areas.

**3-8. Public Concern: The Forest Service should not remove organic layers, topsoil, and root material.**

On soils dedicated for growing vegetation, no more than 15% of a project area will have mineral soils exposed. On 85% or more of the project area, soil disturbance is minimal and the organic layers, topsoil and root mat are left intact. The standard was reworded to have a clearer intent and allow for specific emergency and restoration activities.

**3-9. Public Concern: The Forest Service should implement the forest plan, stabilize eroded areas, work with landowners and partners to address watershed needs, and manage vegetation.**

Objective 5.01 (proposed) As allowed under the Wyden Amendment or other directives, the Forest will work with USDA-NRCS, landowners and partners to share technology and/or expenses to improve water quality conditions on other lands where National Forest resources are impacted.

**3-10. Public Concern: The Forest Service should write a cave management plan.**

The revised forest plan includes caves under the Rare Community Prescription, which provides this habitat a high level of protection wherever it occurs. Management plans for individual caves represents too fine a level of detail for inclusion in the forest plan. However, it is important to

note that provisions of the Federal Cave Resources Protection apply in addition to forest plan direction. Management plans for specific significant caves may be prepared during plan implementation where needed to meet requirements of this law and the forest plan.

**3-11. Public Concern: The Forest Service should implement requirements that protect all streams and surface waters within national forest boundaries.**

Federal, State and local laws (i.e. NFMA, Clean Water Act) require that aquatic resources, streams and surface waters be protected. Forest plans protect aquatic resources by identifying streams, their beneficial uses and developing standards, which protect those resources during management activities. Standards are found in the Riparian Prescription and forest wide standards. Further protection will be provided as needed at the project level.

**3-12. Public Concern: The Forest Service should develop a plan to improve water quality from sources outside the boundaries of wild and scenic rivers.**

The Forest Service has special authorities within the Wild and Scenic River Corridors that they manage. On private lands, the Forest Service has no direct authority to designate, prioritize, plan or improve water quality improvements. Improving conditions involves cooperating with State Water Quality Management agencies, EPA, USDA-NRCS, local communities and citizens, and interest groups. Where Wild and Scenic River resources are being impaired, added priority and attention to address these issues will be given.

**3-13. Public Concern: The Forest Service should coordinate with other agencies and take legal action to protect water quality outside of forest ‘control.’**

The Forest Service does work with counties, states and concerned interests to address water quality problems affecting the National Forest. However, without specific information on the sources and extent of pollutants, it is inappropriate for the Forest Service to attempt legal action when the state and EPA has the direction and funding to be addressing these type problems. Where possible, we should be working together to try to increase awareness and action when we become aware of these problems.

**3-14. Public Concern: The Forest Service should protect water quality.**

Federal, State and local laws (i.e. NFMA, Clean Water Act) require that aquatic resources, streams and surface waters be protected. Forest plans protect aquatic resources by identifying streams, their beneficial uses and developing standards, which protect those resources during management activities. Standards are found in the Riparian Prescription and forest wide standards. Further protection will be provided as needed at the project level.

**3-15. Public Concern: The Forest Service should improve water quality and enforce environmental laws.**

The Forest Service is concerned about water quality and is willing to work with the existing agencies, landowners and others to improve conditions. Although we cannot enforce environmental laws, we do try to make sure that our activities comply with them.

**3-16. Public Concern: The Forest Service should modify sediment yield models to reflect conditions of, and restricted to, national forest lands.**

The sediment model is a tool used to examine the relationship between relative sediment yields and activities proposed in each of the forest plan alternatives. This model also estimates cumulative effects. Because streams function as a conduit for transporting sediment cumulative effects cannot be assessed if the analysis is restricted to National Forest lands. Further, NEPA requires the assessment of cumulative effects to include both public and private lands. Table 3-3 displays the relative increase in sediment for each watershed due to the non-system road activities on the National Forests. Much more detail is available in the process record relative to the specifics. Since Forest Service and privately managed permanent roads were from a digital coverage, they were lumped in the analysis. Temporary roads, skid roads and trails were included with the non-system road activities presented in Table 3-3.

**3-17. Public Concern: The Forest Service should protect watersheds.**

Federal, State and local laws (i.e. NFMA, Clean Water Act) require not only that aquatic resources, streams and surface waters be protected, but also they are managed to provide sustainable uses and benefits. Forest plans protect aquatic resources by identifying streams, their beneficial uses and developing standards, which protect those resources during management activities. Standards are found in the Riparian Prescription and forest wide standards. Further protection will be provided as needed at the project level. Forest wide standards have been developed to provide overall watershed protection during management activities. However, protection also infers a degree of managing to prevent excessive decay or losses associated with no management. Some activities are needed to maintain health, resilience and natural diversity within the watersheds.

**3-18. Public Concern: The Forest Service should protect streams.**

Federal, State and local laws (i.e. NFMA, Clean Water Act) require that aquatic resources, streams and surface waters be protected. Forest plans protect aquatic resources by identifying streams, their beneficial uses and developing standards, which protect those resources during management activities. Standards are found in the Riparian Prescription and forest wide standards. The standards in the Sumter National Forest Plan including the BMPs are to be applied strictly. Some of the more detailed guidance used will be developed in implementation guidelines such as the Region 8 Soil and Water Conservation Practices Guide (2002). Further protection specifics will be provided as needed at the project level.

**3-19. Public Concern: The Forest Service should specify actions and timelines for conducting watershed assessments and analysis.**

Watershed assessments and analysis are excellent tools for identifying priority watersheds, and programming restoration work. Assessments are also useful in land management allocations and in the development of prescriptions. Broad scale watershed analyses were completed by each forest to assess watershed condition and vulnerability. More detailed watershed analysis will be completed prior to project implementation as needed. Due to the costs, resource limits and the attention to detail associated with watershed assessments, watersheds with sensitive issues and moderate to high public ownership pattern will be given priority. Some of the information developed will have some use relative to other watersheds within the vicinity. Due to many uncertainties, it is unrealistic to specify actions and timelines associated with them.

**3-20. Public Concern: The Forest Service should designate high priority watersheds to receive special protection.**

The Sumter National Forest has indicated the several of the watersheds have water quality issues relative to sediment or fecal coliform, sensitive aquatic species, municipal or community sources of water or areas where the populations or diversity of aquatic organisms are less than expected. The Watershed Condition Ranking that was developed to help address the landscape scale effects of a variety of activities was also a major element to consider and help prioritize watershed restoration activities. However, we intend to verify that the conditions are severe and something can be done. We still intend to improve watershed conditions when they come to our attention, but hope to prioritize them when funding is limited. The Forest Plan and EIS indicated our intention to identify water quality problems that are especially limiting to the National Forest resources and improve watershed or specific drainage or stream section conditions by directly improving conditions and also by working with the state, EPA, communities, landowners and other interests to improve watershed conditions to satisfactory levels. We have mentioned that the Chattooga River, Chauga River and Upper Stevens-Turkey Creek areas are the major concern. We also intend to maintain the outstandingly remarkable values of all the other eligible Wild and Scenic Rivers until they are studied and a decision is made. However, when faced with circumstances of severe water quality problems even in a watershed that was not specifically identified as problematic, we intend to face and treat those problems within our authority and ability. However, as indicated over and over, we have a long legacy of erosion, stream adjustments and water quality changes that continue, and will continue regardless of what we do. We recognize that we will not be able to improve all circumstances or conditions, but will do our best to treat many of the problems, work with similar interests and try to produce a meaningful change. In essence, we are saying that all watersheds deserve attention and priority. Even though we have limited area within some watersheds, we are leaving none behind in our analysis and our interest. On the other hand, all things being equal, we would focus more on areas where the percentage of National Forest is a greater portion of the watershed, and where the issues and public interests are greater.

**3-21. Public Concern: The Forest Service should incorporate direction, goals, objectives, and standards to address a whole watershed approach of aquatic conservation for recommended issues.**

The Forest service participates in recovery plans with the Fish and Wildlife Service for federally listed species. Standards are specified in the land management plans to protect and conserve all aquatic species. They will include a watershed scale emphasis especially when there is a connection to the National Forest resources. But in watersheds with little National Forest presence or conditions where ownership pattern has little linkage to aquatic conservation issues, our priority for involvement would be diminished.

**3-22. Public Concern: The Forest Service should establish explicit management categories and prescriptions for riparian areas.**

Forest has developed Riparian Prescription specifically to protect, enhance and restore associated riparian functions and values. Riparian prescription number 11 defines the intent for the riparian corridor, which is an embedded prescription within the other prescriptions in chapter 2 of the forest plan. The overview is provided in Appendix C and provides some illustrations of the Riparian Corridor, offers operational definitions and other information on how this would be applied along with Best Management Practices.

**3-23. Public Concern: The Forest Service should identify ‘reference streams’ and their catchments.**

Page 3-1 of the plan identifies Bad Creek within the 1.A. prescription of the Ellicott Rock Wilderness as a reference drainage. It is to be maintained in relatively undisturbed conditions from recent human intervention or impact. Due to the past disturbance within the SC piedmont area, we have not found a drainage that we feel is a good example for reference drainage status. We are willing to work with the EPA, state and other interests in trying to find added reference drainage areas. Let us know if you have some specific areas of interest or you want to cooperatively look for them.

**3-24. Public Concern: The Forest Service should specify land allocations, standards, guidelines, and planning processes, as recommended, for aquatic conservation areas.**

The Forest service participates in recovery plans with the Fish and Wildlife Service for federally listed species. Standards are specified in the land management plans to protect and conserve all aquatic species. Areas designated for the Carolina Heelsplitter are addressed specifically in Management Area 1. Some of the standards identified are to allocate added riparian buffer areas to maintain consistency with USFWL recovery plans including direction to limit harvesting, roads, mining, OHV trails, etc. Limits in harvesting near Webster salamander sites are also identified. Further guidelines will be developed to address specific project level needs.

**3-25. Public Concern: The Forest Service should rewrite forest wide goals, objectives, and standards to fulfill requirements of their respective classifications and criteria, and to implement recommendations for watershed health.**



Goals, objectives and standards were developed, with review and revision as needed to help respond to issues and concerns for the health, protection, enhancement and restoration of riparian areas, perennial, intermittent and ephemeral streams. We feel the added changes will help us provide for both the protection and management needs to keep them healthy, resilient, diverse and productive. Areas we plan to address also include increased cooperation when watershed or stream conditions indicate impairment that is affecting water quality and beneficial uses. There will be increased emphasis on the identification of instream flows needed to protect stream processes, aquatic and riparian habitats and communities, recreation, research and aesthetic values. An objective was included that estimated 50 instream flow determinations that would be needed and within our estimated capability. The level and type of determination would depend on the specific resources being protected.

**3-26. Public Concern: The Forest Service should specify goals and standards for gully restoration.**

Gully stabilization or restoration are undertaken when active erosion and/or sediment delivery are occurring and impacting resources. The desired results will vary by site, but usually will include reducing, minimizing or halting active erosion processes, and recovery of the affected area to a self maintaining and fully functioning soil, vegetated and productive condition. Standards associated with gully treatments include using recovery methods are similar to other construction activities such as roads, trails, wildlife openings, log landings, etc. However, due to the level of disturbance and severe condition of the soils, some measures go substantially beyond what is normally required to insure revegetation and recovery.

**3-27. Public Concern: The Forest Service should rehabilitate more streams.**

Stream rehabilitation can be complex, expensive and difficult to accomplish. In some instances, water quality and other permits may be required to undertake the work. The 110 miles indicated are just an estimate of the amount that might be undertaken with current budgets. Some of this type work may also be undertaken as mentioned in Objective 1.01. However, we are open to ideas on how this might be funded and accomplished, and are looking for willing partners.

**3-28. Public Concern: The Forest Service should focus watershed restoration projects on watersheds where minimal investments can secure the largest amount of high quality habitat and diversity of aquatic species.**

We do not disagree that expenditures in high quality waters may be just as beneficial to protect the present condition as trying to restore a watershed that has so many problems, that no matter what is done, it will not affectively change conditions. However, watersheds are fairly large units, and maintaining specific subwatersheds and drainages within watersheds my also be just as important to diversity and habitat considerations. In addition, investments that improve watershed conditions may also benefit water quality, soil productivity, vegetation recovery and be critical to proper functioning of aquatic, riparian and upland systems.

**3-29. Public Concern: The Forest Service should establish riparian corridor standards that specify provisions to guide timber harvest and the construction, use, and maintenance of roads.**

Specific road and timber harvest standards are specified in the riparian corridor prescription, forest wide standards and referenced in State BMP requirements. Standards are also stipulated in contract clauses for road construction and timber harvest which is part of the Forest Service Manual System which was not repeated in detail. The need for additional standards, road stabilization techniques, and use restrictions will be determined at the project level. In addition, implementation guidelines such as the R8 Soil and Water Conservation Practices (2002) will be part of the planning and implementation of activities.

**3-30. Public Concern: The Forest Service should adopt FW-51 and make the replacement of culverts that block stream biota a priority.**

Standard 11-8 and 11-24 are the same. Replacement of culverts will be undertaken as they wear out, unless there is a substantial impairment of the migration and health of aquatic species or habitats, and those replacements will be given a priority.

**3-31. Public Concern: The Forest Service should specify standards for the protection of watersheds.**

The state sets standards that are used to protect water quality and beneficial uses. However, due many factors, it is very difficult to determine standards that must apply to all watersheds for their protection. Guidance such as that provided in the Southern Region Soil and Water Conservation Practices Guide will be used for the protection of watersheds, along with Best Management Practices and Standards listed in this Forest Plan.

**3-32. Public Concern: The Forest Service should specify protection at the watershed scale with corridors that extend to the drainage divide.**

Protection is provided in the plan for streams, lakes, aquatic resources wetlands and floodplains (see Riparian Prescription). Riparian Corridor widths were based on research findings, monitoring data and current literature recommendations. Further protection will be considered and prescribed as needed when projects are developed. However, except as contained within the streamside protection measures associated with BMPs which on occasion may extend to or overlap the ridges, there is little interest in extending corridors to the drainage divides. Upper slopes in the vicinity of the drainage divides are often the most suitable areas of access because they are rounded to shed water, away from streams, and limit the cutting of hillsides which can capture surface and subsurface flow.

**3-33. Public Concern: The Forest Service should specify requirements to conduct a watershed analysis prior to initiating site specific project planning, and stipulate the framework for the analysis.**

Watershed Analyses are conducted by the forest as needed and where it is determined that a watershed analysis should be completed to develop a project. Frameworks recommended for the watershed analysis include "Ecosystem Analysis at the Watershed Scale" and "Hydrologic Condition Analysis". During this next planning cycle of about a decade, many of the watershed analyses will be completed. In many instances, we include reference and some analysis based on watershed, subwatershed or drainage scale conditions within project level analysis.

**3-34. Public Concern: The Forest Service should conduct a full cumulative effects analysis and discard results and conclusions based on the watershed health index and associated analyses.**

**Response:** The Forest Service has chosen to address cumulative effects on aquatic species with the watershed condition ranking because it is the most likely source of impacts from management activities, correlates to changes in endemic aquatic species populations, and is the best available science. The watershed scale was most appropriate for the forest plan analysis. However, this is not to suggest that the watershed scale is the only emphasis that will be used to prioritize issues or recommend solutions on the ground. We will continue to address specific site, hillslope, catchment, drainage, and subwatershed level issues in their proper context and considering the National Forest boundaries and interests.

- Because the underlying analyses are fatally flawed with false assumptions, misinterpretations, and unsupported conclusions

**Response:** The purpose of the Watershed Health Index and associated analyses was designed to identify large-scale attributes that may contribute to maintenance of aquatic systems. Further, the relationship between the proportional increase in sediment and endemic fish species is consistent with current scientific thinking related to the dynamic nature of species response to disturbance (i.e. the ranges of generalist species will expand as those of specialists contract). It is reasonable to assume that changes in the proportion of endemics accompanies disturbance in the watershed. However, in response to comments the WHI has been modified and cutoffs based on forest service ownership, riparian landuse and riparian road density have been removed. The process is referred to as the Watershed Condition Ranking to reduce confusion.

- Because the Watershed Health Index masks potentially significant effects.

**Response:** The Watershed Health Index was replaced with the Watershed Condition Ranking (the relationship between locally adapted species and sediment). Project level analysis will also look at smaller scale effects that did not show up at the watershed scale.

- Because the cumulative effects analysis does not consider potential impacts to water quality and aquatic habitat beyond sediment yields.

**Response:** Sediment was used as a surrogate to represent all adverse effects on water quality and the effects on associated beneficial uses.

- Because accuracy of the model is reported to be  $\pm 50\%$
- Because watersheds and fish species within the sample were not representative across the Southern Appalachians, nor for specific location or species.

**Response:** 1.0 is not the expectation because virtually no streams are composed of 100% endemics. It was never implied in Scott & Helfman (2001) that 0.5 was the point of being 'in balance'. Different regions and drainages support different levels of endemism as indicated by least-disturbed reference conditions. Although data from all southern Appalachian forest were not used to develop the model, the data was stratified by physiographic province and based on species described as highland endemics (those that evolved in high elevation conditions). Therefore, the ecological traits that make the species used in the analysis sensitive to disturbance should be similar to other highland endemics. Nevertheless, fish data from Virginia are currently being analyzed.

- Because all cumulative effects analysis rests on the sediment model's estimates.

**Response:** The sediment model is a consistent, repeatable process that addresses the effects of ground disturbing management activities upon streams, water quality and the aquatic environment. Its application is primarily to compare the expected differences among alternatives and present them by watershed, showing both National Forest and total watershed change with respect to current conditions. It is not suggested that sediment is the only cumulative effect, but the analysis relies heavily on sediment to integrate the other effects that may occur relative to ground disturbing activities.

- Because the cumulative effects analysis does not consider the effects of increased sediment on mussels and other species.

**Response:** The relationship between the proportional increase in sediment and endemic fish species is consistent with current scientific thinking related to the dynamic nature of species response to disturbance (i.e. the ranges of generalist species will expand as those of specialists contract). It is reasonable to assume that changes in the proportion of endemics accompanies disturbance in the watershed. The effects of increased sediment on mussels and other species were not analyzed because of the lack of appropriate data. And as suggested, the specifics of mussel species protection and limits must be dealt with at project or individual watershed scales.

- Because the Watershed Health Index does not provide analysis by management activity and alternative

**Response:** The WHI did provide analysis by alternative and included all soil disturbing management activities. However, in response to comments, the WHI has been modified and cutoffs based on forest service ownership, riparian landuse and riparian road density have been

removed. The process is referred to as the Watershed Condition Ranking to reduce confusion. The analysis included most major ground disturbing activities for both public and private lands, but outputs were not presented by specific activity to avoid excessive detail. The soils analysis does provide estimated erosion effects by activity on the National Forest that should give a relative estimate of how they contribute.

**3-35. Public Concern: The Forest Service should demonstrate regional leadership in implementing aquatic conservation and best management practices.**

The Forest service participates in recovery plans with the Fish and Wildlife Service for federally listed species. Standards are specified in the land management plans to protect and conserve all aquatic species.

**3-36. Public Concern: The Forest Service should implement recommended actions to address aquatic conservation needs of the region.**

The Forest service participates in recovery plans with the Fish and Wildlife Service for federally listed species. Standards are specified in the land management plans to protect and conserve all aquatic species.

**3-37. Public Concern: The Forest Service should manage watersheds under 9.A.3 or 9.A.4, as recommended, and follow regional guidance to develop management standards.**

Watershed restoration is discussed in the Forest Plan in Chapter 2 in the Riparian Area Management, Water Quality, Aquatic Habitats, Soil, and Air section. Goals, objectives and standards are defined to address this issue. Chapter 3 within the riparian prescription and management prescription 9.A.3 address this issue also. Finally Chapter 4 within the desired condition and standards of each management area address this concern. We believe our present direction in the Forest plan is adequate to properly protect and restore watersheds. It is not necessary for us to allocate additional acres to management prescriptions 9.A.3 or 9.A.4.

Also see responses to PC 9-8 and PC 9-9.

**3-38. Public Concern: The Forest Service should restore the watershed in Compartment 105.**

On page 3-19 of the Forest Plan, the Lower Rennick's Branch has been identified as a Scenic Area and will be managed under prescriptions 4F and as appropriate for areas within the Riparian Corridor, prescription 11, as provided in the draft Plan page 3-46. Measures to restore conditions will be considered and evaluated with other district projects and forest programs.

**3-39. Public Concern: The Forest Service should protect the Chattooga River.**

The Forest Service analyzed several alternatives that protect the many values of the Chattooga Wild and Scenic River to varying degrees.

**3-40. Public Concern: The Forest Service should manage the Chattooga watershed with identical prescriptions across forests, and issue identical maps that are easy to interpret.**

Significant changes have been made to the Forest Plan to address this issue. A new management prescription 2A CHATTOOGA WILD AND SCENIC RIVER CORRIDOR has been added to Chapter 3 of the Forest Plan as well as significant changes to existing prescriptions 2A1, 2A2, and 2A3. These prescriptions were developed in close cooperation with the Chattahoochee and Nantahala National Forests and will be used by all three Forests in managing the river corridor. Also Management Area 2 (Chattooga River Watershed) in chapter 4 of the Forest Plan provides additional management direction that will be shared among all three Forests for the Chattooga River watershed. In addition, forest plans are dynamic and can change if specific prescriptions are working better to achieve results and benefit public and resource needs. The current mix of prescriptions has been developed separately, but with a certain degree of coordination and desire for consistency with each other.

**3-41. Public Concern: The Forest Service should manage the Chattooga watershed as a cooperative effort among the Chattahoochee, Sumter, and Nantahala National Forests.**

Significant changes have been made to the Forest Plan to address this issue. A new management prescription 2A CHATTOOGA WILD AND SCENIC RIVER CORRIDOR has been added to Chapter 3 of the Forest Plan as well as significant changes to existing prescriptions 2A1, 2A2, and 2A3. These prescriptions were developed in close cooperation with the Chattahoochee and Nantahala National Forests and will be used by all three Forests in managing the river corridor. Also Management Area 2 (Chattooga River Watershed) in chapter 4 of the Forest Plan provides additional management direction that will be shared among all three Forests for the Chattooga River watershed.

**3-42. Public Concern: The Forest Service should explore the rate of fluctuation in water levels following rain events.**

Our hydrologist would like to discuss this with you. There are many possible explanations including the references made to development. The Chattooga River streamgage is located at highway 76, a substantial distance from this area. However, the record is long term and many help to evaluate your concerns at some later date. Droughts common to South Carolina and adjacent areas have occurred for up to five years in the late 1990s and early 2000s. Many storms during the spring and summer of 2003 have changed these conditions for most of the state. We would be glad to consider your observations and information, and discuss it with the US Geological Survey or others.

**3-43. Public Concern: The Forest Service should protect the Chattahoochee River basin.**

This river has its headwaters in Georgia. The Chattahoochee-Oconee National Forest plan will address this question.

**3-44. Public Concern: The Forest Service should restore the Chauga River.**

The Chauga River is very important resource. In the near future, we will be conducting watershed and hydrologic analysis to help determine the present condition and needs for improvement or restoration. If you have any specific ideas or observations on this topic, we would be interested in them.

**3-45. Public Concern: The Forest Service should better protect riparian areas.**

Protection is provided in the plan for streams, lakes, aquatic resources wetlands and floodplains (see Riparian Prescription). Specific standards are prescribed in the Riparian Prescription and forest wide standards.

**3-46. Public Concern: The Forest Service should analyze the benefits of managing ephemeral streams under the riparian prescription as compared to managing the streams for other resources.**

Ephemeral streams were included in the original definition of Riparian Corridors because of their connectivity to stream networks. Ephemeral streams however do not have riparian characteristics and therefore are managed and protected with streamside management zones. Because of their characteristics (i.e. periodic response to stream flow and uncertain identification criteria) specific guidance for management of ephemeral streams is appropriately developed at the forest level. Standards for managing ephemeral streams are included in forest wide standards.

**3-47. Public Concern: The Forest Service should include ephemeral streams in the definition of the riparian corridor and set management standards.**

Ephemeral streams were included in the original definition of Riparian Corridors because of their connectivity to stream networks. Ephemeral streams however do not have riparian characteristics and therefore are managed and protected with streamside management zones. Because of their characteristics (i.e. periodic response to stream flow and uncertain identification criteria) specific guidance for management of ephemeral streams is appropriately developed at the forest level . Standards for managing ephemeral streams are included in forest wide standards.

**3-48. Public Concern: The Forest Service should adopt the original definition of riparian corridor.**

Ephemeral streams were included in the original definition of Riparian Corridors because of their connectivity to stream networks. Ephemeral streams however do not have riparian characteristics and therefore are managed and protected with streamside management zones. Because of their characteristics (i.e. periodic response to stream flow and uncertain identification criteria) specific guidance for management of ephemeral streams is appropriately developed at the forest level. Standards for managing ephemeral streams are included in forest wide standards.

**3-49. Public Concern: The Forest Service should specify standards for protecting streamside management zones and fingers.**

The Riparian Prescription standards protect streams and aquatic resources. Riparian corridors also capture much of the area that would be protected with SMZs. Where additional protection is needed, forest will implement SMZs (I.e. for steep slopes). Furthermore, State BMPs are also standards that will be followed which specify SMZs for silvicultural and similar protection measures will be included for other ground disturbing activities.

**3-50. Public Concern: The Forest Service should expand riparian areas, riparian corridors, and buffer zones.**

Riparian areas are determined on the basis of physical and biological characteristics (vegetation, soils, and hydrology). Riparian corridors (fixed buffers) are established to encompass the Riparian area. Where fixed widths do not capture the Riparian area, distances are adjusted. Forest wide standards including SMZs are employed at the project level.

**3-51. Public Concern: The Forest Service should reduce the widths of riparian zones.**

The Riparian Prescription establishes a level of protection- through fixed riparian corridor widths- to maintain, restore and enhance riparian functions and values. This is one of the goals we intend to meet. Riparian corridor widths can be reduced when it is deemed necessary to manage for Riparian Associated values. When added widths are needed to protect riparian resources, they will be increased.

**3-52. Public Concern: The Forest Service should explain the rationale for eliminating ephemeral streams from the riparian corridor, removing protection, and weakening prescriptions to protect and restore riparian ecosystems.**

Subsequent to issuance of Riparian Management direction, ephemeral streams were removed from the riparian corridor description because ephemeral streams do not have the physical or biological characteristics that qualify as "Riparian". Protection for ephemeral streams was not removed but rather moved to forest-wide standards. The changes made in the Riparian Prescription have not weakened protection of the Riparian area but allows for greater management options for Riparian associated species.



**3-53. Public Concern: The Forest Service should implement aquatic conservation and management direction.**

The Forest service participates in recovery plans with the Fish and Wildlife Service for federally listed species. Standards are specified in the land management plans to protect and conserve all aquatic species.

**3-54. Public Concern: The Forest Service should designate secondary riparian zone buffers beyond the primary riparian zones.**

The Riparian Prescription was developed to provide protection, enhance and restore riparian functions and values. Minimum buffer widths and standards were developed to protect streams, lakes, wetlands and floodplains. Additional SMZs are included beyond the Riparian Corridor where needed to provide additional protection (i.e. steep slopes or highly erodible soils). A secondary riparian corridor width within Management Area 1 Turkey and Upper Stevens Creeks was designated to be consistent with Carolina Heelsplitter recovery needs.

**3-55. Public Concern: The Forest Service should define the ephemeral zone as the overall drainage areas of streams, and protect the entire area.**

Ephemeral streams were included in the original definition of Riparian Corridors because of their connectivity to stream networks. Ephemeral streams however do not have riparian characteristics and therefore are managed and protected with streamside management zones. Because of their characteristics (i.e. periodic response to stream flow and uncertain identification criteria) specific guidance for management of ephemeral streams is appropriately developed at the forest level. Standards for managing ephemeral streams are included in forest wide standards.

**3-56. Public Concern: The Forest Service should develop management prescriptions that allow research and research findings to support science based management of riparian areas.**

Research is one thing, developing, implementing and monitoring ~~of implementing~~ prescriptions and evaluating results is another. Many of the prescriptions including the riparian corridor were developed from Forest Service understanding of the past research and resource needs associated with it. The riparian corridor prescription is described in chapter 3 of the Forest Plan. Research needs are listed in Chapter 5 of the Plan. Both will provide useful information that will add to our knowledge base in a science based approach to management of riparian areas. Research generally is not practical at the plan or prescription scale, but must be honed to deal with highly specific issues and circumstances. We welcome the use of applied research to address and validate specific management assumptions, issues and circumstances within the forest including riparian areas. We intend to improve prescriptions where appropriate to consider the findings of science and try to integrate it into the management of the National Forest.

**3-57. Public Concern: The Forest Service should restore riparian habits to native vegetation, but without using clearcuts.**

Methods of restoring habitats or managing vegetative composition are project level decisions. The term clearcut represents one of several silvicultural practices used in even-aged management. Sometimes, stand conditions indicate even-aged management approaches are the most efficient and sometimes the most appropriate technique to apply will be a clearcut.

**3-58. Public Concern: The Forest Service should actively manage riparian corridors.**

Timber harvesting activities may occur in Riparian Corridors when they are needed to maintain, restore or enhance riparian functions and values and to meet the needs of Riparian associated species. 36 CFR 219.27(c)(1) states that harvesting activities can occur on lands classified as not suited for timber production when such activities are necessary to protect other multiple-use values or are needed to meet forest plan objectives. Riparian corridors were designated as not suitable for timber production because it was determined that managing these lands for the purposes of having “regulated crops of trees ... for industrial or commercial use” (36 CFR 219.3) was inconsistent with meeting the desired conditions of the riparian corridor. Some management activities will also occur infrequently to provide recreation, wildlife and other beneficial public needs.

**3-59. Public Concern: The Forest Service should not designate riparian corridors as unsuitable for timber harvest, but as suitable.**

Timber harvesting activities may occur in Riparian Corridors when they are needed to maintain, restore or enhance riparian functions and values and to meet the needs of Riparian associated species. 36 CFR 219.27(c)(1) states that harvesting activities can occur on lands classified as not suited for timber production when such activities are necessary to protect other multiple-use values or are needed to meet forest plan objectives. Riparian corridors were designated as not suitable for timber production because it was determined that managing these lands for the purposes of having “regulated crops of trees ... for industrial or commercial use” (36 CFR 219.3) was inconsistent with meeting the desired conditions of the riparian corridor.

**3-62. Public Concern: The Forest Service should not restrict silvicultural activities around “ephemeral” streams.**

Silvicultural activities may occur around "ephemeral" streams. Standards however, are developed to reduce nonpoint source pollution from management activities and maintain ground stability since ephemeral streams are hydrologically connected to the stream system.

**3-63. Public Concern: The Forest Service should clearly define ‘riparian area’ and ‘ephemeral stream’ by specifying how much water is required and how long water must be present.**

Riparian area and 'ephemeral stream' are defined in the glossary. Ephemeral streams are defined by short duration storm flows that occur as a direct result of storm precipitation. Actual flow amounts for ephemeral streams cannot be quantified or established.

**3-64. Public Concern: The Forest Service should modify FW-6 to state 'prevents.'**

The intent of FW-6 in the location of skid trails is both to prevent impacts first by avoiding them, but in stances when crossing is necessary, minimizing the impact to stream channel and banks is also important aspect of this standard. The ID team will discuss and consider whether to include this in the final recommendations.

**3-65. Public Concern: The Forest Service should close campsites as needed to restore riparian areas.**

This issue is addressed in the Desired Condition section for Riparian Corridors in the Revised Plan: "Any human-caused disturbances or modifications that cause environmental degradation through concentrated runoff, soil erosion, or sediment transport to the channel or water body are promptly rehabilitated or mitigated to reduce or eliminate impacts."

**3-66. Public Concern: The Forest Service should specify objectives and standards to actively manage for hard mast of oak and hickory early successional habitat within riparian areas.**

Comments were split on the desirability of using active vegetation management within riparian areas for the benefit of wildlife. Some commenters want more specific direction for managing these highly productive areas for oak mast production and early- successional habitats. Others feel these areas should be used to emphasize old growth restoration and protection of aquatic species and water quality. The revised plan attempts to emphasize water quality, aquatic species and old growth restoration in the riparian corridor. We have recognized the importance and value of riparian areas by creating a separate prescription for riparian corridors. Desired conditions within this prescription emphasize late-successional forests, and many standards are included to ensure maintenance of water quality. These qualities are of primary importance. However, this prescription does not rule out active management, when it can be conducted in ways compatible with maintaining or enhancing riparian resources. Vegetation management projects that enhance mast production, canebrake restoration, or create early successional habitat may be proposed for riparian corridors during plan implementation, recognizing that portions of the riparian corridor are very wide floodplains or river terraces, and may extend into upland areas in some circumstances. Opportunities will be evaluated on specific areas to maintain early successional habitat, restore canebrakes and improve waterbird habitat within the riparian corridor when the effects to water quality and aquatic habitats are minimal. Monitoring will track the acreage and condition of riparian corridors, including levels of vegetation management activities implemented.

**3-67. Public Concern: The Forest Service should correct point source pollution at Fall Creek.**

We would like you to visit with the forest hydrologist relative to this comment. He needs to verify if this is the Fall Creek in Oconee County tributary to the Chattooga River, or another stream with that name on the Sumter National Forest. The forest hydrologist is not aware of any point sources on the Fall Creek mentioned above, but is willing to follow up on this with more specific information. Strong chemical smells as those described can also be referred to South Carolina Department of Health and Environmental Control for their evaluation.

**3-68. Public Concern: The Forest Service should develop a 5,300 acre reservoir near the Fairforest and Tyger Rivers in Union, South Carolina.**

Forest Service officials learned about renewed interest in the concept for a 5,300-acre lake in Union County after the revised draft Land and Resources Management Plan (LRMP) had been released to the public for review and comment. Although some who submitted comments on the draft plan wanted a decision on the lake concept in this LRMP, we have determined that is inappropriate. The LRMP is a broad document that outlines what types of management activities are allowable in what parts of the forest, much like a county zoning plan does for a county. The LRMP does not make project-specific decisions. While this document does not offer an opinion on the Union County lake concept, it also does not exclude it from consideration. However, this LRMP does require that all site-specific proposals, such as a lake proposal, must be compatible with the guidelines it establishes. Separate from this plan, a more-detailed, site-specific analysis (probably an Environmental Impact Statement, or EIS) would be needed for a lake proposal.

As required by law, Forest Service officials would work diligently to ensure the public is involved in the development of such an EIS for National Forest land. A project like the Union County lake concept would be a highly complex one, involving a number of jurisdictions, federal and private lands, and state and federal agencies. A feasibility study on the lake concept is needed to determine whether or not to move forward with the lake concept, which agencies are the appropriate ones to be involved, and if the concept site for the dam is a viable one. The Forest Service's role in such a project would be determined after a feasibility study, and will depend upon the necessary approvals related to natural resources, funding sources, and legal authorities. Discussions were underway at the time this document was prepared concerning what agency should conduct this type of study and when and how it should be done.

If the Union County lake concept is determined feasible and the Forest Service is the lead agency on the project, all public facilities constructed as a part of it would have to meet the requirements of the Americans with Disabilities Act. Further, no private residences of any type are permitted on National Forest land.

**3-69. Public Concern: The Forest Service should build a large reservoir.**

See response to PC 3-68.

**3-70. Public Concern: The Forest Service should build the dam at the confluence of Fairforest Creek and Tyger River.**

See response to PC 3-68.

**3-71. Public Concern: The Forest Service should build a lake with an ADA (Americans with Disabilities Act) accessible pier.**

See response to PC 3-68.

**3-72. Public Concern: The Forest Service should conduct a feasibility study for creating a major impoundment.**

See response to PC 3-68.

**3-73. Public Concern: The Forest Service should act to prohibit the placement of manufactured homes along the lake, if the lake is built.**

See response to PC 3-68.

**3-74. Public Concern: The Forest Service should not develop a 5,300 acre reservoir near the Fairforest and Tyger Rivers in Union, South Carolina.**

See response to PC 3-68.

**3-75. Public Concern: The Forest Service should notify stakeholders of the exact proposed location of the lake.**

See response to PC 3-68.

**3-76. Public Concern: The Forest Service should conduct a formal public hearing regarding the proposed lake.**

See response to PC 3-68.

**3-77. Public Concern: The Forest Service should analyze effects of fragmentation within the Draft Environmental Impact Statement.**

Fragmentation is a multi-faceted issue. It may affect a variety of species at a variety of scales in a variety of ways. It is a broad umbrella concept that includes a great diversity of potential cause-and-effect relationships. Most comments related to fragmentation are stated in broad

terms that are therefore difficult to address. To effectively deal with this issue in planning, it is necessary to be specific about what fragmentation effects are of concern.

For example, one specific fragmentation issue is productivity of forest interior birds which is perhaps the most high-profile and well-documented aspect of fragmentation effects on species populations found in published literature. The scale and focus of analysis used in the EIS (percent forest cover on 75,000 acre landscapes) is the most appropriate approach for assessing fragmentation effects on bird productivity. Early in the EIS analysis process it became evident that forest fragmentation, and subsequently effects on forest interior birds, on the Sumter National Forest were parameters that would not provide a detectable measure for evaluating the effects of management alternatives. All watersheds on the Sumter National Forest containing National Forest System lands are over 80% forested. Additional support for this type of landscape analysis is found in a new book on bird conservation by Faaborg (see Chapter 6 of *Saving Migrant Birds: Developing Strategies for the Future*, published in 2002 by University of Texas Press, Austin).

No other specific fragmentation effects have been raised, internally or externally, that are significant and well-documented enough to warrant additional analysis.

**3-78. Public Concern: The Forest Service should prevent forest fragmentation.**

See response to PC 3-77.

**3-79. Public Concern: The Forest Service should implement ecosystem based, landscape scale, multiple species management.**

The principles of ecosystem management, landscape scales, and multiple species management are incorporated throughout the goals, objectives, management areas, prescriptions, and standards described in the Plan.

**3-80. Public Concern: The Forest Service should continue management activities that benefit wildlife.**

Comment noted.

**3-81. Public Concern: The Forest Service should manage standards for demand species to provide target game wildlife populations sufficiently abundant to allow recreational harvest.**

Part of monitoring trends in species that are sought after by hunters and anglers includes analysis of harvest levels. Part of managing public lands on National Forests includes blending the needs of a variety of wildlife species. One of our fundamental goals is to maintain sufficient population levels of many species of wildlife, including those species that are harvested by recreational users of the Forest.

**3-82. Public Concern: The Forest Service should manage forests to return wildlife to a natural state with biodiversity.**

Many commenters expressed a desire to see national forests managed for maintenance and restoration of “natural conditions” to support healthy ecosystems, clean water, and abundant wildlife, as opposed to an emphasis on resource extraction. We feel the revised plan is in line with these priorities. Within the Southern Appalachian region, vegetation management will be driven by the need to create desired ecological conditions, not to meet resource extraction goals. These plans clearly focus on the ecological conditions left on the ground, not on resources removed. Timber production emphasis prescriptions are only used on the piedmont districts under the preferred alternative. All other prescriptions used emphasize ecological restoration, recreation, or special area protection.

Timber sales are one of the most important and efficient tools we have for creating desired conditions on the ground. To use this tool effectively, in most cases we designate individually which trees are to be cut and which are to be retained, and carefully administer the sale to ensure disturbance to soil, water, and remaining trees is within specified limits. This approach is not only effective, it is efficient: by selling cut trees, we generate revenue rather than paying for the service. An added benefit is that sold material is used and generates economic activity within surrounding communities. However, to repeat, any proposed timber sales must make sense in terms of the on-the-ground condition created as a result.

**3-83. Public Concern: The Forest Service should modify Standard 1.A 4 to specify that structural habitat improvements for fish are allowed.**

According to the Wilderness Management Handbook, Exhibit 1, Policies and Guidelines for Wildlife and Fish Management in National Forest and Bureau of Land Management Wilderness, fish and wildlife habitat manipulation is allowed in wilderness areas. Statements from the handbook supporting this include: Actions necessary to protect or recover threatened or endangered species, including habitat manipulation and special protection measures, may be implemented in the wilderness. To prevent Federal listing, protect indigenous species that could become threatened or endangered or are listed as threatened or endangered by States. Standard 1.A-4 has been deleted from the Forest Plan.

**3-84. Public Concern: The Forest Service should change wording to restrict stocking to native species negatively affected by human influence, and allow stocking of non-native species only under specified conditions.**

From the Wilderness Management Handbook, Exhibit 1, Policies and Guidelines for Wildlife and Fish Management in National Forest and Bureau of Land Management Wilderness: Exotic species of fish shall not be stocked. The order of preference for stocking fish species is a) Federally listed threatened or endangered species b) indigenous species. Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species

is likely to survive. Standards 1.A-5 and 1.B-5 are restated as follows: Allow fish stocking only to reestablish or maintain native species; species of fish traditionally stocked before wilderness designation may be considered native if the species is likely to survive.

**3-85. Public Concern: The Forest Service should specify rules and references, in the forest plan, for stocking trout in wilderness.**

From the Wilderness Management Handbook, Exhibit 1, Policies and Guidelines for Wildlife and Fish Management in National Forest and Bureau of Land Management Wilderness: Exotic species of fish shall not be stocked. The order of preference for stocking fish species is a) Federally listed threatened or endangered species b) indigenous species. Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species is likely to survive. Standards 1.A-5 and 1.B-5 are restated as follows: Allow fish stocking only to reestablish or maintain native species with approval from the Regional Forester; species of fish traditionally stocked before wilderness designation may be considered native if the species is likely to survive. Also, from the handbook: Aerial stocking of fish shall be permitted for those waters in wilderness areas where this is an established practice before wilderness designation or where other practical means are not available. Add the following statement to Standard 1A-4, Stocking shall normally be done by primitive means; however, Regional Foresters may permit dropping of fish from aircraft for those waters where this practice was established before the area was designated a wilderness and Standard 1B-4, Stocking shall normally be done by primitive means; however, Forest Supervisor may permit dropping of fish from aircraft for those waters where this practice was established before the area was designated a wilderness.

**3-86. Public Concern: The Forest Service should not stock streams with non-native trout species near wilderness areas.**

From the Wilderness Management Handbook, Exhibit 1, Policies and Guidelines for Wildlife and Fish Management in National Forest and Bureau of Land Management Wilderness: Exotic species of fish shall not be stocked. The order of preference for stocking fish species is a) Federally listed threatened or endangered species b) indigenous species. Species of fish traditionally stocked before wilderness designation may be considered indigenous if the species is likely to survive. The Chattooga River on the Andrew Pickens Ranger District has been traditionally stocked with rainbow and brown trout in cooperation with the South Carolina Department of Natural Resources, Georgia Department of Natural Resources and Trout Unlimited to maintain recreational fishing opportunities for the public.

**3-87. Public Concern: The Forest Service should address fisheries management and provide prescriptions, standards, and requirements for monitoring.**

Fisheries management is incorporated into desired future condition and standards in the land management plans. Monitoring questions can be found in Chapter 5 of the land management plans. Details of proposed monitoring can be found in Appendix E of the Forest Plan.



**3-88. Public Concern: The Forest Service should provide consistent prescriptions for Georgia and South Carolina, and coordinate with each state's department of natural resources.**

Under 2.A.1 (Chattooga River) and Desired Condition, this statement has been added: Aquatic and riparian protection measures as referenced in Riparian Prescription 11 apply to this prescription. The following paragraph replaces paragraph 13 under Desired Conditions in the Riparian Prescription: The biological integrity of aquatic communities is maintained, reatored or enhanced. Aquatic species distributions are maintained or are expanded into previously occupied habitat. The amount, distribution and characteristics of aquatic habitat for all life stages are present to maintain populations of indigenous and desired nonnative species. Habitat conditions contribute to the recovery of species under the Endangered Species Act. Species composition, distribution and relative abundance in managed habitats are comparable to that of natural habitats of the same region or reference stream. Streams and water bodies are periodically inventoried and monitored on a sample basis to characterize larger scale conditions or trends. Streams and water bodies are protected from adverse effects and managed to restore native species as appropriate. Management activities are allowed to restore, enhance, and manage aquatic communities of native and demand species. Management activities will be coordinated with the South Carolina Department of Natural Resources.

**3-89. Public Concern: The Forest Service should specify that it will conduct inventorying and monitoring and act to restore, enhance, and manage aquatic habitat conditions.**

The following sentence has been added to all Plan prescriptions: Aquatic and riparian protection measures as referenced in Riparian Prescription 11 apply to this prescription.

**3-90. Public Concern: The Forest Service should promote trout stocking and fishing below Highway 28.**

The revised Sumter Plan does not preclude stocking below Highway 28. However, trout stocking is a function/lead of the State DNR agencies in cooperation with the USFS. Stocking has occurred below the Highway 28 Bridge in the recent past.

**3-91. Public Concern: The Forest Service should participate in the Power for Wildlife Program.**

The Francis Marion and Sumter National Forest is a charter member of the Power for Wildlife Program in South Carolina. On the ground participation is a project level decision and is encouraged under the Plan; see Management Prescription 5.C. Designated Utility Corridors.

**3-92. Public Concern: The Forest Service should work with partners to assess and analyze the distribution of habitats across the landscape and to develop a regional plan for conservation of these habitats.**

The Sumter National Forest is an active participant with the South Carolina Department of Natural Resources, the Atlantic Coast Joint Venture, Partners in Flight, Partners in Amphibian and Reptile Conservation, and a host of private conservation organizations such as; Ducks Unlimited, The National Wild Turkey Federation, Quail Unlimited, Trout Unlimited, The Nature Conservancy, Native Plant Society. Part of our mission is to improve the quality and distribution of habitats on the Sumter National Forest and in doing so we work with these organizations and several academic institutions for the betterment of the Forest and the conservation of habitats. Regional strategies are beyond the scope of this Forest Plan.

**3-93. Public Concern: The Forest Service should specify details regarding the provision of large, contiguous, forested, and remote areas for wildlife.**

The state of South Carolina is approximately 2/3 forested. The Sumter National Forest, even with its broken ownership pattern, is found in some of the largest blocks of contiguous forestland on the landscape. For all known species, the relatively small scale of disturbance resulting from national forest management would not provide a detectable response of effects on the value of these lands for species that prefer large areas of forested habitat. However, some species do respond positively to remoteness (low density of open roads). On the Sumter National Forest, remote areas are provided by several prescriptions, including 1A, 1B, 2A1, 2A2, 2A3, 4D, 4F, 6C, as well as portions of 8A1.

**3-94. Public Concern: The Forest Service should provide evidence that fragmentation has not caused decline in species of fish and wildlife.**

See response to PC 3-77.

**3-95. Public Concern: The Forest Service should not automatically deduct non-forested areas from the calculations of successional percentages.**

Evaluating surfaces of pavement or gravel, area occupied by buildings, and surface area of deep water habitats are not useful in evaluating terrestrial habitat conditions. On the Sumter National Forest successional percentages were applied at the management prescription level which included small amounts of non-forested areas.

**3-96. Public Concern: The Forest Service should better protect black bear habitat.**

Available information on South Carolina's mountain black bear population indicates that black bears are relatively abundant and their populations are stable to increasing. Effects of plan alternatives are analyzed in the EIS (see the black bear section in the Demand Species portion of Chapter 3 of the EIS). This analysis indicates that suitable habitats for black bear will be provided and improved under the preferred alternative.

**3-97. Public Concern: The Forest Service should manage bear habitat as described in Alternative B.**

Comment noted.

**3-98. Public Concern: The Forest Service should respond to questions about standards for bear management.**

Black bear is a high profile species that is receiving increased attention from the scientific community and the public. In order to address management, standards, and the black bear specifically, it has been added to the list of management indicator species for the Sumter National Forest (mountains only).

**3-99. Public Concern: The Forest Service should limit concern for the New England cottontail to the Andrew Pickens District.**

This is correct.

**3-100. Public Concern: The Forest Service should place more dove fields in 8.B.1, allow continuing use of the Ross Mountain Dove Field, and use no-till methods.**

Specific methods and practices for placement and maintenance of managed dove fields on the Sumter National Forest are project level decisions. Dove fields are an appropriate land use in 8.A.1 as well as other prescriptions; 7.E.2, 8.B.2, 9.G.2, and 10.B.

**3-101. Public Concern: The Forest Service should allow continuation of the Tater Hill Wildlife Demonstration Forest.**

The area known as Tater Hill is a recent acquisition and activities conducted on this area will be decided at the project level. It is in management prescription 8.A.1 which allows for a mix of habitat conditions.

**3-102. Public Concern: The Forest Service should implement stronger avian monitoring, habitat restoration, objectives, and active management.**

In order to comply with the provisions of Executive Order 13186, a team of biologists from each of the five Southern Appalachian revision forests (as well as the Daniel Boone National Forest) worked closely with the Migratory Bird Office of the U.S. Fish and Wildlife Service (FWS) to incorporate bird conservation measures in the revised plan. Cooperation involved reviewing relevant Partners in Flight Bird Conservation Plans and meeting with FWS personnel on multiple occasions to develop and revise recommended management strategies. Management strategies that have been incorporated into the revised Sumter plan include objectives and standards for restoration and maintenance of key habitat conditions, such as mature forest with diverse canopy structure, early successional forest, mature riparian forest, riparian forests with dense

understories, canebrakes, and open pine and oak woodlands, savannas, and grasslands. In fact, much of the vegetation management directed at major forest community types in the revised plan is driven by bird conservation needs.

Following release of draft plans and EISs, we met again with FWS personnel to review and discuss proposed revised plans during the public comment period. Based on this review, the FWS submitted comments to individual forest staffs, in some cases leading to further modifications of revised plans.

**3-103. Public Concern: The Forest Service should implement ‘all bird’ conservation language and practices via the North American bird conservation initiative.**

We agree.

**3-104. Public Concern: The Forest Service should participate in the North American waterfowl management plan and Atlantic Coast Joint Venture partnerships, and reference habitat identified in the North American waterfowl management plan.**

See response to PC 3-92.

**3-105. Public Concern: The Forest Service should identify candidate sites and restoration goals for riparian and early successional habitats to support bird species, and direct managers to develop and implement restoration actions.**

Restoration objectives for riparian and early successional habitats are imbedded the description of riparian corridors in the Plan. Forest Plan goals 2 and 8 set the stage for developing and restoring habitats to support birds and other species of wildlife in riparian areas. Site selection will be a project level decision.

**3-106. Public Concern: The Forest Service should conduct annual bird monitoring.**

We agree. Annual bird point monitoring has been conducted for 10 years on the Sumter National Forest.

**3-107. Public Concern: The Forest Service should manage stream management zones in a manner that provides habitat for various bird species.**

We agree.

**3-108. Public Concern: The Forest Service should implement the threatened and endangered species plan for eagles and wood storks.**

As stated in the background information included in Chapter 2 under the PETS and locally rare issue, recovery plans for all federally endangered and threatened species, when available, are

followed. Two forestwide standards directly incorporate information from available plans for both eagles and wood storks.

**3-109. Public Concern: The Forest Service should protect and restore threatened, endangered, sensitive, and locally rare species and their habitat.**

Goals in the Revised Plan which provide for sensitive species and their habitats include Goal 8, which directs the forest to maintain and restore natural communities and habitats in amounts, arrangements, and conditions capable of supporting viable populations of existing native and desired non-native plants, fish, and wildlife species within the planning area, Goal 10, which directs the forest to contribute to the conservation and recovery of federally listed threatened and endangered species and contribute to avoid federal listing of other species under the Endangered Species Act, and Goal 12, to protect and restore rare communities found on National Forest lands. Goal 20, encouraging the use of prescribed fire and mechanical fuels treatment for maintaining and restoring fire-adapted ecosystems on the Forest, will benefit sensitive species associated with fire-maintained ecosystems such as fraser's loosestrife (*Lysimachia fraseri*). Management prescriptions which emphasize habitat for sensitive species include botanical/zoological areas (4D), rare communities (9F), riparian corridors (11), woodland and grassland/savanna habitats (8B2), and hardwood restoration (9G).

**3-110. Public Concern: The Forest Service should modify goals, objectives, and standards for threatened and endangered species, as recommended.**

Your comments were considered and some changes were made in the wording of PETS goals, objectives, and standards. Some of the suggestions are likely to be implemented as site-specific mitigation in conjunction with projects or as part of routine program management.

**3-111. Public Concern: The Forest Service should implement the threatened and endangered species plan to protect bats.**

The Sumter National Forest is on the southern edge of the range for Indiana bat and therefore, protective measures for the species are not needed. Mines containing bats are protected under the rare community prescription.

**3-112. Public Concern: The Forest Service should only use gates or fencing as a last option to protect bats.**

The forestwide standard in the draft plan requiring the construction of gates at the entrance of mines was deleted in the final.

**3-113. Public Concern: The Forest Service should implement a ¼-mile buffer around bat roosts.**

Management of a 1/4 mile buffer around significant (5 bats or more) maternity and winter roosts for Rafinesque's big-eared bat, will be addressed at the project level rather than through a Forestwide standard. Restrictions within this buffer addressed at the project level will consider restrictions to new roads, trails, and regeneration harvest.

**3-114. Public Concern: The Forest Service should specify goals that the southern mountain lion and its habitat will be protected, and identify that habitat within the alternatives, as well as provide similar specifications for black bear and the red cockaded woodpecker.**

The Southern Mountain Lion is not listed by the U.S. Fish and Wildlife Service as occurring in the counties occupied by the Sumter National Forest and was therefore not considered in this Forest Plan. The Red-cockaded Woodpecker is considered extirpated from the Forest. Through a forestwide standard, dens used by black bear will be protected and prescription 8.A.1. also provides for the diversity of habitats used by black bear.

**3-115. Public Concern: The Forest Service should make the recovery of threatened and endangered species a priority in the forest plan revision.**

See response to PC 3-109.

**3-116. Public Concern: The Forest Service should specify survey requirements for protected, threatened, endangered, threatened, and sensitive species.**

Providing specific surveying or inventorying requirements in the Revised Plan for the large array of projects and practices envisioned with implementation of the revised plan would not increase protection of PETS species. Survey (inventory) requirements for PETS species have been addressed in the regional supplement to the Forest Service Manual (2672.43). This document requires each project proposal and species therein to be evaluated for the need to inventory. This process can be viewed at [http://www.southernregion.fs.fed.us/planning/vmeis/final\\_FSM\\_2670\\_supplement.pdf](http://www.southernregion.fs.fed.us/planning/vmeis/final_FSM_2670_supplement.pdf)

**3-117. Public Concern: The Forest Service should comply with direction requiring management and recovery of threatened, endangered, and sensitive species.**

See response to PC 1-6.

**3-118. Public Concern: The Forest Service should require forests to maintain records of federally-listed threatened and endangered species and the regional forester's list of sensitive species.**

Records of federally listed threatened and endangered species, and Regional Forester sensitive species, are maintained on the Forest as part of routine program management activities.

**3-119. Public Concern: The Forest Service should protect the Oconee bell.**

Viable populations for the sensitive species Oconee Bell will be conserved on the Forest consistent with NFMA requirements.

**3-120. Public Concern: The Forest Service should specify all state-listed plants and animals, and consider the effects of management actions on these species.**

State listed endangered or threatened plants and animals were included in the viability analysis, and will be provided for through rare community prescriptions and other habitat provisions in the Forest Plan. Those species with federal or global rarity concerns are included on our PETS lists and are addressed in the biological assessment and evaluation included in the FEIS.

**3-121. Public Concern: The Forest Service should conduct full surveys and inventories of species and their habitats sufficient to ensure viability.**

See response to PC 3-122.

- Because the Forest Service has not conducted necessary surveys and inventories

Some comments contend the species viability evaluation places too much emphasis on habitat as opposed to population parameters, and that the existing information on species populations are inadequate to support the effects analysis. As described in the EIS section on Terrestrial Species Viability Evaluation, use of detailed demographic analysis to evaluate population viability is not feasible for the large number of species considered. Therefore, our goal is to use a clearly defined, transparent process to identify species for which there are substantive risks to maintenance of viable populations, and to ensure consideration of appropriate habitat management strategies to reduce those risks to acceptable levels where feasible. This goal applies equally well to the aquatic species viability evaluation. Both aquatic and terrestrial viability evaluations use information on habitat *and populations* of individual species to assess viability risks. The terrestrial viability evaluation used population abundance in the form of F Ranks as input to viability risk assessment. The aquatic viability evaluation used distribution of populations by watershed and the relationship of watershed disturbance to populations of environmentally sensitive species to assess viability risk. We feel the level of population information used in the analysis is appropriate for the broad-scale strategic planning represented by forest planning.

- Because the Forest Service has provide no population monitoring data or analysis that document that species will be maintained

See previous response within this same Public Concern statement (immediately above).

- Because habitat data is an unsuitable surrogate for population data

Some commenters fault viability evaluation for using habitat as a surrogate for population information, and contend the viability analysis is inappropriately based on the assumption that all suitable habitat is occupied. As discussed in other responses under this Public Concern statement, viability evaluations use both population and habitat information to assess viability risk. Habitat is not used as a surrogate for population information, nor is there an assumption that all suitable habitat is occupied. Even when habitat is not likely to be limiting risk to viability may still be high as a result of population rarity.

- Because the use of habitat data as a surrogate has been discounted by the Federal judiciary

See previous response within this same Public Concern statement (immediately above).

- Because the viability analyses is based entirely on national forest lands and ignores all other land ownership activities and their direct, indirect and cumulative effects

Some comments contend that cumulative effects to species viability is inadequate because only national forest land is considered. This contention is inaccurate. Aquatic species viability evaluation clearly analyzed entire watersheds, including private land conditions, as part of viability risk assessments. In the terrestrial species viability evaluation, the habitat distribution variable explicitly incorporates consideration of conditions on intermixed private lands.

- Because of the use of expert judgment and arbitrary approaches and decisions

Although formal peer review of completed viability evaluations were not conducted, elements of external review and adjustment were incorporated throughout the viability evaluation process. For the terrestrial viability evaluation, basic information on species status, habitat relationships, and threats was obtained through an agreement with NatureServe, leading to involvement of a large number of experts from state agencies and academia. Habitat Association Reports, which served as the basis for many management recommendations, were subject to peer review. Later, recommended plan language was reviewed by both endangered species and migratory bird staffs of the US Fish and Wildlife Service. The aquatic viability evaluation process was in large part developed by scientists from The University of Georgia. During the comment period on the DEIS, we solicited process reviews of both the terrestrial and aquatic viability analyses by Forest Service research scientists, who assessed the evaluations for consistency with best science (record of these reviews are available on request).

Some comments contend that the terrestrial viability evaluation needs peer review because too many steps in the process depend on expert judgments. Three primary variables drive the viability risk assessment: current species abundance, expected future habitat abundance, and expected future habitat distribution. Current species abundance, or F Ranks, were developed by external experts, reviewed by Forest Service biologists, and negotiated where differences in data or opinion occurred. Therefore, this variable has been through a fairly rigorous review process. Expert judgment was often involved in assigning habitat variables to broad categories. However,



all of these variables were combined in the evaluation in a transparent and mechanical way so that their contributions assessed viability risk is obvious.

- Because there are no analysis and explanation or justification for including or excluding species in rare species monitoring programs

See response to PC 3-122.

- Because actual population data is required

See responses to Public Concern 3-126.

- Because the strategy for viability analysis is designed to get around *Sierra Club V. Martin*

As discussed in the response to Public Concern statement 1.055, we agree that population monitoring is an important part of providing for species viability in the overall planning process. In addition, the revised plan includes provisions for population monitoring of management indicator species. Our approach in the revised plan is designed to keep population monitoring meaningful, feasible, and in compliance with relevant statute, regulation, and case law.

- Because monitoring that lacks scientific basis violates NEPA and is arbitrary and capricious

See response to PC 3-129 and response to PC 3-126.

**3-122. Public Concern: The Forest Service should build a fine filter species monitoring program, and disregard the existing coarse filter viability analyses.**

Some commenters expressed satisfaction that viability evaluations have identified species and habitats most at risk, leading to appropriate attention to conservation of the most threatened habitats and communities. Other commenters pointed to the need for additional “fine-filter” considerations to provide for species viability. Most of these commenters focused on the need for more specificity regarding inventory and monitoring of species of viability concern, including those of local viability concern (“locally rare” species). We agree that inventory and monitoring are critical and necessary components of a program to provide for species viability. The issue is where in the overall planning process the details of these components are considered and documented.

Because of the incredible diversity of species on the forest monitoring populations of every species of potential viability concern is not feasible. Practical monitoring programs must combine monitoring of habitat conditions, populations of indicator species, and populations of priority viability concern species. This combination is reflected in the Revised Plan’s monitoring chapter, which includes monitoring questions that cover all of these elements. The Monitoring Summary Table in Appendix E of the Revised Plan provides more specifics on relevant elements to be monitored. Task sheets, to be used for implementing the monitoring program, provide

additional detail, and are available upon request. In addition, the monitoring question associated with element 7 in the Monitoring Summary Table indicates additional inventory and monitoring of viability concern species (including “locally rare” species, where appropriate) will occur based on prioritization developed and revised during plan implementation. Prioritization will involve use of more site-specific information on species occurrences, in addition to the more general information from the viability evaluations in the EIS. Although many commenters express desire to see more of this detail at this time, more detail at this strategic planning level is not necessary to complete plan revision. Given the large number of species and the site-specific considerations involved, and the likelihood that priorities will shift throughout the life of the plan as information is obtained, it is appropriate to establish these additional details as part of plan implementation.

Related comments contend that the set of selected Management Indicator Species (MIS) are inadequate to represent all species of viability concern. As discussed above, indicator species are but one part of our biological monitoring program. We have made no effort to select MIS to represent all species of viability concern, nor is there a requirement for us to do so. MIS, as described in 36 CFR 219.19, serve a variety of purposes during forest planning, not all of which are relevant to species viability. Only where appropriate are MIS selected for the Revised Plan “because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities” (36 CFR 219.19 (1)). Reasons for selection of MIS are documented in Chapter 5 of the revised plan, in the relevant sections of the EIS, and in the Management Indicator Species Selection Process Record, which is available upon request. Some commenters correctly noted that we have de-emphasized the role of MIS in viability analysis. We have reduced emphasis on MIS because of the current state of science, which calls into question many traditional uses of the indicator species concept (see MIS Selection Process Record for a brief review). Nevertheless, our selection and use of MIS in this plan revision meets both the letter and intent of regulations.

**3-123. Public Concern: The Forest Service should establish goals, objectives, and standards for monitoring threatened, endangered, sensitive, and locally rare (TESLR) species.**

Monitoring is a task that is outlined in Chapter 5 of the revised Plan. Monitoring of species with a viability concern will be conducted. Our strategy is to monitor species and/or their habitat based on our objectives for that species. Details of monitoring tasks will be developed as we begin to implement the revision. Some species will need a very detailed plan; others will be monitored through collection of data by other agencies and individuals.

**3-124. Public Concern: The Forest Service should abolish programs related to sensitive and locally rare species.**

Dropping programs relating to sensitive and locally rare species are not decided in the revision of the Forest Plan

**3-125. Public Concern: The Forest Service should specify criteria requiring consultation with the U.S. Fish and Wildlife Service.**

Criteria regarding consultation with the U.S. Fish and Wildlife Service is included in the Endangered Species Act, Forest Service Manual direction, and is briefly described in the background section for PETS in Chapter 2 of the Forest Plan.

**3-126. Public Concern: The Forest Service should specify numerous management indicator species, including plants, aquatic life, insects, fish, birds, and particularly, salamanders.**

Several commenters indicate that reasons for selection of MIS are not given, and that selected MIS are not adequate to meet legal requirements. Reasons for selection of MIS are documented briefly in Chapter 5 of the revised plan and in the sections of the EIS relevant to each MIS. More detailed rationale for MIS selection is found in the Management Indicator Species Selection Process Record, which is available upon request. This record documents a selection process that is designed to follow closely the MIS requirements in 36 CFR 219.19 (1982 version). Species were considered for selection under each of the five categories listed in 36 CFR 219.19(1), and selected where appropriate. Two primary criteria were used to judge appropriateness of a species as MIS: 1) changes in the species' population should primarily reflect the effects of national forest management activities, and 2) population trends of the species must be capable of being effectively and efficiently monitored and evaluated in terms of habitat changes.

Finding species that meet these criteria is more difficult than it might first appear, especially in light of current scientific understanding. When regulations were adopted in the early 1980s, use of MIS was deemed the best approach for addressing biological diversity. Today, their use as the sole or primary means of planning and evaluating biological diversity is overly simplistic. A tremendous amount of research and scientific publication has occurred over the past twenty years, giving us much greater insight into ecological interactions and ecosystem functions. We now have a much greater appreciation for the complexity of population responses, and the limitations of using one species as a "proxy" for whole communities (see literature cited in the MIS Selection Process Record). We also are more aware of the inherent difficulties in precisely monitoring populations of many species.

As a result, we have reduced our emphasis on MIS during this round of planning, while staying in compliance with both the letter and intent of related regulations. At the same time, we have greatly *increased* emphasis on consideration of viability of many more individual species, and incorporated use of ecologically-based vegetation classification systems, newly developed by The Nature Conservancy and NatureServe. Use of this classification system includes recognizing and protecting rare community types. In addition, rather than focusing on a handful of individual species, our monitoring programs have increased emphasis on monitoring species groups and communities, such as birds, bats, fish, and rare communities, because this approach will give us much better information on more species and on overall system function. Where appropriate, individual species also will be monitored. We also will continue to work with our

partners in Forest Service Research and at universities to encourage and support research on key biological issues that are too complex to be addressed through our monitoring programs.

This shift in emphasis reflects our understanding of the current state of science, and an increased commitment to biological conservation, not, as some commenters suggest, an attempt to avoid these issues.

Other commenters contend that selected MIS are not adequate to represent all species or potential management effects as needed to provide for species viability and forest health and diversity. Of the five categories of MIS listed in the regulations, only one category is to be selected because they are believed “to indicate effects of management activities on other species of selected biological communities...” (36 CFR 219.19(1)). The purpose of other categories of MIS are to focus attention on effects of management on T&E recovery, species with special habitat needs “that may be influenced significantly” by management, and meeting public demand for game and non-game species. The MIS Selection Process Record clearly documents our consideration of species under each of these categories.

Based on these five categories, it is clear that not all MIS are to serve as “proxies” for other species; some are of direct interest themselves. Regulations make no direct link between species viability requirements and MIS. Use of MIS as the sole or primary means of assessing viability risk is not consistent with best science, as documented in literature cited in the MIS Selection Process Record. We have made no effort to select MIS to represent all species or all management effects, nor is there a requirement for us to do so. As indicated above, species viability requirements have been addressed primarily through direct evaluation of all species of viability concern and a mix of monitoring strategies.

Some commenters questioned the appropriateness of migratory birds as MIS and what they feel is our over-reliance on birds as MIS. These issues are addressed in the MIS Selection Process Record. In that document, we recognize the pros and cons of migratory birds as MIS, and discuss how the primary drawbacks may be overcome during monitoring and evaluation. As indicated earlier in this response, most species have some drawbacks as MIS. Our selection process indicates that birds often have the least serious drawbacks of candidate species and therefore are often the most appropriate MIS available.

### **3-127. Public Concern: The Forest Service should include aquatic species as management indicator species.**

The Forest Service chose to monitor aquatic communities rather than MIS for the following reasons: The use of MIS is controversial because it is based on the assumption that suitable habitat for the indicator is also suitable for other associated species. For a species to be a good indicator of changes in habitat, it has to be one of the most sensitive members of the community to a particular stressor. These species are often rare and/or difficult to monitor. Species that exhibit these characteristics show inconsistent patterns that cast doubt on their usefulness as indicators. Researchers (citations available upon request) have found that fewer samples are

needed to precisely estimate community level attributes than to estimate species attributes and recommend the use of species groups or community indices over individual species for stream fish studies.

**3-128. Public Concern: The Forest Service should consider a reasonable range of alternatives for proposed endangered, threatened and sensitive species as management indicator species.**

The NFMA requires that the Forest Plan shall contain monitoring and evaluation requirements. There is no requirement under NEPA that monitoring and evaluation requirements be determined for each alternative.

**3-129. Public Concern: The Forest Service should not use habitat types as indicators for species viability.**

Comments suggest that we should use management indicator species (MIS), rather than habitat, to drive viability evaluation, and that the set of selected Management Indicator Species (MIS) are inadequate to represent all species of viability concern. Use of indicator species as the sole or primary means of assessing viability risk is not consistent with best science, as documented in literature cited in the MIS Selection Process Record. Indicator species are but one part of our biological monitoring and evaluation program. We have made no effort to select MIS to represent all species of viability concern, nor is there a requirement for us to do so. MIS, as described in 36 CFR 219.19, serve a variety of purposes during forest planning, not all of which are relevant to species viability. Only where appropriate are MIS selected for the Revised Plan “because their population changes are believed to indicate the effects of management activities on other species of selected major biological communities” (36 CFR 219.19 (1)). Reasons for selection of MIS are documented in the Management Indicator Species Selection Process Record, which is available upon request. Some commenters correctly noted that we have de-emphasized the role of MIS in viability analysis. We have reduced emphasis on MIS because of the current state of science, which calls into question many traditional uses of the indicator species concept (see MIS Selection Process Record for a brief review). Nevertheless, our selection and use of MIS in this plan revision meets both the letter and intent of regulations.

- Because a mix of successional habitat does less well for species that need mature forests Comments express dissatisfaction that the evaluation lacks sensitivity to identify more differences in effects to species viability among alternatives. This issue is addressed in the EIS section on terrestrial viability evaluation. Primary reasons for relatively small differences are: much risk to viability is a result of factors substantially outside Forest Service control such as surrounding land uses in national forest landscapes and watersheds, exotic pests, and pollution; the most critical management measures were included in all alternatives to ensure they all meet minimum legal requirements for viability; and activity levels proposed under all alternatives are modest relative to the total land base.

Comments contend that the differences in viability effects that *are* disclosed are skewed to those species requiring disturbance-dependent habitats, and that detrimental effects to species associated with low-disturbance habitats are not adequately disclosed. This appearance reflects the fact that, under current conditions, disturbance-dependent habitats are generally more limiting on national forest land than are low-disturbance habitats. Therefore, the risk assessment is more sensitive to changes in their abundance. While increasing disturbance-dependent habitats often may cause a reciprocal decrease in low-disturbance habitats, the marginal effect in these more common low-disturbance habitats results in less change to viability risk. In addition, this reciprocal relationship is not as direct as it might first appear. Some restoration and maintenance of disturbance-dependent habitat is expected to occur in communities on dry and xeric sites, where fire suppression has resulted in conditions that do not represent quality habitat for either disturbance-dependent or low-disturbance species. Adding disturbance in these situations is a way to have cake and eat it too.

- Because statements about habitat elements with the highest risk species are not supported by species/habitat relationship tables

See previous response within this Public Concern statement (immediately above).

**3-130. Public Concern: The Forest Service should not use the same management indicator species for all alternatives.**

Regulations related to MIS state: “Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the management indicator species” (36 CFR 219.19(2)). MIS are not actions or outputs, the variables that typically vary by alternative. They are planning tools, used to “indicate” management effects by alternative. Changing MIS with each alternative would greatly reduce our ability to use them to compare and contrast effects across alternatives, and is not consistent with our reading of regulation intent.

**3-131. Public Concern: The Forest Service should not use common species and community level monitoring as (or in lieu of) management indicator species.**

See response to PC 3-126.

**3-132. Public Concern: The Forest Service should provide explanation and documentation for the elimination and reduction of management indicator species, and the selection of management indicator species and monitoring methodologies.**

See response to PC 3-126.

**3-133. Public Concern: The Forest Service should provide the scientific basis for stating that the maintenance of “ . . . a mix of successional habitats and/or a desired species composition is a primary objective for most of the lands on the Sumter National Forest.”**

Habitats for the large number of summer resident and an equally large number of winter resident species found on the Sumter National Forest across two distinct physiographic areas provides the motivation for diversity of habitats across the landscape. Managing forest composition towards greater diversity of native species is the primary motive for restoration of plant communities on the Forest.

**3-134. Public Concern: The Forest Service should modify goals, objectives, and standards related to special areas, rare communities, and old growth, as recommended.**

Your comments were considered and some changes were made to the monitoring and evaluation section of the Forest Plan, and standards related to special areas and rare communities. Restoration methods will be determined at the project level. Canebrakes were once abundant on the piedmont, so the objective of 5% is limited by anticipated budget and personnel constraints, as well as other resource concerns. Additional direction for maintaining a network of old growth patches is incorporated into management area DFC's.

**3-135. Public Concern: The Forest Service should give appropriate attention to the discovery, monitoring and protection of special areas, rare communities, and old growth.**

When rare communities are found within special areas, the rare communities standards will apply. Your comment regarding provisions for future old growth was considered. Future old growth will be promoted within prescriptions which are unsuitable for timber production.

**3-136. Public Concern: The Forest Service should acknowledge that the classification used for major forest communities is a generalization.**

One commenter suggests that we make clear that the classification of major forest communities used in the terrestrial species viability evaluation is a generalization so that the limitations of the classification are apparent, and that the classification used is of little use as a screen for viability concern species. All classification systems are generalizations. The commenter does not specify where they feel this lumping has resulted in erroneous or misleading conclusions.

To plan for habitats, the continuum of conditions on the ground must be generalized into a classification system so that they may be analyzed. For the terrestrial species viability evaluation, we looked at a variety of forest community classification systems, including the Forest Services CISC data classification, NatureServe's vegetation classification, and the classification system developed for old growth planning. While each of these has its advantages, none exactly matched the habitat association groupings that were most apparent when we looked at the full set of habitat needs for each species of potential viability concern. To facilitate and simplify species viability analysis, we lumped some forest communities together, where keeping them separate did not add appreciably to our ability to focus management direction or analysis. Major forest communities used in the viability analysis are described at the beginning of each associated forest community section in the EIS.

**3-137. Public Concern: The Forest Service should provide for the protection and recruitment of large woody debris by retaining all trees within one site potential tree height of a stream.**

Riparian areas are managed for the recruitment and retention of large woody debris. Specific large woody debris needs are determined on the basis of stream characteristics. See Riparian corridor prescription.

**3-138. Public Concern: The Forest Service should protect and recruit large woody debris as an important component of forested environments.**

Comments focus on recruitment of coarse woody debris into stream systems. Some commenters feel that ephemeral stream guidelines are not sufficient to provide this recruitment. Provisions in the Riparian Prescription, including emphasis on late successional forests, are designed explicitly to provide for large woody debris. Refer to Goal #4 and standard FW-13 in Chapter 2 of the Forest Plan and the desired condition and standard 11-2 in Chapter 3 of the Forest Plan.

**3-139. Public Concern: The Forest Service should specify goals and objectives for restoring canebreak communities.**

An objective for canebrake restoration is described in Objective 11.02 under Special areas, rare communities and old growth in chapter 2 of the Plan.

**3-140. Public Concern: The Forest Service should increase grassland/shrubland in stand type 8.A.1, Mixed Successional Forest Habitats.**

Comment noted.

**3-141. Public Concern: The Forest Service should modify various management prescriptions used in the Sumter National Forest.**

Mgt rx 6: Other management prescriptions supplied area to meet old growth needs. Mgt rx 11: Comment noted. Mgt rx 4D: 1)ROS class of roaded natural is based on proximity to existing roads. 2)For scenery management system, note response to comment 5-78. 3) Regarding buffer zones, the boundaries are the boundaries. 4)Standard 4.D.-2 should provide satisfactory protection from mineral lease operations. In addition, any such proposals are subject to site specific analysis and requirements. There are no grazing allotments on the Sumter. 5)Few botanical/zoological areas will have horse or mountain bike use. In any areas that do, if they come in conflict with the primary goals of perpetuating species and communities of interest, then such uses should be discontinued.

Mgt rx 8A1: 1)Harvest proposals are analyzed site specifically. 2)Before considering intermingled riparian corridors, 4-10% desired early successional forest translates to 100-250



year rotations 3) Silvicultural systems are site specific decisions, not plan level decisions. Mgt Area 4: Comment noted. Mgt rx 8A1: Comment noted. Mgt rx 4G: 1) Comment noted. 2) Note response to comment 5-78. 7E2-OBJ-1: Early successional percentages for any given management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. Effects are displayed in the EIS. 8B2-OBJ-2: Comment noted. Mgt rx 7E2 and 8A1: Comment noted. 8A1-OBJ-1: The range of early successional percentages for any given management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. Effects are displayed in the EIS. 8B2-OBJ-2: Comment noted.

Mgt rx 8A1: Effects are displayed in the EIS. Refer also to responses to comments under 7-65 and 7-94. 8A1-OBJ-1: 1) Refer to responses to concerns 7-94 and 7-100. 2) Details of how early successional habitat will be created and maintained is addressed in site specific project analysis. 3) Estimated road construction is addressed in the EIS. 8A1-OBJ-2: 1) Regarding successional forests, refer to response to concern 7-100. 2) Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. 3) For scenery management system, note response to concern 5-78. Standard 8A1-2: This standard for ruffed grouse has been removed from the plan. Standard 8A1-3: Comment noted. Mgt rx 8A1: 1) Regarding OHV use, note that a forest wide standard prohibits OHV trails within the Chauga and Chattooga watersheds. 2) In the lower Chauga, future old growth will be provided by management prescriptions 4D, 4F, 9F and 11. As directed by forest wide standard, existing old growth as defined in "Old Growth Guidance for the Southern Region," when encountered, will be managed to protect the old growth characteristics.

Mgt rx 8B2: The range of early successional percentages for any given management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. 8B2-OBJ-2: This objective has been deleted. The same information is now in the desired condition. The reference is to late successional conditions, which may include old growth. Mgt rx 8B2: Woodlands, savannas and grasslands are discussed in the DEIS beginning on page 3-106. 8B2-OBJ-1: Comment noted. Regarding successional forests, refer to the response to concern 7-100. 8B2-OBJ-2: Regarding successional forests, refer to response to concern 7-100. Standard 8B2-1: Regarding the scenery management system, note response to concern 5-78. Standard 8B2-2: Comment noted. Standard 8B2-3: Suitability of lands for timber production is set forth in 36 CFR 219.14. Suitability of lands for timber production is discussed in chapter 2 of the Revised LRMP in the wood products section.

Mgt rx 8B2: The range of early successional percentages for any given management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. This percentage range for early successional habitats is consistent with reasonable rotation ages for loblolly pine in the piedmont, since it will probably remain the dominant species in most of these areas. Mgt rx 8B2 in Mgt Area 3: Creating and maintaining woodland/savanna habitats is also one of the desired conditions in management prescription 8A1. Mgt rx 9G2: Early successional percentages for any given

management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. This objective has been deleted. This same information is now in the desired condition. The reference is to late successional conditions, which may include old growth.

Mgt rx 9G2: Comment noted. 9G2-OBJ-1: This objective has been deleted. The same information is now in the desired condition. Regarding successional forests, refer to response to concern 7-100. 9G2-OBJ-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. Standard 9G2-1: Regarding the scenery management system, note response to concern 5-78. Standard 9G2-2: Comment noted. Standard 9G2-3: Suitability of lands for timber production is set forth in 36 CFR 219.14. Suitability of lands for timber production is discussed in chapter 2 of the Revised LRMP in the wood products section. 10B-OBJ-1: Early successional percentages for any given management prescription were set at standard levels for all of the Southern Appalachian NFs. Regarding the rationale for these percentages, see response to concern 7-94. 10B-OBJ-2: The reference is to late successional conditions, which may include old growth. Mgt rx 6B: Comment noted.

Standard 6C-1: Regarding the scenery management system, note response to concern 5-78. Management prescription 6C has been used sparingly because future old growth will be provided by many other management prescriptions, including 1A, 1B, 2A1, 2A2, 2A3, 4D, 4F, 7A, 7E1, 9F, 11, 12A, and the natural area in 4G1. In addition, as directed by forest wide standard, existing old growth as defined in “Old Growth Guidance for the Southern Region,” when encountered, will be managed to protect the old growth characteristics. Mgt rx 9A3: Comment noted. The basis for this approach is that many areas with active erosion continue to erode and add sediment to stream systems without intervention. 9A3-OBJ-1: This objective has been deleted. The same information is now in the desired condition. Regarding successional forests, refer to response to concern 7-100. 9A3-OBJ-2: This objective has been deleted. The same information is now in the desired condition. Regarding successional forests, refer to response to concern 7-100.

Standard 9A3-1: Regarding the scenery management system, note response to concern 5-78. Standard 9A3-2: Comment noted. Standard 9A3-3: Suitability of lands for timber production is set forth in 36 CFR 219.14. Suitability of lands for timber production is discussed in chapter 2 of the Revised LRMP in the wood products section.

### **3-142. Public Concern: The Forest Service should modify certain objectives for the Sumter National Forest.**

Objective 9A3-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. Objective 8.2: The reference for this concern is unclear, since there is no objective 8.2. However, it sounds like a reference to the desired amount of early successional habitat. These are based on the area in a management prescription, not the percentage in a project area. Objective 7E2-1: Comment

noted. Regarding successional forests, refer to response to concern 7-100. Objective 7E2-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. Objective 9A3-1: Regarding successional forests, refer to response to concern 7-100. Mgt rx 9G2: Comment noted. Objective 9G2-1: Regarding successional forests, refer to response to concern 7-100. Objective 9G2-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. 9G2-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88.

Objective 10B2-1: Comment noted. Regarding successional forests, refer to response to concern 7-100. Objective 10B2-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. Objective 8B2-1: Regarding successional forests, refer to response to concern 7-100. Objective 10B2-2: Regarding successional forests, refer to response to concern 7-100. Objective 8B2-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88. Objective 3.02: Methods to accomplish this objective are evaluated in site-specific project analysis documents. Having a small portion (<5%) of the riparian corridor in this habitat condition adds to the diversity of habitats. The desired future condition of the riparian corridor would include this small amount of dense regeneration characterized by high stem densities and a proliferation of vines.

Objective 8A1-1: Comment noted. Regarding successional forests, refer to response to concern 7-100. Regarding the rationale for these percentages, see response to concern 7-94. Details on creating and maintaining early successional habitat are evaluated in site specific project analysis. Road construction estimates are displayed in Appendix F, and in the EIS. Objective 8A1-2: Regarding successional forests, refer to response to concern 7-100. Regarding old growth, refer to responses to concerns on old growth from 7-56 to 7-88.

### **3-143. Public Concern: The Forest Service should modify certain standards for the Sumter National Forest.**

Standard FW-56: The requirement for 330 feet separation between regeneration areas has been removed from this standard. Closer proximity of regeneration areas makes them more useful to some neotropical migratory bird species. Regarding fragmentation, see responses to concerns 3-77, 3-78, and 3-94. Standard FW-57: Comment noted. Standard 8A1-2: This standard has been removed from the LRMP. Mgt rx 4G1: Comment noted. Standard 4G1-1: Regarding the scenery management system, note response to concern 5-78. Standard 6C-1: Regarding the scenery management system, note response to concern 5-78.

Mgt rx 6C: Management prescription 6C has been used sparingly because future old growth will be provided by many other management prescriptions, including 1A, 1B, 2A1, 2A2, 2A3, 4D, 4F, 7A, 7E1, 9F, 11, 12A, and the natural area in 4G1. In addition, as directed by forest wide standard, existing old growth as defined in “Old Growth Guidance for the Southern Region,”

when encountered, will be managed to protect the old growth characteristics. Also refer to responses to concerns on old growth from 7-56 to 7-88.

**3-144. Public Concern: The Forest Service should acknowledge the Quentin Bass material in the forest plan revision process.**

Several commenters questioned the appropriateness of the even-aged successional model inherent in the Successional Forest Options incorporated in the Revised Plan. They frequently cited materials raised in a paper by a forest specialist that contend that Southern Appal. forests are naturally uneven-aged, and regenerate predominately through “gap-phase dynamics” rather than by larger, more severe disturbances. Some commenters fault the Forest Service for not considering this information.

Contrary to assertions made by some commenters, information compiled by Bass was considered during planning. It was distributed to staffs of all Southern Appalachian forests undergoing revision, and was reviewed by planners at the forest and regional levels. Points of agreement and disagreement were discussed at varying levels across these forests. There are many points of agreement, which are corroborated by a predominance of mainstream scientific literature. We agree that *some* major forest types in the Southern Appalachians are low disturbance systems that commonly regenerate through natural development of relatively small canopy gaps, and that frequent fire in these systems is not desirable. These areas of agreement are incorporated in the Revised Plan and EIS through direction and analysis for mesic deciduous forests, which include cove, riparian, mixed mesophytic and northern hardwood forests. This direction and analysis considers the amount of these forests allocated to Forest Successional Options 1 and 2 (which should be dominated by gap-phase processes), the need for canopy gaps within these forests, and the limited role of fire (cite Mesic Deciduous Forest Section of EIS, and appropriate objectives and standards from the plan). There are, however, some of Bass’ conclusions with which we disagree, as do some members of the academic and research communities with whom we have consulted.

Bass’ presentation of forest conditions in the late 1800s and early 1900s depends heavily upon the Ashe and Ayers Report and descriptions contained in the field notes and maps of the tracts of land that were acquired for inclusion in the National Forests. Bass also has provided substantive literature (bibliography) to support his views. However, he rejects or ignores the substantial body of scientific literature (much of it published in the last 10 years) that contradicts his conclusions regarding the role of fire and other disturbance in maintaining upland oak and pine forest types.

Unlike the scientific literature used and cited during planning, Bass’ analysis has not been through the rigorous process of peer review, critique, and publication in mainstream scientific journals. Prior to filing of the whistleblower complaint, the Forest Service contracted review of Bass’ analysis by Paul and Hazel Delcourt of the University of Tennessee, who have published widely on historical disturbance ecology. Their written review indicates areas of agreement and disagreement similar to those identified by forest planning teams. It also is important to note that

Bass is an archaeologist and not an ecologist or forester, professions that are educated and trained to make ecological interpretations of forest condition data. In his paper, use of terms, lack of reference to the most current scientific literature, and resulting conclusions often do not reflect the best available science. Based on these considerations, we believe Bass' analysis was given an appropriate level of consideration during planning.

Although understanding historical and pre-European settlement conditions provides an important context for conservation planning, restoring such conditions is not an overriding objective or legal requirement. In most cases, too much has changed for this restoration to be feasible, let alone desirable. Plan direction represents a decision on multiple-use management informed by the best science on disturbance ecology, not an attempt to recreate historical conditions.

Although understanding historical and pre-European settlement conditions provides an important context for conservation planning, restoring such conditions is not an overriding objective or legal requirement for plan revision. In most cases, ecological conditions have changed too much for this to be feasible, let alone desirable. Plan direction represents a decision on multiple-use management informed by the best science on disturbance ecology, not an attempt to recreate historical conditions.

Based on synthesis of the scientific literature, our understanding is that Southern Appalachian forests historically have been subject to highly variable disturbance regimes across the landscape. This variation resulted from the interaction of fire, wind, and other disturbance factors with the highly variable topography and edaphic conditions of the mountains. We disagree with Bass, and follow most current scientific literature, in recognizing that fire, primarily of Native American origin, played an important role in maintenance of upland pine and oak forests, and open woodlands, savannas, and grasslands. Compared to today, forest structure was likely more open on upland sites, due to the influence of fire, and more heterogeneous on lower slopes and coves, due to gap-phase dynamics of older forests. Overall, within-stand structures were likely variable due to the variable effects of natural disturbance factors. Many areas would not easily be categorized as either even-aged or uneven-aged, but some level and pattern of older residual overstory trees would almost always be present, even in areas providing important early-successional habitat. This variable structure can be approximated with uneven-aged, two-aged, and even traditional even-aged management systems, all of which involve retention of varying levels of overstory structure. A patchwork of uniform even-aged stands established by clean clearcuts is clearly outside the historical range of variation of forest structure and is also clearly not the desired condition for any portion of the national forest.

Although the Revised Plan includes objectives for restoration of native fire-maintained habitats, we recognize that we will not be able to restore the influence of fire to the landscape to historical levels due to a variety of logistical and social reasons. Creation of early-successional forests can compensate for the loss of open fire-maintained habitats for some species. So, although we recognize that the mix of types of early-successional habitats maintained under the Revised Plan cannot reflect historical conditions, we have considered the overall abundance of these habitats within an historical ecological context to arrive at objective levels. As some of these fire-

maintained habitats are restored, need for early-successional forest as habitat for some species will decline. However, need will not disappear; other species, such as ruffed grouse, depend upon the dense woody growth found in early-successional forests. In addition, other multiple-use considerations, such as need for habitat to support game species for recreation, ecological restoration of native forests, forest health considerations, and in some cases timber production, will continue to make creation of some level of early-successional forest desirable.

\*Delcourt, P.A. and H.R.Delcourt. 1996. Holocene vegetation history of the northern Chattooga Basin, North Carolina. *Conserv. Biol.* 11:1010-1014

### **3-145. Public Concern: The Forest Service should protect or restore rare communities.**

Several commenters compared provisions for rare communities across forests and found differences. Concerns include lack of delineation of rare communities and allocation of specific acreage to the Rare Community Prescription, and uncertainty about when, where, and how rare communities would be inventoried, delineated, and allocated. Despite some differences that have resulted as regional recommendations were incorporated into individual plans, each revised plan includes language that makes clear our intent with regard to rare communities. Our intent is that rare communities, as defined in each plan, will be given high priority for maintenance and restoration wherever they occur on the forest. To accomplish this intent, it is clear that we will need to improve our inventories of rare communities as the plan is implemented. We will improve rare community inventories through a variety of approaches, including project-level surveys where needed to ensure maintenance or restoration of rare communities. As rare communities are located and mapped, they will automatically be allocated to the Rare Community prescription, unless or until such allocation would result in a substantial impact to achievement of conditions and outputs envisioned in the plan. The plan indicates that rare communities will be monitored for number and acreage of occurrence, condition (which includes presence of rare species), management needs, and management accomplishments. This focus will ensure that rare communities continue make a critical contribution to community and species diversity on the forest.

### **3-146. Public Concern: The Forest Service should provide guidance that specifies how areas will be delineated and reassigned to Management Prescription 9.F, Rare Communities.**

Some commenters desire to see more detail on what activities are likely to be involved in rare community maintenance and restoration. Maintenance includes protection from adverse effects of management activities, recreational uses, and invasive nonnative species, where warranted. Restoration will primarily involve restoring composition, structure, or function within existing rare communities where these characteristics are outside desired ranges. In some cases, restoration may involve expanding or reestablishing rare communities where they once likely occurred. Primary management needs for maintenance and restoration are indicated in rare community definitions in the plan (See Chapter 3 - Management Prescriptions, 9F). Because of the variety of needs that may arise, it is not desirable to get too specific about, or to limit, the

kinds of activities that may be involved in maintenance or restoration of rare communities. Under the direction in the revised plan, it will be incumbent on project-level planning to demonstrate that proposed actions to be implemented in rare communities will meet the purpose of maintaining or restoring these communities.

**3-147. Public Concern: The Forest Service should provide better protection for rare communities on the Sumter National Forest.**

Your comments were considered and some changes were made in the wording of standards associated with the rare community prescriptions. Incorporation of a buffer surrounding each rare community designation will be addressed on a case-by-case basis.

**3-148. Public Concern: The Forest Service should protect rare communities.**

See response to PC 3-145.

**3-149. Public Concern: The Forest Service should request greater funding to monitor rare and endangered plant communities.**

Funding estimates for monitoring in the Forest Plan are just that, estimates. These numbers were reviewed and were eliminated in the final.

**3-150. Public Concern: The Forest Service clearly delineate rare communities and allocation; provide specific direction for restoration; establish standards for monitoring, maintaining records, and surveying; identify and protect all special areas; and, establish goals, objectives, and standards for special areas and rare communities.**

See response to PC's 3-145 and 3-148.

**3-151. Public Concern: The Forest Service should allocate sufficient monies to monitor rare communities.**

Funding estimates for monitoring in the Forest Plan are just that, estimates. These numbers were reviewed and were eliminated in the final.

## **CHAPTER 4 – TRANSPORTATION**

### **4-1. Public Concern: The Forest Service should develop and enforce road density standards.**

Open roads density standards should only be established when supported by site-specific science-based analysis. An interdisciplinary science-based roads analysis at the appropriate scale will be used to inform planners and decision makers of needed and unneeded roads and to recommend priorities for implementation. When open road density standards are warranted, measures will be taken to enforce the standards.

### **4-2. Public Concern: The Forest Service should evaluate and improve forest system roads.**

The forest does have a large backlog of road maintenance needs that it has not been able to fund. Program and deferred maintenance dollars received are spent to improve roads based on concerns for sediment reduction to streams and improvement of aquatic habitat. The forest has a large culvert replacement program that will take advantage of opportunities related to fish passage improvement.

### **4-3. Public Concern: The Forest Service should leave one-half mile sections of undisturbed habitat along roadsides for aesthetic purposes.**

In the Scenery Management System some roadsides, recreation sites, trails as well as other viewsheds have sections that retain vegetation for aesthetic purposes. For a complete explanation of the Scenery Management System see the glossary of the Forest Plan or EIS.

### **4-4. Public Concern: The Forest Service should develop goals and objectives for reducing road mileage to fiscally responsible levels.**

Each forest has objectives for road management. In addition, before the Record of Decision was signed finalizing the decision on the plan, a Roads Analysis was completed that laid out objectives for road management, including reduction of road miles.

### **4-5. Public Concern: The Forest Service should not pave several roads.**

The decision on paving Burrell's Ford road has not been made at this time. The environmental assessment for this proposed project will evaluate several alternatives to reduce sediment into the Chattooga River watershed, improve driver safety on the road and reduce annual maintenance cost.

### **4-6. Public Concern: The Forest Service should pave forest roads with permeable methodologies to stop runoff and increase user access.**



National Forest System (NFS) roads serve a multitude of uses and are constructed and maintained to best serve the intended use within available funding. These roads may range from single lane roads with turnouts to double lane roads. Road surfaces vary from native surfaced to bituminous paved roads. Road management objectives are developed for each NFS road that guide road design criteria and planned maintenance. Many factors are considered in determining what type of road surfacing is most appropriate. They include, but are not limited to traffic (volume and types of vehicles), resource protection (water quality, erosion, etc.), climate, strength of underlying soils, user safety and comfort, economics and availability of funds. Road management objectives are reviewed periodically for appropriateness.

**4-7. Public Concern: The Forest Service should ensure that any new bridge across the Chattooga River be aesthetically pleasing.**

The Wild and Scenic Rivers Act prohibits any action which detracts from an outstandingly remarkable value. One of the outstandingly remarkable values of the Chattooga River is scenery. Any future development will have careful aesthetic considerations as well as project specific environmental analysis.

**4-8. Public Concern: The Forest Service should describe actions being taken regarding the potential replacement of bridges.**

The bridges crossing the Chattooga River are not under the jurisdiction of the Forest Service. The current bridge over the river on US 76 is under consideration for replacement by South Carolina and Georgia transportation agencies. Funding and environmental concerns have delayed the decision on the removal of old US 76 bridge.

**4-9. Public Concern: The Forest Service should conduct the roads analysis process.**

A forest-scale roads analysis has been completed to inform the decision as required in FSM 7712. While it is desirable to have the forest-scale roads analysis completed prior to issuance of the draft, it is not a requirement.

**4-10. Public Concern: The Forest Service should incorporate the analysis of the road system into the draft plan revision before it becomes final and involve the public in the roads analysis process.**

A forest-scale roads analysis has been completed to inform the decision as required in FSM 7712. The roads analysis process is not a NEPA decision process and therefore does not require a formal public scoping and comment period. Public involvement in identification of issues and assessment of transportation needs and opportunities was encouraged and welcomed.

**4-11. Public Concern: The Forest Service should conduct a new roads analysis.**

The forest-scale roads analysis was not intended to analyze the all roads (classified and unclassified) on National Forest lands. There are multiple scales at which roads analysis may be conducted to inform road management decisions. Roads analysis at the forest-scale provides the context for informing road management decisions and activities at the watershed, area and project level. The forest-scale roads analysis and the resulting report 1) display the classified roads and display how the roads are intended to be managed; 2) provide guidelines for addressing road management issues and priorities; 3) identify significant social and environmental issues, concerns and opportunities to be analyzed through lower level analyses; and 4) document coordination efforts with other government agencies (FSM 7712.13b.). The Responsible Official has the discretion and duty to determine whether or not a roads analysis below the forest-scale is needed and the degree of detail that is appropriate and practicable. (FSM 7712.13)

**4-12. Public Concern: The Forest Service should develop criteria for when a watershed or project scale roads analysis will be needed.**

The Forest Service has issued direction on roads analysis at the watershed and project scales. “The responsible Official has the discretion and duty to determine whether or not a roads analysis below the forest-scale is needed and the degree of detail that is appropriate and practicable. Guidance on selecting the appropriate scale and those proposed actions which may trigger a need for a roads analysis is set forth in FSM 7712.13, paragraphs a-c.” (FSM 7712.13) Additional guidance is provided in the report Roads Analysis: Informing Decisions About Managing the National Forest Transportation System (USDA Forest Service, 1999, Misc. Report FS-643).

**4-13. Public Concern: The Forest Service should demonstrate which roads are necessary to implement the forest plan.**

The actual determination of which roads are necessary is made by each forest. See Response to PC 4-25.

**4-14. Public Concern: The Forest Service should include only realistic projections of environmental effects in the roads analysis based on likely natural processes and management activities.**

We believe that the environmental effects analysis is based on reasonable projections that reflect natural processes that are likely and management activities that we anticipate. Since these processes and activities have not yet occurred, it is difficult to determine what they will be, however, it is the job of the interdisciplinary team to make these determinations.

**4-15. Public Concern: The Forest Service should conduct a meaningful analysis of the effects of road construction and maintenance on aquatic habitats.**

See response to PC 3-34..

**4-16. Public Concern: The Forest Service should identify a minimum road system option as required by Forest Service Manual 7712.11.**

36 CFR 212.5 requires the Forest Service to identify the minimum road system needed for safe and efficient travel and for administration, utilization, and protection of National Forest System lands, using a science-based roads analysis at the appropriate scale. The forest-scale roads analysis was not intended to analyze the all roads (classified and unclassified) on National Forest lands. There are multiple scales at which roads analysis may be conducted to inform road management decisions. Roads analysis at the forest-scale provides the context for informing road management decisions and activities at the watershed, area and project level. Outcomes of roads analysis at the watershed and area-scale would identify needed and unneeded roads (FSM 7712.13c)

**4-17. Public Concern: The Forest Service should develop standards to ensure that aquatic resources are protected from damage due to increased road use and maintenance.**

We have BMP's which limit road construction in the streamside management zones. See response to PC 4-19.

**4-18. Public Concern: The Forest Service should clarify whether or not temporary roads are included in construction estimates.**

Temporary road costs are part of the costs used to determine the "stumpage value" of the timber, which is a "net" figure. So while there are no explicit temporary road costs in the analysis, they are accounted for through the reduction in the "net revenue" (or stumpage value) figure used in the economic analysis.

**4-19. Public Concern: The Forest Service should only construct new roads if no other feasible alternative exists to deal with emergency situations.**

Road standards should only be established when supported by site-specific science-based analysis. Decisions on road construction, reconstruction, and decommissioning are best handled at the watershed or project level based upon site-specific information and analysis. An interdisciplinary science-based roads analysis at the appropriate scale will be used to inform planners and decision makers of needed and unneeded roads and to recommend priorities for implementation.

**4-20. Public Concern: The Forest Service should only consider new roads if they help in maintaining and protecting sensitive areas.**

New road construction is expected to occur at very low levels under the preferred alternative. The projected 10-year estimate for new road construction needs on the forest is nine (9) miles. It

is not possible under a multiple use plan to limit roads to only one purpose as the commenter suggests; however, given the emphasis of the preferred alternative, what limited road construction that may occur is most likely to be motivated by recreational or timber related activities.

**4-21. Public Concern: The Forest Service should not construct additional roads.**

This is same basic concern as PC 4-25. An additional concern was expressed over building new roads for fuel reduction burning. The forest has not construct any new roads for the burning program. The road analysis process, as part of the burn decision would allow the public to input their comments on any road plans.

**4-22. Public Concern: The Forest Service should consider the costs of road construction for creating the desired conditions outlined in the proposed plan.**

The Forest Plan identifies the desired conditions to be achieved, and the EIS explains the projected outputs and activities needed to meet those desired conditions, along with the environmental effects of those projected outputs and activities. The commentor is correct that the Forest Service may not receive the full budget needed to carry out all the activities projected in the Plan and EIS.

**4-23. Public Concern: The Forest Service should prevent damage to the forest from temporary roads.**

The forest evaluates the need for temporary roads and the appropriate standard during an activity analysis process. The forest is currently working on additional guidelines for the use and construction of temporary roads. The addition of more engineering help in field location of temporary roads has been discussed to help identify and reduce impacts to the land.

**4-24. Public Concern: The Forest Service should decrease the number of roads and maintain them better.**

The Forest Service is conducting roads analyses, at appropriate scales, to: Identify transportation management opportunities and priorities; 2. Assess transportation management needs, long-term funding, and expected ecosystem, social, and economic effects; and 3. Establish transportation management objectives and priorities. Generally, the area and watershed-scale roads analysis will be the most appropriate scale to identify and prioritize roads that are no longer needed or those roads needing major improvement. Road management decisions and timing of their implementation may be affected by several factors, such as public safety, resource effects and availability of funding.

**4-25. Public Concern: The Forest Service should close forest roads.**

This concern is best addressed at a watershed or project decision scale rather than in Forest Planning. An interdisciplinary science-based roads analysis at the appropriate scale will be used to inform planners and decision makers of needed and unneeded roads and to recommend priorities.

The forest has been consciously building less roads and decommissioning unneeded roads for the last several years. The use of the road analysis process for evaluating road needs as part of watershed and area analysis for resource activities will continue this trend. The projected level of new road construction in the plan (less than 0.9 miles per year) will have very little effect on the forest road density or total miles of system roads.

**4-26. Public Concern: The Forest Service should close roads outside of present planning scope.**

This concern has been addressed in PC 4-25. The forest plan provides the guidance for road decisions but the actual decision is made through a project level analysis.

**4-27. Public Concern: The Forest Service should develop objectives or standards for decommissioning roads.**

The Forest scale Road Analysis Process could identify some opportunities for road decommissioning. However, the more appropriate scale for most of the roads that need decommissioning is at the area, watershed or project scale. See response to PC 4-25.

**4-28. Public Concern: The Forest Service should add direction to management prescriptions for deconstructing roads.**

See response to PC 4-27.

## **CHAPTER 5 – RECREATION**

### **5-1. Public Concern: The Forest Service should double the size of Management Prescriptions 4.D and 4.F.**

The Proposed Plan has increased the size of the scenic area from 3,300 acres to 3,459 acres to include additional scenic waterfalls and drainages. Cedar Creek was added as a botanical area in this Proposed Plan and is approximately 500 acres adjacent to the Chauga River.

### **5-2. Public Concern: The Forest Service should explain why the lower Chauga was moved from Management Prescription 6.B to 8.A.1.**

In the lower Chauga, future old growth will be provided by management prescriptions 4D, 4F, 9F and 11. As directed by forest wide standard, existing old growth as defined in “Old Growth Guidance for the Southern Region,” when encountered, will be managed to protect the old growth characteristics.

### **5-3. Public Concern: The Forest Service should make several changes to Management Prescription 7.E.1.**

The use of the 7.E.2 instead of the 7.E.1 in the Chattooga Corridor allows for the recreation resource to be emphasized while still allowing some timber harvest. The use of 7.E.1 does not allow for timber harvest. The Prescription 7.E.1 and mineral development may be compatible in some places. Site specific analysis is required prior to mineral development. OHV use is compatible with the emphasis of the prescription with only small increase and decreases. OHV use in the riparian area parts of this prescriptions is prohibited except for designated crossings.

### **5-4. Public Concern: The Forest Service should not assign Management Prescription 12.A to the Rock Gorge Roadless Area.**

The management of this area allows for protection of the area's roadless character in a remote backcountry setting. The prescription was localized at the forest level to better reflect the forests' conditions and improve implementation. The Scenery Management System information has been more fully explained in both the Plan's and EIS's glossary. The Prescription 12A and mineral development is compatible in some places and with mitigation measures. Site specific analysis is required prior to mineral development.

### **5-5. Public Concern: The Forest Service should modify various management prescriptions on the Sumter National Forest.**

To meet the rapid increase in recreation there are increases in recreation acreage in several prescriptions such as 7.E.1, 7.E.2 and 4.F. Also, most prescriptions are compatible with recreation facilities both trails and sites. Prescription 9.F generally are limited in number of occurrences, are small in size, and have relatively discrete boundaries. There will be

opportunities in the stream bottom areas of the Enoree and Long Cane districts to restore native vegetation and diversity. For a description of the recreation alignment see the glossary of the Forest Plan or EIS. Specific activities allowed within roadless areas must not detract from their roadless area characteristics. For an explanation of the Scenery Management System see the glossary of the Forest Plan or EIS. Limited mineral development is allowed with no surface occupancy stipulation and mineral material authorization is allowed but must protect the recreation character. The use of the 7.E.2 instead of the 7.E.1 in the Chattooga Corridor allows for the recreation resource to be emphasized while still allowing some timber harvest. The use of 7.E.1 does not allow for timber harvest.

**5-6. Public Concern: The Forest Service should encourage wildlife viewing and hunting opportunities in Management Prescription 7.E.2, Dispersed Recreation with Vegetation Management.**

The prescription 7E2 allows for wildlife viewing and hunting opportunities.

**5-7. Public Concern: The Forest Service should assign the Management Prescription 12.A, Remote Backcountry Recreation, to the Big Mountain Area.**

The Sumter National Forest has assigned 12A to that area. The only area that is allocated to 12A is Big Mountain Roadless Area. The remainder of the Chattooga watershed in that area is allocated to dispersed recreation, 7E2.

**5-8. Public Concern: The Forest Service should ensure that management prescriptions for the Ellicott Rock Wilderness are the same for both the Sumter and Chattahoochee National Forests.**

The Wilderness direction for Ellicott Rock is in the Chattahoochee Forest Plan, the Sumter Forest Plan as well as the Nantahala Forest Plan. The management direction for this area is in desired conditions, standards and objectives. Although in each plan they may not appear in the same location, the intent of the wilderness direction is similar and doesn't conflict.

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**5-10. Public Concern: The Forest Service should provide more detail as to what activities are permitted under Management Prescription 7.E.2.**

OHV use is not allowed in the Chattooga Watershed (See forestwide standards, Chapter 2). The specific type and timing of harvest and burning are site-specific decisions made at a local level.

**5-11. Public Concern: The Forest Service should apply Management Prescription 12.A to the South Carolina side of the Chattooga River between Ira Branch and Kings Creek.**

The Big Mountain roadless area is the only area that is allocated to the 12A prescription. Some of the area between Ira Branch and King's Creek is included in the Big Mountain Roadless Area.

No additional areas were included.

**5-12. Public Concern: The Forest Service should apply Management Prescription 12.A in the Big Mountain Area of the Chattooga River.**

This comment supports the preferred alternative.

**5-13. Public Concern: The Forest Service should not assign Management Prescription 7.E.2 to the Chattooga River watershed.**

The use of the 7E2 instead of the 7E1 in the Chattooga Corridor allows for the recreation resource to be emphasized while still allowing some timber harvest. The use of 7E1 does not allow for timber harvest. OHV use is not allowed in the Chattooga Watershed (See forestwide standards). This prescription in areas adjacent to the Chattooga Wild and Scenic River are compatible as long as it doesn't detract from the outstandingly remarkable values and free-flowing condition.

**5-14. Public Concern: The Forest Service should collect data on all user groups in the Chattooga River watershed.**

The Forest Service collects data on all user groups through a National Visitor Use Survey, done about every 5 years on the Sumter National Forest. The survey does not focus only on the Watershed, it gathers use data for the entire National Forest.

**5-15. Public Concern: The Forest Service should not presume that a wilderness designation allows only recreation.**

The Environmental Impact Statements (EIS) in addressing Issue 8 - Roadless Areas and Wilderness Management discloses that Wilderness, roadless and other un-roaded areas are managed to provide their full range of social and ecological benefits. The EIS further discloses that in addition to outdoor recreation in wilderness, there is a non-user component that values American wilderness. Wilderness is valued for preserving representative natural ecosystems and local landscapes. The very existence of wilderness is valued by the American public as part of the natural heritage of the country.

**5-16. Public Concern: The Forest Service should recognize the importance of public land recreation.**

The Forest Plans do not ignore Recreation. Direction is provided in the form of Goals, Standards, Guidelines, and the allocation of lands to management prescriptions where a wide spectrum of recreation opportunities and settings are provided and permitted.

**5-17. Public Concern: The Forest Service should not support recreational activities at the expense of the ecological integrity of resources.**



Recreation facilities and trails must not conflict with environmental laws such as Clean Air Act, Clean Water Act, etc. (see forestwide recreation standards). The goal is to provide recreation opportunities on an environmentally sound basis. OHV's are a legitimate use of National Forests and can be built and maintained on suitable areas. Site specific environmental analysis is required prior to construction of trails, including OHV trails. The Forest will enhance backcountry recreation. The intent of the goal is to increase both SPM and SPNM by reducing roaded natural or rural recreational opportunities. Any proposed OHV trails on the Andrew Pickens Ranger District would require site-specific environmental analysis and public comments.

**5-18. Public Concern: The Forest Service should continue to have an inclusive policy for various recreation activities on National Forest System lands.**

The Sumter National Forest strives to provide a spectrum of recreation setting and opportunities.

**5-19. Public Concern: The Forest Service should better analyze the supply and demand for wilderness based recreation.**

Same as response to PC 5 -21.

**5-20. Public Concern: The Forest Service should better analyze the real price of recreational opportunities on National Forest System lands.**

The most recent information available at the time of our analysis are prices expressed in 1989 dollars and estimated from 1989 to 2040 are found in the FS publication "Resource Pricing and Valuation Procedures for the Recommended 1990 RPA Program", which is a part of the Process Record. We estimated the real price growth to year 2000 and adjusted the values to reflect 2000 prices. See page B-59 of Sumter DEIS, respectively. If revised prices are made available from Forest Service Research and Forest Service Strategic Planning and Resource Assessment Units before the Final Draft EIS is release, these new prices will be substituted for the DEIS prices.

**5-21. Public Concern: The Forest Service should better document the need for recreation on National Forest System lands.**

Many comments were received throughout the planning process concerning the 1997 guidance from the Region on methodologies for calculating recreational supply and demand for wilderness. This included a calculation of the "practical maximum capacity" of roadless and wilderness areas. The Region recognized the concerns with this methodology and issued a letter on March 8, 2002 which emphasized that these calculations are "theoretical" and that the "rationale for the wilderness recommendations should be based on the merits of each roadless area and the sustainability of wilderness values".

As a result, the calculations from this methodology are not included anywhere in the EIS, and they were not a determining factor in making wilderness recommendations. What were

determining factors were the factors identified in the Forest Service Handbook at FSH 1909.12, Chapter 7.23b. These factors are: the location, size, and type of other wildernesses in the general vicinity and their distance from the proposed area, present visitor pressure on other wildernesses, the extent to which nonwilderness lands provide opportunities for unconfined outdoor recreation experiences, the habitat needs of certain biotic species (those that need “protected areas” or those that cannot survive in “primitive surroundings”), and an area’s ability to provide for preservation of identifiable landform types and ecosystems.

The answers to some of these factors are in the individual roadless area descriptions found in Appendix C. However, for some of the other factors within a particular National Forest, the answers were essentially the same for each roadless area. This information can be found in the EIS. The Record of Decision then provides the rationale for why certain roadless areas were or were not recommended for wilderness designation.

**5-22. Public Concern: The Forest Service should recognize the increase in recreational use of the Chattooga River corridor and equitably manage the competing uses.**

Use of most public land continues to increase. We appreciate efforts in the past to combat litter and hope that can continue. Road closures, such as Burrell's Ford, are site specific decisions not appropriate at the Forest Plan level. Also, mountain bike access is not currently allowed in the Wild and Scenic Corridor but that decision about what trails on which bikes are allowed is a site specific decision. The Forest Plan does not allow boating above Highway 28. The restrictions placed on commercial (guided) floaters are in this Forest Plan, any change to those restrictions including numbers of floaters will require additional public comment and an amendment to the Forest Plan. Studies do show that recreationists' expectations can change over time including how many people contribute to the feeling of crowding

**5-23. Public Concern: The Forest Service should only allow ATV use in Management Prescription 7.C, OHV Use Area.**

Through the 7.C prescription, the LMP identifies where the management will emphasize off highway vehicle (“OHV”) recreation. In other prescriptions, OHV recreation may not be emphasized but may be compatible. For example, a single trail or smaller trail system may already exist, or be appropriate for development, in other prescriptions. Finally, it is important to provide logical trail systems including connections between trail systems, trail heads, or points of interest. The Forest Plan states where motorized recreation is prohibited or permitted. Additionally, a few comments continued that the EIS failed to consider a range of alternatives for motorized recreation. However, the EIS did examine a range of OHV opportunities among the seven alternatives. Chapters 2 and 3 discuss, by alternative, the acres allocated to the 7C prescription and the percent of estimated change in motorized trails.

**5-24. Public Concern: The Forest Service should modify various standards related to OHV/ATV use.**

Recreation facilities and trails must not conflict with environmental laws such as Clean Air Act, Clean Water Act, etc. (see forestwide recreation standards). The goal is to provide recreation opportunities on an environmentally sound basis (see forestwide goals). See forestwide standards which prohibit OHV trails within the ephemeral stream zones except at designated crossings and where the trail location requires some encroachment, for example, to accommodate steep terrain. Site specific environmental analysis is required prior to construction of new trails, including new OHV trails. We agree that proper program management is important to the success of OHV recreation. Partnerships with motorized recreationists, communities, forest interest groups, other law enforcement agencies and public land manager are also essential in providing information on where and how to ride. Plan-level decisions on OHV recreation are reviewed in the annual forest plan monitoring report. Additionally, current regulations give the authority to land managers to close areas that are being adversely impacted. See 36 CFR 295, Use of Motor Vehicles Off Roads, and 36 CFR 261, Prohibitions. Also, off-route use of OHV's is enforced based on available law enforcement staffing. Off-route use of OHV's is prohibited under a Supervisor's Order based on the Code of Federal Regulations. Those caught are generally ticketed for each offense, occasional cases may go to court with the penalty based on the Judge's discretion. Criteria for location of OHV routes is not required forest plan direction and could not take the place of site specific analysis. Application of the 7C prescription around OHV routes is not required. Any new OHV trails on the Andrew Pickens Ranger District, including areas outside of the Chattooga and Chauga Watersheds would require site-specific environmental analysis and public comment.

**5-25. Public Concern: The Forest Service should not open up more National Forest System lands to ATV use.**

Off-highway vehicle ("OHV") recreation is clearly a valid use of, as well as a frequently enjoyed activity, on National Forest Lands. See Executive Order 11644, as amended by Executive Order 11989, Use of Off-Road Vehicles on Public Lands, 37 FR 2877 (Feb. 9, 1972), 42 FR 26959 (May 25, 1977.) As overall strategic direction for forest lands, the LMP balances recreational use and protection of resources. It emphasizes OHV recreation in certain areas. It also recognizes that OHV recreation is inappropriate for certain settings due to impacts on ecological resources or conflicts with other recreationists or designated land uses.

This Forest Plan provides an umbrella of direction for future site-specific developments by designating where OHV recreation may be compatible with other uses; it however does not make site-specific project decisions. Any future proposals for development of OHV routes – whether new systems or additions to existing systems - will require further site-specific project analysis which will take into account potential site-specific impacts such as noise, disturbance to wildlife, erosion, invasive species and conflicts with other uses. These future project proposals will solicit public comment on site-specific considerations such as location, length, use of roads, safety, vehicle types, trailheads, operational periods, and site-specific monitoring.

During LMP implementation, screening criteria will be used to guide the development of OHV opportunities in compatible prescriptions. For example, the potential impact of noise associated

will be examined and, if necessary, mitigation measures will be designed to reduce negative effects to an acceptable level.

Finally, a number of comments were concerned with proper trail design, trail maintenance, presence of law enforcement, illegal riding off designated OHV routes and damage to the land by illegal riding. We agree that proper program management is important to the success of OHV recreation. Partnerships with motorized recreationists, communities, forest interest groups, other law enforcement agencies and public land manager are also essential in providing information on where and how to ride. The Agency is committed to offering high quality OHV riding opportunities in a natural setting and is committed to the stewardship of Forest Service lands. Plan-level decisions on OHV recreation are reviewed in the annual forest plan monitoring report. Additionally, current regulations give the authority to land managers to close areas that are being adversely impacted. See 36 CFR 295, Use of Motor Vehicles Off Roads, and 36 CFR 261, Prohibitions.

**5-27. Public Concern: The Forest Service should not limit bicycle use to designated bicycle trails.**

Not all National Forest trails are suitable for mountain bike use, so the Forest chose to designate suitable trails. The intent is not to limit mountain bike use.

**5-28. Public Concern: The Forest Service should not equate the fishing experience on the Chattooga River with the fishing on the Tuckaseegee, Davidson, and Nantahala Rivers.**

The Forest Service does not equate these rivers, these rivers were identified by anglers as substitutes for the Chattooga River. The study that cited this information was the Chattooga National Wild & Scenic River Trout Angler Substitution Study (Bixler and Backlund, 2002)

**5-29. Public Concern: The Forest Service should not place fishing platforms on the portions of the Chattooga River with a Wild and Scenic River designation.**

This prescription only applies to the segments of the River that are classified recreational. Other sections of the river that are classified as wild or scenic have different desired conditions and a different set of standards.

**5-30. Public Concern: The Forest Service should establish multi-use recreational trails.**

The Sumter National Forest does allow a variety of trail users on most trails. In general however, horse and OHV trails are separate. Hikers are allowed on all trails and mountain bikes are allowed on all OHV and most horse trails.

**5-31. Public Concern: The Forest Service should support the GEM Trail.**

The demand for trails of all kinds is increasing while budgets for construction and maintenance of trails remain static or often decreases. The overall focus of each of the Southern Appalachian Forests in the plan revision is to work to maintain and improve current trail systems and to analyze any additional needs for trails as funding permits. Analysis of a long distance trail through the Southern Appalachians was not analyzed as part of our plan revision. A long distance trail such as the Great Eastern Mountains Trail will require a separate planning effort that would tier to the revised forest plan. Trail development is compatible with the revised forest plans as are the goals to reduce congestion on the Appalachian Trail and provide multiple-use trail opportunities. We would encourage you interested publics to begin to dialog with all forests that would be affected by the proposed GEM trails to discuss the feasibility and opportunity for success in such an ambitious endeavor.

**5-32. Public Concern: The Forest Service should clarify the officer that would approve camping stays over 14 days.**

A Forest Service employee that has the authority to extend the 14 limit for camping.

**5-34. Public Concern: The Forest Service should clarify several management prescriptions in regards to equestrian use.**

Trailheads in 2.A.3. can include horse trailheads but horses must be on designated trails in the Chattooga corridor. Horses are not allowed in botanical/zoological areas (4.D.) or in any part of rare communities (9.F). In old-growth areas (6.C.) they are only allowed on designated trails. Horses are allowed in scenic areas (4.F.) and watershed restoration areas (9.A.3).

**5-35. Public Concern: The Forest Service should not rely on gravel roads to provide trails for equestrian use.**

The Forest Service transportation system consists of a variety of roads. Roads are defined as “a motor vehicle travelway over 50 inches wide, unless designated and managed as a trail”. Classified roads are defined as “roads wholly or partially within or adjacent to National Forest System lands that are determined to be needed for long-term motor vehicle access, including State roads, county roads, privately owned roads, National Forest System roads, and other roads authorized by the Forest Service (36 CFR 212.1).”

These roads are divided into functional classes depending on whether they act as arterial, collector or local roads. Each road is then assigned a maintenance level. Maintenance levels 2-3 are roads maintained for high clearance vehicles or for passenger vehicles where the surface is not smooth. Maintenance level 4 is for passenger vehicles with a smooth surface and maintenance level 5 roads are designed to be smooth and dust free, and may be paved surfaces.

The proposed revised plan restricts horses to trails designated for horse use and classified roads. Roads are not a substitute for well designed and planned horse trails, however they do provide additional opportunities to enjoy the national forests on horseback and help meet some of the

rapidly escalating demand for horseback riding opportunities. Each forest has many miles of roads, particularly maintenance level 2-3 roads that generally are narrower in width with surfaces that are more difficult for vehicles and have generally slower vehicle traffic. Some of these are graveled roads, however surface type often depends on the native materials in the area. Many of these are barely over the 50-inch definition and provide canopied and attractive travel corridors.

The new plan direction tries to provide a balance between protecting the environment and providing horseback riding opportunities. Restricting horses to designated trails and classified roads will reduce the number of user created trails that are contributing to soil loss and degraded water quality. Additionally, it should help clear up confusion about where it is legal to ride, e.g. only on numbered roads and designated trails. By allowing horses to ride on classified roads, people living adjacent to national forest will still be able to ride into the forest and have access to the designated trail system as well as the road system. Horseback riders riding on the road system will be encouraged to be safe and realize that they may encounter motor vehicles if they choose to ride on classified roads.

**5-36. Public Concern: The Forest Service should increase partnerships to deal with equestrian issues.**

We agree and are continually looking for additional opportunities to partner in the management of equestrian facilities and trails.

Trails and other dispersed recreation activities are a large part of the overall recreation program for the Southern Appalachian National Forests. Overall, building additional trails would be compatible with the forest plans as revised. However, the forest plan does not prescribe how much additional trail will be built. Adding trails to the forest will be an individual project decision based on need, type of trail, desired location and funding. The Forest Service is always seeking to develop partnerships to deal with all resource issues.

**5-37. Public Concern: The Forest Service should use local volunteers to help support equestrian use on National Forest System lands.**

We agree. See response to concern # 36 above.

The use of the volunteer program is one of the main ways the Forest Service uses in providing services to the public. In particular, it is the local volunteers that make much of the recreation available to the public. Local volunteers to help in managing and supporting equestrian use are welcome.

**5-38. Public Concern: The Forest Service should better educate the public on appropriate equestrian behavior on National Forest System lands.**

We agree and continually look for opportunities to explain good trail stewardship to all user groups.

**5-39. Public Concern: The Forest Service should clarify whether equestrian use is permitted in various areas of the Sumter National Forest.**

Our forest plan is generally a permissive document, in other words, unless an action is specifically mentioned as prohibited it is allowed. Activities should not detract from the desired conditions of the area. Horse use is allowed in the Turkey Stevens Creek Watershed unless specific prescription that preclude it (e.g Turkey Stevens Creek Botanical/Zoological Area). Horseback riding (including cross country travel) is allowed across the forest in most prescriptions, however, in some areas, horses are not allowed or allowed only on trail.

**5-44. Public Concern: The Forest Service should not allow off-trail equestrian use.**

Off-trail equestrian use was not considered a significant resource impact on the Sumter at this time. The majority of equestrian use and impacts are on designated horse trails, not cross-country.

**5-45. Public Concern: The Forest Service should acknowledge that equestrian use on National Forest System lands is increasing.**

We agree demand for equestrian use is increasing (see recreation section in FEIS).

**5-46. Public Concern: The Forest Service should not limit equestrian use to only designated trails.**

See response to PC 5-35.

**5-47. Public Concern: The Forest Service should include equestrian use as a typical use within a 2.A.1, Designated Wild River Segment, Management Prescription.**

Horseback riders are allowed within the Chattooga Wild and Scenic Corridor only on designated trails. The list of activities within the desired condition is not an exhaustive list.

**5-48. Public Concern: The Forest Service should allow boating on the upper Chattooga River.**

Whitewater boating on the main stem of the Chattooga above Highway 28 was analyzed in two of the Forest Plan alternatives: A and E. The analysis looked at the potential for interactions/conflicts between boaters and other user groups, impacts to solitude, and management concerns (e.g. search and rescue) among others. The current closure on boating was part of the 1985 Sumter Plan and was subjected to public review during that planning process. We agree boaters have low impacts on the natural resource. The closure will continue under the revised Sumter Plan to help preserve the solitude experience, and the "sense of place"

and expectations that have developed for corridor recreationists over the years. Additionally, the closure will continue the successful zoning of uses that have experienced conflict in the past. The analysis shows that there would likely be conflicts between boaters and other users, and that these conflicts would be more negative to anglers than to boaters. It is doubtful that any shifts in the numbers of boaters from below Highway 28 to above would be noticeable in terms of spreading use out on the river. The analysis shows there would be some resource impacts within the corridor should boating be allowed above Highway 28. These impacts would include some additional trampling of vegetation as boaters frequent more popular runs and with search and rescue operations that would likely occur over time.

The closure will minimize management costs (such as increased staffing, search and rescue operations, access management) in the corridor. Even though technological advances have occurred in boating/kayaking equipment, search and rescue is still anticipated. It is recognized that the boaters most likely to be floating the river above Highway 28 would be those who are extremely skilled in self-rescue techniques. However, the likelihood is that search and rescue operations would still be necessary over time as users of all skill levels utilize these portions of the river. At the same time, boating will continue on the Chattooga below Highway 28 and everywhere else in the watershed. Economic benefits of allowing boating above Highway 28 would likely be negligible. The closure is consistent with the Wild and Scenic Rivers Act and other laws since boating is not precluded on the river as a whole - every use does not need to occur everywhere. The decisions to exclude boating above Highway 28 in the 1970's and again in 1985 were not illegal nor did they violate law or policy. The agency has discretion to determine the appropriate mixes of uses in a way that best protects and enhances the outstandingly remarkable values associated with each river. Finally, the section of the Chattooga River above Highway 28 is not the only river section in the Nation where boating is precluded: the Upper Rogue in Oregon is another example.

Whether or not the Chattooga is the only wild and scenic river that excludes boating in some areas is not considered to be significant in determining what is best for the Chattooga. If the Chattooga is the only river that excludes boating in some areas, some believe this actually adds an outstandingly remarkable value that should be protected.

**5-49. Public Concern: The Forest Service should continue to ban boating on the upper Chattooga River.**

The decision is to continue the boating closure on the Chattooga River above Highway 28. Also, see response to comment 5-48. Additionally, we agree that South Carolina has limited trout waters. Commercial boating was not considered/ analyzed in any alternative.

**5-50. Public Concern: The Forest Service should, in the Chattooga River Corridor, place the specific limits and special rules in the appropriate commercial operating plans.**



The Forest Service has decided that the Forest Plan is the best place for some of the more controversial direction for the Chattooga River. The Forest Plan can be amended to allow for changes to the Forest Plan. The limit on guided boats to seven is to minimize impacts associated with trip size and to ensure guided trips meet the spacing requirements that provide solitude for boaters and other users. No splitting of trips will be allowed to minimize crowding at river access areas. No guided boats can run Five Falls above 2.5 water level because of safety concerns associated with those rapids.

**5-51. Public Concern: The Forest Service should use wilderness river rangers to help manage the Chattooga River watershed.**

The Sumter National Forest Plan allows for river ranger programs. The budget and optimum staffing levels are factors that affect the river ranger program.

**5-52. Public Concern: The Forest Service should consider the enforcement of regulations proposed in Alternatives A and E.**

Budget levels and staffing for law enforcement activities are handled outside the purview of the Forest Plan.

**5-53. Public Concern: The Forest Service should rely on volunteers to help ensure that boaters using the Chattooga River headwaters to do so responsibly.**

We agree and look for opportunities to use partnerships and volunteers in the management of boating opportunities on the boatable sections of the Chattooga. This does not apply to the main stem of the Chattooga above Highway 28 since the boating closure will remain in effect there.

**5-54. Public Concern: The Forest Service should not link headwaters boating to the Highway 76 gauge but should allow boaters to determine when there is enough water to boat.**

The Highway 76 gage was the only river gage available on which to base the analysis of water levels above Highway 28. It was used as a proxy for these levels based on input from various experts.

**5-55. Public Concern: The Forest Service should state that reducing deaths on the Chattooga River by one half of the average under the current forest plan is a goal of the PRLMP**

We do not agree that this goal is appropriate in the forest plan. (If a goal were added, we would want to reduce deaths to zero.)

**5-56. Public Concern: The Forest Service should not allow fisherman to alter the riverbed of the Chattooga River.**

Anglers are not allowed to alter the riverbed of the river.

**5-57. Public Concern: The Forest Service should include, in Appendix H, the reasons for the boating ban above the Highway 28 Bridge.**

The available documentation (including the Chattooga W&S Development Plan published in the 1976 Federal Register) is not conclusive on the reasons for closing the river to boating above Highway 28. We agree that conflicts between different user groups may arise on the river. The Record of Decision discusses the reasons for not allowing boating above Highway 28.

**5-58. Public Concern: The Forest Service should, in Appendix H, include more information on the uniqueness of the Upper Chattooga for anglers.**

The uniqueness of the Chattooga River above Highway 28 to anglers was described in the "Affected Environment" section, under the headings of "Scenery" and "Fishing Experience and Management."

**5-59. Public Concern: The Forest Service should, in Appendix H, acknowledge that angler-boater interactions may lead to conflicts.**

The Forest Service agrees with the statement that angler/boater interactions may lead to conflicts. Clarifications have been made to the document. The Forest Service stands by its statement on pages H-16 and 18 that "anglers are more numerous and concentrated in and around stocking points (suggesting a higher tolerance for interaction among fellow anglers in these areas), suggesting also that impacts to angler solitude from interactions with boaters would not be as much of a concern in these areas." Impacts to angler solitude should in fact be less in these areas, although clarification has been made that conflicts may arise due to goal interference with the fishing activity itself.

**5-60. Public Concern: The Forest Service should not, in Appendix H, assume that all members of the Rubun and Chattooga Chapters of Trout Unlimited are Chattooga backcountry anglers.**

The word "backcountry" has been removed from the sentence "In a recent study of backcountry anglers who are members of the Rabun and Chattooga chapters of Trout Unlimited (Bixler and Backlund 2002),....." Subject paragraph has been placed after the paragraph that starts with "The interactions between anglers and boaters at stocking access points....."

**5-61. Public Concern: The Forest Service should include March in the defined period of optimal fishing.**

This change has been made to Appendix H.

**5-62. Public Concern: The Forest Service should allow zoning to resolve the angler-boater conflicts.**

We agree that zoning is and has been an effective management tool for resolving conflicts among different user groups on the Chattooga.

**5-63. Public Concern: The Forest Service should not use word omission, selection, and phrasing to bias Alternative H in favor of opening the upper Chattooga to boating.**

The analysis is intended to portray an objective look at the alternatives. Some additional editing/word-smithing has been done in an attempt to clarify this concern. This includes acknowledging that some of the interactions between different user groups could in fact lead to conflicts.

**5-64. Public Concern: The Forest Service should, in Appendix H, analyze the growth of creeking as a recreational activity.**

At this point in time, growth rates for this activity (creeking) are extremely hard to predict. These users represent a very small proportion of kayakers. For growth rates on kayaking, see the recreation section of the Final Environmental Impact Statement. Use is expected to increase for kayaking which might result in an increase in creeking users. This has been clarified in the analysis.

**5-65. Public Concern: The Forest Service should, in Appendix H, analyze whitewater boating growth rates.**

Similar to Response 5-64, growth rates for whitewater boating can be found in the recreation section of the FEIS under kayaking, canoeing and rafting.

**5-66. Public Concern: The Forest Service should, in Appendix H, consider the effects of the sounds of boaters on anglers.**

We agree and have added information about the noise impacts to anglers from boaters on the river.

**5-67. Public Concern: The Forest Service should recognize the impacts of opening the last 21 miles of the upper Chattooga River to year-round unrestricted boating access.**

For analysis of the impacts of allowing boating above Highway 28, see Alternative A and E in Appendix H of the FEIS.

**5-68. Public Concern: The Forest Service should consider the impacts of opening 10 miles of the upper Chattooga River below Burrell's Ford for December through March boating access at water levels above 2.5 feet on the Highway 76 gauge.**

We recognize that under Alternative A, a 2.5 foot reading at a gage located several miles downstream would be difficult to enforce. There would not likely be 100% compliance with the boating regulations. These issues have been clarified in Appendix H.

**5-69. Public Concern: The Forest Service should, in MA 2-10, delete the last sentence stating section 4 trips would not run the Five Falls at water levels of approximately 2.5 - 3.0 feet.**

The standard is included in the Forest Plan was not intended to inhibit innovation. The Forest Plan can be amended to allow for changes such as future improvements in rafting gear.

**5-70. Public Concern: The Forest Service should allow boating between Burrell's Ford and Highway 28 when the Highway 76 gauge exceeds 1,400 cfs.**

A modified version of Alternative A did not need to be analyzed. Sufficient analysis is available in Appendix H to make this modification in the Record of Decision.

**5-71. Public Concern: The Forest Service should set a higher river level for Sections 00, 0, and 1.**

We used the best information available when setting the low end boatable level of 2.0 feet at the Highway 76 gage.

**5-72. Public Concern: The Forest Service should consider the infrastructure needs of boating on the Chattooga River.**

Infrastructure including parking and roads were described in Alternatives A and E of Appendix H. We did not anticipate any additional access needs to accommodate this use.

**5-73. Public Concern: The Forest Service should limit shuttle permits on the Chattooga River.**

The Forest Plan limits the number of shuttle permits to no more than two.

**5-74. Public Concern: The Forest Service should not allow boating in the Ellicott Rock Wilderness Area.**

The number of people within a wilderness does affect the wilderness experience. However, using non-motorized boats is allowed by the Wilderness Act. If the number of users of any type exceed the maximum carrying capacity of the wilderness, use limits are an option. The plan does not allow boaters above Highway 28.

**5-75. Public Concern: The Forest Service should include a standard governing the**

**construction or maintenance of trails, campsites, and other recreational developments in ephemeral zones.**

We have sufficient direction in the plan to provide environmentally sound recreation programs within the ephemeral zone, see Chapter 2, Recreation Section and Chapter 3, 7.D prescription. One additional standard has been added to ephemeral zones, "new motorized trails are prohibited within ephemeral stream zones except at designated crossings or where the trail location requires some encroachment, for example, to accommodate steep terrain."

**5-76. Public Concern: The Forest Service should implement trail user fees to support trails.**

We appreciate your generous support of fees for recreation activities on the forest. The Forest Plan does not address, promote, or prohibit charging fees for recreation.

**5-77. Public Concern: The Forest Service should establish a visual corridor for the Benton Mackaye, Bartram, and Pinhoti Trails.**

Trails, such as those mentioned, have visual corridors that protect the scenery resources along them. In mapping the inventory of the scenic resource, primary trails, which the Benton Mackaye, Bartram, and Pinhoti Trails would be, are assigned high concern levels and the trails are used to map the seen areas from these trails. The foreground, middle ground, and background area that is viewed from these trails would be assigned a higher scenic value than areas not having a high concern level, thus establishing a greater need for visual protection. A matrix is then used to assign Scenic Classes or their relative scenic value to the public to these areas. The Forest Plans use this inventory along with the other resource management inventories to assign the scenic management direction, Scenic Integrity Objectives, for the trails and surrounding areas. This process allows for the scenic protection of these trails.

**5-78. Public Concern: The Forest Service should modify several management prescriptions and standards related to Scenery and Visual Resources Management.**

The Scenery Management System information (including scenic integrity objectives) has been more fully explained in both the Plan and EIS glossary. The Scenic Byway prescription has been changed to unsuitable.

The direction for management of the Scenic Management System (SMS) is explained in the United States Department of Agriculture, Forest Service, Agriculture Handbook Number 701, Landscape Aesthetics, A Handbook for Scenery Management. Here is a brief discussion of the system: The primary components of the SMS include: Landscape Character map and descriptions, Scenic Attractiveness, Existing Scenic Integrity, Concern Levels, Seen Areas, Scenic Classes, which are developed in the inventory. The Forest Plan components are Landscape Character Goals, Scenic Integrity Levels, Scenic Integrity Objectives, and Standards and Guidelines. These give management direction for the management areas.

All land areas are mapped. Mapped units for the most part are ecological sections or subsections but may be other land units. For these units, Landscape Character descriptions are developed for mapping Scenic Attractiveness, Class A-Distinctive, B-Typical, and C-Indistinctive areas. Each unit has its own descriptions. From this map will latter be determined the high priority scenic areas. Existing Scenic Integrity Levels indicate the degree of intactness and wholeness of the existing landscape character. Very High Scenic Integrity Level is an unaltered landscape, High Scenic Integrity Level is a landscape that appears unaltered, Moderate Scenic Integrity Level is a landscape that is slightly altered, Low Scenic Integrity Level is a landscape that is moderately altered, Very Low Scenic Integrity Level is a landscape that is heavily altered, and Unacceptably Low Scenic Integrity Level is a landscape that is extremely altered.

Concern Levels are next determined. Concern Levels are a measure of the degree of public importance placed on the landscape viewed from travel ways and use areas. Concern Levels reflect both the number of visitors and the interest of visitors in scenery. Concern Level 1 areas include primary recreation areas, very high use roadways, major roadways and trails through the forest, and places with moderate use where nearly all visitors are very concerned about scenery. Concern Level 2 areas include mostly secondary recreation areas, secondary roadways, trails, and places with moderate use and visitors with moderate interest in scenery. Concern level 3 travel ways and areas are those which receive very little use and/or use is primarily by visitors not concerned with scenery.

After Concern Levels are determined, the Seen Areas in each distance zone are mapped. Foreground is defined as up to ½ mile from the viewer, Middleground is ½ mile to 4 miles, and Background is over 4 miles from the viewer. The Seldom Seen areas are also mapped.

Scenic Classes are determined by overlaying Scenic Attractiveness, Landscape Visibility, and Concern Level. The matrix in Table 4-2 page 4-16 from the SMS handbook is used. Scenic Class 1 scenery has extremely high public value, Scenic Class 2 scenery has very high public value, Scenic Class 3 scenery has high public value, Scenic Class 4 scenery has moderately high public value, Scenic Class 5 scenery has moderate public value, Scenic Class 6 scenery has moderately low public value, and Scenic Class 7 scenery has low public value. The Scenic Classes are used during the Forest planning process to compare the value of scenery to other resources.

Scenic Integrity Objectives (SIOs) and Landscape Character Goals are developed for Forest Plan Management Areas. Scenic Integrity Objectives are Very High-unaltered, High-appears unaltered, Moderate-slightly altered, and Low-moderately altered. The SIO that is assigned to a management area in the Forest Plan may be different than that of its existing Scenic Integrity Level indicating that any new management will meet the constraints of the assigned SIO.

**5-79. Public Concern: The Forest Service should not encourage gold panning on National Forest System lands.**

The Forest Service does not encourage or discourage recreational gold panning on National Forest System lands.

## **CHAPTER 6 – SPECIAL DESIGNATIONS/LANDS**

### **6-1. Public Concern: The Forest Service should establish a National Forest encompassing the entire Chattooga River watershed.**

This would take an act of Congress to implement and is outside the scope of this plan.

### **6-2. Public Concern: The Forest Service should comply with its own documentation of which prescriptions are compatible with maintaining roadless character.**

The prescriptions that protect the roadless character vary by Forest Plan. Each forest could add additional restrictions that would restrict certain actions to a generic prescription that would protect roadless character where the generic prescription would not. As a result one prescription that will protect roadless character in one Forest Plan may not protect it in another Forest Plan. While all Forest Plans or EISs do not list which prescriptions are compatible, the Plan or EIS does show acres or percent of acres that have their roadless character protected.

### **6-3. Public Concern: The Forest Service should list prescriptions considered roadless compatible.**

Same as response to PC 6-2.

### **6-4. Public Concern: The Forest Service should ensure that management direction is consistent with the Roadless Area Conservation Rule.**

On July 14, 2003, a Federal District Court Judge permanently enjoined the 2000 Roadless Area Conservation Rule. Should this decision be overturned through further court proceedings, and the RACR go into effect, then the direction from this Rule would supercede Forest Plan direction. Additionally, should the RACR go into effect, it would not require an amendment or revision of the Forest Plan (36 CFR 294.14(b)). In terms of the Forest Plan being consistent with the RACR, in the selected alternative, all of the roadless areas would have their roadless characteristics maintained and about 50% of the roadless areas would be consistent with the RACR. The Record of Decision documents where management would be inconsistent with the RACR..

### **6-5. Public Concern: The Forest Service should follow regional guidance regarding roadless inventories.**

There are three steps to determining what lands to recommend for wilderness designation. The first step is described in FSH 1909.12, Chapter 7.1, which states that, “The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act.” This involves using the criteria in FSH 1909.12, Chapter 7.1 to identify those “roadless” areas. The region also issued guidance in 1995 to provide some consistency on how to interpret that



direction. Once the areas meeting the criteria are identified, the next step is to “evaluate” these areas to determine their “suitability” for wilderness recommendations. As is stated in FSH 1909.12, Chapter 7.2, “An area recommended as suitable for wilderness must meet the tests of capability, availability and need.” The region also issued guidance in 1997 to provided some consistency on how to interpret the direction in FSH 1909.12, Chapter 7.2 on “evaluating” the roadless areas. The last step is during the development of the forest plan alternatives where the effects of recommending or not recommending the roadless areas for wilderness designation are analyzed and documented in the environmental impact statement. The Forests have followed these three steps.

**6-6. Public Concern: The Forest Service should more adequately protect roadless areas.**

The Sumter National Forest has four roadless areas of which the majority was placed in the following prescriptions, recommended wilderness, wild and scenic river prescription (wild) and scenic area. Also, all roadless area characteristics are protected with a Forestwide goal.

**6-7. Public Concern: The Forest Service should provide more information on roadless areas under consideration for wilderness as required by NEPA.**

Appendix C of the EIS provides information about each roadless area. Chapter 3 of the EIS, under the section on Roadless Areas provides information about how each roadless area will be managed in each alternative. Chapter 2, in the Comparisons of Alternatives, section provides a table that compares the acres recommended for wilderness designation by each alternative and the acres that would maintain their roadless characteristics by alternative, along with a table that identifies which roadless areas are recommended for wilderness designation by each alternative. Lastly, the Record of Decision provides the rationale for why the roadless areas were or were not recommended for wilderness designation in the selected alternative.

**6-8. Public Concern: The Forest Service should act in accordance with the roadless policy.**

Regional Forester’s 1920 letter of May 19, 1995 gave direction on determining if a road should be considered improved or unimproved for the roadless inventory. All Forests followed this direction.

Description of an "Improved" Road

An improved road has a definable, constructed cross-section, is properly drained, may or may not be surfaced, and is useable by most vehicle types. Some roads may only be useable by high clearance vehicles. It is also stable for the predominant traffic during the normal use season.

All roads assigned a Maintenance Level of 3, 4, or 5 in the Forest Development Transportation Plan are improved roads maintained for travel by standard passenger cars.

Maintenance Level 1 (roads closed to vehicle use for one year or longer) and Maintenance Level 2 (roads maintained for high clearance vehicles such as pick-ups, 4x4's, etc.) are "improved roads" if they meet the above description.

#### Description of an "Unimproved" (or "Non-Improved") Road

Maintenance Level 1 and 2 roads are "unimproved" roads if they do not have a definable, constructed cross-section, but rather were developed through use. They would have no surfacing or improved drainage structures. They may not be stable under some traffic or weather conditions during the normal use season. Their primary use is by high-clearance vehicles, but some roads may be used by most vehicle types.

#### Further Clarification on the Differences Between Improved and Unimproved Roads (See also page 11)

The determination as to whether a road is "improved" or "unimproved" is an area where a certain amount of flexibility was contemplated. For the Maintenance Level 1 and 2 roads, the actual conditions of the road are what make the determination as to whether or not it is an "improved" or "unimproved" road. The major points are:

-Maintenance Level 2 roads can be improved roads, even if only suitable for high-clearance vehicles. This is in keeping with our position that "standard passenger-type vehicles" (FSH 1909.12, 7.11-3) encompasses all types of street-legal vehicles. However, if a Maintenance Level 2 road: a) is not currently being maintained for these; b) does not have a definable, constructed cross-section; and c) is not stable during normal traffic and weather conditions, then it is an unimproved road.

-Maintenance Level 1 roads are not maintained for any vehicular use. Consequently, it is our expectation that many of these roads are unimproved. However, it is the function and appearance of these roads that are the key points to consider in making a determination if it is an improved or unimproved road.

#### Additional Information to Consider

-Consider all forest roads; not just those on TIS (the Transportation Inventory System). The road inventory status has nothing to do with the decision on how a roadless area is affected. The deciding factors are jurisdiction (FS versus Other) of the road and whether the road is improved or unimproved.

-A road that is permanently closed and managed as a wildlife opening is not a road.

-If the long-term intent is to maintain a road for access, but it is currently mowed as a wildlife opening, it is an improved road.

-A road is maintained for vehicle travel if there is scheduled maintenance on a specified timeframe. (If a road is currently closed as a result of storm damage, but the long-term intent is to open the road and maintain its use, then the road is still viewed as being "maintained for travel".)

-A temporary road that is permanently closed and not maintained is not an improved road, regardless of how it looks. Temporary roads are not managed as roads after their time period for use has elapsed and are not a part of the road inventory.

-If a road is under the jurisdiction of a State or County, it cannot be included in a roadless area, no matter whether the road is improved or unimproved. If the jurisdiction of a road is uncertain and the road is located on NFS land, then assume that the Forest Service has jurisdiction. A road with a prescriptive right is assumed to be a State or County road.

-Relative to the road-density criterion, there is no restriction on the number of miles of unimproved roads that can be in a roadless area. This may, however, affect some of the other criteria.

-A gated road is not a closed road, but is a restricted road. A gated road usually has some traffic during the year, even if only administrative. Whether a gated road is an improved or unimproved road will depend upon the actual conditions of the road.

-If a road bisects an area under consideration as being roadless which causes the road miles to exceed the 1/2-mile road per 1,000-acre criteria, if it is appropriate and logical, the area should be separated into 2 areas and then each area evaluated for its roadless characteristics.”

#### **6-9. Public Concern: The Forest Service should place all unroaded areas into protective management.**

There is no requirement to place all unroaded areas into protective management. For some roadless acres, it may be determined that there are some resource management needs that are not compatible with “protective management”. FSH 1909.12 - LAND AND RESOURCE MANAGEMENT PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1, CHAPTER 7 - WILDERNESS EVALUATION, 7.2 EVALUATION OF POTENTIAL WILDERNESS gives direction to carefully evaluate the potential addition of roadless areas to the National Wilderness Preservation System to determine the mix of land and resource uses that best meet public needs. Some areas are allotted status as a roadless area some are not.

#### **6-10. Public Concern: The Forest Service should not use a standard of 2,500 core acres for protecting roadless values.**

One of the critical issues that was identified during individual forest reviews of their roadless inventories concerned the criterion from Forest Service Handbook 1909.12 (7.11b) requiring that a roadless area be “conducive to the perpetuation of wilderness values.” The 1964 Wilderness Act defines a number of wilderness values. Among these values, Section 2 of the Act states that wildernesses must have “outstanding opportunities for solitude and a primitive and unconfined type of recreation.” In an attempt to quantify this criterion, use of the Recreation Opportunity Spectrum (ROS) and the semi-primitive class of lands is recommended. As defined in the 1986 ROS Book, recreationists in areas inventoried as semi-primitive have a high to moderate “probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance...in an environment that offers challenge and risk.” Based on this definition, semi-primitive lands were identified as the lands that best satisfied the solitude qualities of roadless areas.

Therefore, it is desirable for the “core” of a roadless area to meet the conditions of a semi-primitive non-motorized or semi-primitive motorized ROS classification. (Generally, there are very few areas in the Southern U.S. that qualify under the “primitive” ROS classification.) Since the ROS Book states that semi-primitive areas contain at least 2,500 acres (unless they are contiguous to primitive class lands) this 2,500-acre minimum size can be used as a screen to evaluate areas identified and mapped by either the forest or the public. This 2,500-acre screen does not apply to additions to existing wildernesses. However, it is important to recognize that this 2,500-acre semi-primitive “core” size is not an absolute minimum. It is only a screen and as such is only used as a guide.

Some areas above or below this size, may or may not provide solitude. For these areas, look closely at topography, proximity to type and use of roads, population centers and other sights and sounds of human activity to determine if solitude and primitive and unconfined recreation could be experienced. This is a professional judgment based on knowledge of the area.

**6-11. Public Concern: The Forest Service should not exceed the intended purposes and limits of “semi-primitive core” in eliminating areas from roadless protection.**

The Recreation Opportunity Spectrum (ROS) in defining its remoteness criteria establishes criteria for semi-primitive recreation settings. Areas that are at least ½ mile but not further than 3 miles from all roads qualify as Semi-primitive Non-Motorized Areas and areas that are within ½ mile of primitive roads but not closer than ½ mile from better than primitive roads qualify as Semi-Primitive Motorized Areas. This was used as a guide in delineating the areas that have outstanding opportunities for solitude and a primitive and unconfined type of recreation and thus would be considered as a roadless area.

**6-12. Public Concern: The Forest Service should not recommend additional Roadless Areas.**

The Forest Service is directed by the Code of Federal Regulations to evaluate and consider roadless lands for wilderness. 36 Code of Federal Regulations (CFR), 219.17 Evaluation of

Roadless Areas, directs the Forest Service, unless stated differently by law, to evaluate and consider roadless areas for recommendation as potential wilderness areas during the forest planning process. Roadless areas include previous inventoried roadless areas which remain essentially roadless and undeveloped, and have not been designated as wilderness or designated to not be considered for wilderness by law, and other essentially roadless areas at the discretion of the Forest Supervisor. The Forest Service is directed by the Forest Service Handbook to identify any additional roadless areas. FH 1909.12 - LAND AND RESOURCE MANAGEMENT PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1EFFECTIVE 8/3/92, CHAPTER 7 - WILDERNESS EVALUATION, 7.1 - INVENTORY OF POTENTIAL WILDERNESS directs that the first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act (chapter 9).

**6-13. Public Concern: The Forest Service should use proper criteria and methods in conducting roadless area inventories.**

The evaluation process for the Roadless Inventory followed FSH 1909.12 Land and Resource Management Planning Handbook, Chapter 7.2, Evaluation Of Potential Wilderness and Chapter 4.19c, Appendix C – Roadless Area Evaluation, and the July 22, 1997, letter on the Southern Region’s Guidance to FSH 1909.12 Land and Resource Management Planning Handbook, Chapter 7.2, Evaluation Of Potential Wilderness and Chapter 4.19c, Appendix C – Roadless Area Evaluation. This guidance was developed at the request of the Forests to define terms in the FSH 1909.12, Chapter 7 and Chapter 4.19c that were vague so that evaluations would be consistent in evaluating roadless areas.

**6-14. Public Concern: The Forest Service should eliminate the “sights and sounds” criteria in determining areas suitable for the roadless inventory.**

Forest Land and Resource Management Plans followed direction in FSH 1909.12 - LAND AND RESOURCE MANAGEMENT PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1, EFFECTIVE 8/3/92, CHAPTER 7 - WILDERNESS EVALUATION, 7.2 - EVALUATION OF POTENTIAL WILDERNESS, which gives direction on evaluation of potential wilderness. One of the items given to consider is the ability to manage the area as wilderness. This is described as the degree to which the area contains the basic characteristics that make it suitable for wilderness designation without regard to its availability for or need as wilderness. One of the principal wilderness characteristics given to consider is Manageability and to specifically evaluate how boundaries affect manageability of an area. Boundaries, to the extent practicable, act as a shield to protect the wilderness environment inside the boundary from the sights and sounds of civilization outside the wilderness. If the sights and sounds of civilization are determined to be important, they must be described. It is proper to not consider lands that do not meet the test for capability.

**6-15. Public Concern: The Forest Service should inventory qualified roadless areas.**

The Forest Service used the criteria in the Forest Service Handbook for identifying roadless areas for this planning effort.

**6-16. Public Concern: The Forest Service should remove regionally added restrictions on roadless inventory.**

See response to PC 6-13.

**6-17. Public Concern: The Forest Service should cite the regulatory or statutory basis for the idiosyncratic delineation of roadless areas on the Andrew Pickens Ranger District.**

The Forest Service used criteria in the Forest Service Handbook for identifying roadless areas. There were various methodologies used for applying the criteria and forests used the methods that were available to them.

**6-18. Public Concern: The Forest Service should adopt a word other than “wilderness” to refer to regenerated wildlands.**

Wildernesses in the eastern US often times had some management activities, including logging, prior to designation. The Wilderness Act acknowledges this and allows for some previous activities.

**6-19. Public Concern: The Forest Service should correct the definition of “wilderness” in Appendix B.**

The Forest has updated the glossary entry in Appendix B of the Forest Plan and also in the EIS.

**6-20. Public Concern: The Forest Service should designate Wilderness or Wilderness Study Areas in all ecological units on the forest.**

Forest Land and Resource Management Plans followed direction in FSH 1909.12 - LAND AND RESOURCE MANAGEMENT PLANNING HANDBOOK, CHAPTER 7 - WILDERNESS EVALUATION, 7.2 - EVALUATION OF POTENTIAL WILDERNESS, 7.23 – Need, 7.23b – Factors, 6. in determining which ecosystem unit to recommend for wilderness. The July 22, 1997, letter on the Southern Region’s Guidance to FSH 1909.12 Land and Resource Management Planning Handbook, Chapter 7.2, Evaluation Of Potential Wilderness and Chapter 4.19c, Appendix C – Roadless Area Evaluation stated that the discussions of ecosystem section and subsections should be included. Appendix C of the EIS discloses the ecosystem section and subsection where each roadless area is located and if it would fill any void in representation. This is used to help determine the need for an area to be allocated to wilderness. Some sections or subsections had no lands that qualified for wilderness study.

**6-21. Public Concern: The Forest Service should document the relative wilderness representation by ecological province, section and subsection.**

Appendix C, Evaluation of Roadless Areas, of the EIS discloses if the roadless area is represented by an existing wilderness with its ecological province and section and subsection, which establishes the need for representation by a wilderness.

**6-22. Public Concern: The Forest Service should make critical wilderness information more accessible.**

Issue 8, Roadless Areas and Wilderness Management in the Environmental Impact Statement (EIS), table 2.10 and 2.12 displays acres of recommended areas for Designation as Wilderness Study Areas and which areas are recommended for wilderness.

**6-23. Public Concern: The Forest Service should provide Congress with a sufficient array of wilderness options to achieve Wilderness Act goals.**

The Southern Appalachian Forests all conducted a roadless area analysis and subsequent wilderness evaluations on these areas according to FSH 1909.12,7.

The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act (ch. 9). Section 2(c) defines wilderness as, “(...in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.” The wilderness areas recommended within each of the forest plans are based on analysis and discussion of the demand and need for additional wilderness areas.

Approximately 12% of the total number of wilderness areas designated in the United States are located in the Forest Service's Southern Region. These 12% cover a wide variety of ecosystem types. The only units in the Southern Region without a designated wilderness are the Land Between the Lakes National Recreation Area in Golden Pond, KY and the Caribbean National Forest in Puerto Rico. Forty-nine percent of the wilderness areas recommended in the Southern Appalachian Assessment are being recommended for wilderness study. These 49%, designated as wilderness, will help to further implement the goals of the Wilderness Act.

**6-24. Public Concern: The Forest Service should address wilderness recommendations on a regional basis.**

Lands are evaluated from a regional perspective as part of the evaluation for recommendation for wilderness study as part of the Southern Appalachian Assessment. The study was done at the same time by all forests. Also the criteria that is used for assessment directs the Forest Service to use a regional perspective. For example, rare community types, total lands allocated to ecosystem section and subsection, wilderness proximity to population centers are evaluated. See response to PC 6-13 for additional comments.

**6-25. Public Concern: The Forest Service should better document wilderness supply versus demand.**

See response to PC 5-21.

**6-26. Public Concern: The Forest Service should include a wilderness supply and demand analysis in the DEIS.**

See response to PC 5-21.

**6-27. Public Concern: The Forest Service should determine the need for wilderness through an analysis of the local and national distribution of wilderness.**

See response to PC 6-24.

**6-28. Public Concern: The Forest Service should analyze wilderness capability, availability, and need as specified in the National Forest Management Act regulations.**

See response to PC 5-21.

**6-29. Public Concern: The Forest Service should adequately explain the rationale for not recommending areas for wilderness.**

Of the four roadless areas in South Carolina, two are included are recommended for wilderness (Ellicott Rock Extension). Bee Cove Roadless Area is located in the White Rock Scenic Area and has management that enhances scenery and related recreation. The roadless area has had the area in this type of management since the 1985 Forest Plan. This management best protects the area for a variety of uses. Big Mountain Roadless Area is located on two National Forests, the Sumter National Forest and the Chattahoochie National Forest. The area should have the same management across the entire area. The rationale for selecting a 12A (Remote, few open roads) prescription is that it best protects the roadless characteristics. A portion of the roadless area crosses the Chattooga Wild and Scenic River which are wild and scenic river prescriptions.



**6-30. Public Concern: The Forest Service should clarify the criteria used in determining wilderness recommendations.**

Of the four roadless areas in South Carolina, two are included are recommended for wilderness (Ellicott Rock Extension). Bee Cove Roadless Area is located in the White Rock Scenic Area and has management that enhances scenery and related recreation. The roadless area has had the area in this type of management since the 1985 Forest Plan. The rationale for leaving it in this management was that it best protects the area for a variety of uses. Big Mountain Roadless Area is located on two National Forests, the Sumter National Forest and the Chattahoochie National Forest. The area should have the same management across the entire area. The rationale for selecting a 12A (Remote, few open roads) prescription is that it protects the roadless characteristics. A portion of the roadless area crosses the Chattooga Wild and Scenic River which are wild and scenic river prescriptions.

**6-31. Public Concern: The Forest Service should gather accurate wilderness demand baseline data.**

See response to PC 5-21.

**6-32. Public Concern: The Forest Service should not use a formulaic process in evaluating potential wilderness areas.**

The Forest Service Handbook at FSH 1909.12, Chapter 4.19c and Chapter 7.2 identify the factors to use in evaluating potential wilderness areas. The region also issued guidance in 1997 to provided some consistency on how to interpret the direction in FSH 1909.12, Chapter 7.2 and 4.19c. The Forest then used this direction and guidance for the evaluations.

**6-33. Public Concern: The Forest Service should not use regional guidance as rigid proclamations when recommending wilderness.**

The commentor references FSH 1909.12, Chapter 7.21,1 of the evaluation criteria, but does not recognize that Chapter 7.21a – Additional Capability Characteristics for Areas in the East, is also applicable. Under Chapter 7.21a, it states that “National Forests east of the 100th meridian may contain limited nonconforming uses and/or nonconforming structures and improvements while retaining capability for wilderness designation

**6-34. Public Concern: The Forest Service should clarify the use of “solitude” as a definitive criterion in the delineation of potential wilderness areas.**

Comments were made that the criterion of “solitude or primitive and unconfined recreation” should not be used in the determination of which lands should be included in the roadless inventory. However, FSH 1909.12, Chapter 7.1 states that, “The first step in the evaluation of potential wilderness is to identify and inventory all roadless, undeveloped areas that satisfy the definition of wilderness found in section 2(c) of the 1964 Wilderness Act.” Section 2(c) of the

1964 Wilderness Act states that “An area of wilderness is further defined to mean in this Act an area ...” that “(2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation.”

According to the 1964 Wilderness Act, an area of wilderness is defined to have “at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition.” According to FSH 1909.12, Chapter 7, while the 5,000 acre limit is a specific criterion (with some exceptions) for lands in the Western U.S., for the Eastern U.S. because of landownership patterns, the 5,000 acre limit is not applicable. Therefore, some guidance is needed on how to determine that an area “is of sufficient size as to make practicable its preservation and use in an unimpaired condition”. In attempting to provide that guidance, the other provisions of the Wilderness Act definitions need to be considered, including the criterion that an area needs to have “outstanding opportunities for solitude or a primitive and unconfined type of recreation” (Section 2(c)).

In attempting to identify these areas, the only non-subjective inventory of acres with these characteristics that is available, is from the Recreation Opportunity Spectrum (ROS). Within the ROS, areas classified as either “semi-primitive” or “primitive” would generally meet the Wilderness Act criterion of providing “opportunities for solitude or a primitive and unconfined type of recreation”. Since there are few “primitive” areas in the Eastern U.S., we primarily looked for the “semi-primitive” areas which according to the ROS Handbook, need to contain at least 2,500 acres. However, we also recognized that this cannot be a hard and fast rule, and the regional guidance for inventorying roadless areas specifically states that – “it is important to recognize that this 2,500-acre semi-primitive ‘core’ size is not an absolute minimum. It is only a screen and as such should be used only as a guide.”

**6-35. Public Concern: The Forest Service should better communicate the basis for recommending areas for wilderness study.**

Of the four roadless areas in South Carolina, two are included are recommended for wilderness (Ellicott Rock Extension). Bee Cove Roadless Area is located in the White Rock Scenic Area and has management that enhances scenery and related recreation. The roadless area has had the area in this type of management since the 1985 Forest Plan. The rationale for leaving it in this management was that it best protects the area for a variety of uses. Big Mountain Roadless Area is located on two National Forests, the Sumter National Forest and the Chattahoochee National Forest. The area should have the same management across the entire area. The rationale for selecting a 12A (Remote, few open roads) prescription is that it best protects the roadless characteristics. A portion of the roadless area crosses the Chattooga Wild and Scenic River which are wild and scenic river prescriptions.

**6-36. Public Concern: The Forest Service should not interpret Congress’s use of “challenge” to create extreme sport wilderness areas.**

Forest Land and Resource Management Plans followed direction in FSH 1909.12 - LAND AND RESOURCE MANAGEMENT PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1, EFFECTIVE 8/3/92, CHAPTER 7 - WILDERNESS EVALUATION, 7.2 - EVALUATION OF POTENTIAL WILDERNESS, which gives direction on evaluation of potential wilderness. The characteristic of “Challenge” is one of the characteristics in determining the quality of the wilderness resource that is included in the analysis.

**6-37. Public Concern: The Forest Service should not follow regional guidance for the definition of “challenge” in wilderness areas.**

The guiding principles for describing “challenge” are from the Forest Service Handbook 1909.12, Chapter 7. The information in the regional guidance document the commentor is referencing was simply an example of what a write-up on “challenge” in a “generic” roadless area could possibly look like. The commentor has however, misinterpreted the “example write-up” as the actual guiding principles.

**6-38. Public Concern: The Forest Service should remove bias against consideration of stand alone wilderness areas.**

The Regional guidance on developing a roadless area inventory, dated May 19, 1995; and the guidance on evaluating the roadless areas, dated July 22, 1997; both outline processes to identify and evaluate all the areas that meet the criteria for potential wilderness and not just those areas adjacent or contiguous to existing wilderness areas. The “design criteria” for the “rolling alternative” (Alternative I) did include a statement to start the development of this alternative with the “wilderness additions” being recommended for wilderness. However, this was only to be a “starting off point” for further discussions/deliberations on which areas to include for wilderness recommendations within this particular alternative. It was these discussions/deliberations with the public, along with the information applicable to each roadless area, that led to the ultimate decision on which areas to recommend for wilderness in Alternative I. The Record of Decision then provides the rationale for why roadless areas were recommended or not recommended for wilderness designation within the Selected Alternative.

**6-39. Public Concern: The Forest Service should include additional areas as wilderness study areas.**

Of the four roadless areas in South Carolina, two are included are recommended for wilderness (Ellicott Rock Extension). Bee Cove Roadless Area is located in the White Rock Scenic Area and has management that enhances scenery and related recreation. The roadless area has had the area in this type of management since the 1985 Forest Plan. The rationale for leaving it in this management was that it best protects the area for a variety of uses. Big Mountain Roadless Area is located on two National Forests, the Sumter National Forest and the Chattahoochee National Forest. The area should have the same management across the entire area. The rationale for selecting a 12A (Remote, few open roads) prescription is that it best protects the roadless characteristics. A portion of the roadless area crosses the Chattooga Wild and Scenic River

which are wild and scenic river prescriptions.

**6-40. Public Concern: The Forest Service should recommend suggested areas for wilderness study.**

See response to PC 6-12 comment

**6-41. Public Concern: The Forest Service should be consistent when eliminating wilderness area recommendations.**

Determining the inventory of wilderness is a straight forward account of what wildernesses are available in the area. The evaluation process for recommending roadless areas to the National Wilderness system is defined in FSH 1909.12 - LAND AND RESOURCE MANAGEMENT, PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1, CHAPTER 7 - WILDERNESS EVALUATION. Each Forest used this process for recommending and eliminating potential areas for wilderness recommendations. The recommendations responded to the management emphasis of each alternative. The Forest Plans followed direction in FSH 1909.12 - LAND AND RESOURCE MANAGEMENT, PLANNING HANDBOOK, WO AMENDMENT 1909.12-92-1, CHAPTER 7.23 for determining need for an area to be designated as wilderness.

**6-42. Public Concern: The Forest Service should not recommend additional wilderness areas.**

See response to PC 6-12.

**6-43. Public Concern: The Forest Service should protect all of the land that qualifies for wilderness.**

See response to PC 6-12.

**6-44. Public Concern: The Forest Service should consider non-inventoried roadless areas for possible wilderness recommendations.**

Regional Forester 1920 letter of March 8, 2002 directed Forest Supervisors to consider non-inventoried roadless areas where appropriate.

“Where the public or Forest Interdisciplinary Team (IDT) has proposed that a particular area outside of the roadless inventory be recommended for Wilderness – the Forest Supervisor has the flexibility and option to consider assigning that area a Management Prescription 1B (Recommended Wilderness Study Area) the same way he or she would consider allocating that area to any of a number of other possible land allocations. These allocations should address a particular issue or need. If the Forest Supervisor decides to allocate such an area outside of the roadless inventory to a Mgt. Pres. 1B in the Forest Plan, then that area will need to have a corresponding description and evaluation in Appendix C of the EIS. This description would be

somewhat similar to the evaluations for the individual roadless areas in that it would describe the attributes of the area and document why it is being recommended for wilderness consideration. The Forest Plan should also identify actions that are needed to achieve the area's potential wilderness characteristics (for instance, if there are any roads in the area, plans may be needed to close and decommission them in the future.)"

**6-45. Public Concern: The Forest Service should include suggested areas for recommended wilderness and wilderness expansions.**

The Roadless Area review that was completed for the Southern Appalachian Forests (Cherokee NF, Chattahoochee and Oconee NFs, Jefferson NF, NFs in Alabama, and the Sumter NF) as part of the requirements for Land and Resource Management Planning evaluated all lands to determine if they qualified for Roadless status. Those lands included the Mountain Treasures identified by The Wilderness Society.

The inventory evaluation process followed Forest Service Handbook (FSH) 1909.12, Chapter 7, Section 7.1, Inventory of Potential Wilderness. All lands that did qualify for Roadless designation were included as Inventoried Roadless Areas. Those lands that did not qualify were not included in the designation.

The individual Forest Land and Resource Management Plan revisions evaluated and recommended various inventoried Roadless Areas for wilderness study following direction in FSH 1909.12, Chapter 4.19c, FSH 1909.12 Land and Resource Management Planning Handbook, Chapter 7.2, Evaluation Of Potential Wilderness, and the July 22, 1997, letter on the Southern Region's Guidance to FSH 1909.12 Land and Resource Management Planning Handbook, Chapter 7.2, Evaluation Of Potential Wilderness and Chapter 4.19c, Appendix C – Roadless Area Evaluation.

Recommended Wilderness Study Areas were assigned to MRx 1.B.

**6-46. Public Concern: The Forest Service should develop a new management plan for the Ellicott Rock Wilderness Area.**

The Sumter National Forest Plan allows for a new management plan for Ellicott Rock Wilderness. This plan would be written in coordination with the Chattahoochee National Forest and the Nantahala National Forest.

**6-48. Public Concern: The Forest Service should identify and consider cultural resources prior to Federal undertakings.**

The Forests in R8 have a strong record of compliance with the historic preservation requirements in the National Historic Preservation Act, s. 106 which requires the agency to "take into account the effect of the undertaking on any district, site, building, structure, or object that is included in

or eligible for inclusion in the National Register”. To do this R8 has developed a preservation program pursuant to s.110 (2) “for the identification, evaluation, and nomination to the National Register of Historic Places, and protection of historic properties”. R8 has a Programmatic Agreement (PA) signed by State Historic Preservation Officers (SHPOs) and the Advisory Council on Historic Preservation. The PA is being updated to include Tribal Historic Preservation Officers (THPOs). It describes the basic framework for consultation and how historic preservation actions are undertaken in R8. Under the PA, Forests have written MOU’s in consultation with their SHPOs (and now THPOs) that describe how basic heritage inventory, survey, evaluation, and protection are undertaken on each National Forest. In every case, heritage values are considered during the NEPA process and no actions that may adversely affect heritage properties eligible for the National Register of Historic Places are undertaken without consultation and, where necessary, data recovery or mitigation.

**6-49. Public Concern: The Forest Service should double the size of the Chauga and Cedar Creek management areas.**

The Proposed Plan has increased the size of the scenic area from 3,300 acres to 3,459 acres to include additional scenic waterfalls and drainages. Cedar Creek was added as a botanical area in this Proposed Plan and is approximately 500 acres adjacent to the Chauga River.

**6-50. Public Concern: The Forest Service should modify the Management Prescription 4.D, Botanical Area.**

Your comments were evaluated and some changes were made to prescription 4.D. A better explanation of the scenery management system was incorporated into the glossary for the Forest Plan and FEIS.

**6-51. Public Concern: The Forest Service should prescribe a Backcountry or 6.B, Old Growth Restoration, Management Prescription for Jocassee Gorges.**

An inventory for old growth was completed for the Forest Service acquisition in the Jocassee area, and no stands met the criteria for existing old growth as described in the Guidance were found. The Forest Service chose the 8.A.1. prescription to be more appropriate for this area.

**6-52. Public Concern: The Forest Service should change the management prescription of several areas to 7.E.1, Dispersed Recreation.**

Prescriptions are allocated to different areas in order to achieve management objectives for many resources. Prescription 7.E.1 is generally described as management emphasis for Dispersed Recreation Areas and is unsuitable for timber management. Prescription 7.E.2 is generally described as management emphasis for Dispersed Recreation Areas and is suitable for timber management. Prescription 8.B is generally described as management emphasis for Early-Successional Habitat and is suitable for timber management. Where Dispersed Recreation

emphasis areas have been assigned a prescription that is suitable for timber management, timber management is compatible with the recreation management objectives of the areas

**6-53. Public Concern: The Forest Service should overlay bear habitat with wilderness candidates.**

As part of the roadless areas evaluations, the evaluations should consider any species habitat associates or individual species with habitat needs within the roadless areas. This includes bear habitat. However, it should be noted that wilderness designations are not needed to maintain bear habitat.

**6-54. Public Concern: The Forest Service should preserve several compartments.**

These areas were evaluated for inclusion in either the Scenic or Botanical/Zoological prescription. Many of the areas fall within, and will be preserved under the riparian prescription or prescription 7.A.1., each which are unsuitable for timber production.

**6-55. Public Concern: The Forest Service should inventory, analyze, protect, and designate several areas.**

These areas were evaluated and none occur on the Sumter National Forest.

**6-56. Public Concern: The Forest Service should provide a better explanation of the scenery management system.**

The Scenery Management System information has been more fully explained in both the Plan and EIS glossary.

**6-57. Public Concern: The Forest Service should expand wild and scenic river designations.**

The Sumter National Forest did an eligibility study for the forest and found that 8 were eligible. A suitability study must be done on those rivers prior to recommendation for inclusion in the National Wild and Scenic River System.

**6-58. Public Concern: The Forest Service should protect several rivers as candidates for designation as Wild and Scenic Rivers.**

The Sumter National Forest must complete a suitability study prior to recommendation of eligible rivers to Congress. The individual values of each river that are outstandingly remarkable will be protected until the suitability is completed.

**6-59. Public Concern: The Forest Service should conduct a suitability analysis of several rivers for Wild and Scenic River designation.**

The Southern Appalachian Forests conducted an analysis of the rivers and streams on the forests as required by FSH 1909.12,8.14. This directs forests to study rivers and evaluate their eligibility for inclusion in the National Wild and Scenic Rivers System. The planning teams evaluate each river to verify that it meets the eligibility criteria specified in sections 1(b) and 2(b) of the Wild and Scenic Rivers Act. Documentation of the finding of eligibility or noneligibility and the river's potential classification are included in the EIS. Beyond this point, there is latitude in treatment of eligible rivers. The preferred process would be to proceed with determining suitability by completing a river study in the draft forest plan. However, most of our forests were unable to complete suitability at this time and are delaying the suitability determination on eligible rivers until a subsequent separate study is carried out. In the interim, the forest plans do provide for protection of the river area until a decision is made as to the future use of the river and adjacent lands.

**6-60. Public Concern: The Forest Service should provide standards and objectives to assist resource managers in protecting the outstandingly remarkable values of Wild, Scenic, and Recreational Rivers.**

Suitability studies will be conducted in the future for eligible rivers, until that time, the outstandingly remarkable values will be protected (See forestwide standards.) The outstandingly remarkable values vary by river as do the river conditions therefore specific standards were not developed. A forestwide standard has been added that protects the outstandingly remarkable values of the eligible rivers. One standard that might apply well to one river might not apply to another river. One objective was added to complete the Suitability Study for Turkey/Stevens by 2009.

**6-61. Public Concern: The Forest Service should not actively manage areas in violation of the Wild and Scenic Rivers Act.**

The maintenance of existing wildlife openings is not a violation of the Wild and Scenic Rivers Act nor is the use of prescribed fire in the corridor. The exclusion of natural fire patterns within the corridor has led to rhododendron and laurel in unnatural amounts. The Wild and Scenic Rivers Act was not intended to stop all activities within the corridors, activities range from fewest in the wild sections to more in the recreational sections as long as those activities protect and enhance the outstandingly remarkable values of the river.

**6-62. Public Concern: The Forest Service should recommend the Chauga River and Cedar Creek for Wild and Scenic River Designation.**

The Sumter National Forest must complete a suitability study prior to recommendation of eligible rivers to Congress. The individual values of each river that are outstandingly remarkable will be protected until the suitability is completed.



**6-63. Public Concern: The Forest Service should better protect the Chauga River, and Turkey and Stevens Creeks.**

The Wild and Scenic Rivers act allows for varying degrees of management within the wild and scenic river corridor, from most restrictive in the wild segments to least restrictive in the recreational segments. In the areas that surround the Wild and Scenic corridor, a variety of management activities are available. However, those activities cannot detract from the outstandingly remarkable values of the rivers.

**6-64. Public Concern: The Forest Service should not recommend Turkey and Stevens Creeks for designation as Scenic and Recreational River segments.**

The Wild and Scenic Rivers act allows for varying degrees of management within the wild and scenic river corridors, from most restrictive in the wild segments to least restrictive in the recreational segments. In the areas that surround the Wild and Scenic corridor, a variety of management activities are available. However, those activities cannot detract from the outstandingly remarkable values of the rivers. Also, a suitability study must be completed prior to recommendation to Congress, this analysis requires additional public comment.

**6-65. Public Concern: The Forest Service should ensure that any future bridge over the Chattooga River be worthy of the river's caliber.**

The Wild and Scenic Rivers Act prohibits any action which detracts from an outstandingly remarkable value. One of the outstandingly remarkable values of the Chattooga River is scenery. Any future development will have careful aesthetic considerations.

**6-66. Public Concern: The Forest Service should make efforts to diversify floral and faunal richness in Wild Scenic and Recreational River segments.**

Prescribed burning in the corridor is allowed for some purposes including restoring native communities. OHV trails are not allowed in the Chattooga watershed.

**6-67. Public Concern: The Forest Service should institute identical prescriptions for the Chattooga River in both the Chattahoochee-Oconee and Sumter National Forests.**

The Forest agree that the prescriptions should be identical and have made numerous changes to incorporate this into both plans, (see Chapters 2 and 3 in the final Plan.) Wild and Scenic River management allows for wildlife and fish habitats in a manner consistent with the river's outstandingly remarkable values. The stocking of demand species is not precluded in the Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act allows for varying degrees of management within the wild and scenic river corridors, from most restrictive in the wild segments to least restrictive in the recreational segments. In the areas that surround the Wild and Scenic corridor, a variety of management activities, included fishing platforms, are available. However, those activities cannot detract from the outstandingly remarkable values of the rivers.

**6-68. Public Concern: The Forest Service should improve the Management Prescriptions 2.A.1, 2.A.2, and 2.A.3 to better protect the Chattooga River corridor.**

The Forest agree that the prescriptions should be identical and have made numerous changes to incorporate this into both plans, (see Chapters 2 and 3 in the final Plan.) Wild and Scenic River management allows for wildlife and fish habitats in a manner consistent with the river's outstandingly remarkable values. The stocking of demand species is not precluded in the Wild and Scenic Rivers Act. The Wild and Scenic Rivers Act allows for varying degrees of management within the wild and scenic river corridors, from most restrictive in the wild segments to least restrictive in the recreational segments. In the areas that surround the Wild and Scenic corridor, a variety of management activities, included fishing platforms, are available. However, those activities cannot detract from the outstandingly remarkable values of the rivers. See the glossary for explanations of the Scenery Management System.

There are no grazing allotments on the Chattooga River and the riparian prescription (11) prohibits corralling livestock within 100 feet of a stream or waterbody. Existing conditions of the Chattooga River area also considered in determining management activities, activities are not recommended based solely on classification. ROS classifications are based on the presence of roads in or near the areas. The entire Chattooga Wild and Scenic Corridor is unsuitable.

**6-69. Public Concern: The Forest Service should minimize the area that would experience high levels of recreational development within the Stevens Creek corridor.**

Stevens Creek is classified as Recreational based upon the level of existing activities and developments with the area. ROS classifications are based on the presence of roads in or near the areas.

**6-70. Public Concern: The Forest Service should widen the Wild and Scenic River corridor between Ira Branch and Lick Log Creek.**

The Sumter National Forest can ask Congress for a boundary change if information is available that supports that recommendation. However, the Wild and Scenic Rivers Act limits the boundaries of all Wild and Scenic Rivers to 320 acres per linear of river.

**6-72. Public Concern: The Forest Service should not permit streambed modifications on Wild and Scenic Rivers.**

There is no specific reference in the Forest Plan to "making streambed modifications to enhance trout habitat" in a Wild and Scenic River. There are references in Forest Wide Direction (Riparian Area Management) and in Management Prescriptions to improve and restore aquatic habitat. Management Prescriptions 2.A.2 and 2.A.3 include aquatic and riparian restoration as a management action.

**6-75. Public Concern: The Forest Service should designate the Chattooga River watershed as a Research Natural Area.**

Objectives in the Chattooga watershed include much more than research and education, which are objectives of any research natural area. Additionally, the entire watershed is not necessarily of unique scientific interest and importance.

**6-76. Public Concern: The Forest Service should work with adjacent landowners to enhance wildlife and recreation opportunities.**

Our involvement in specific wildlife projects are decided at the program level not at the Forest Plan level. The Forest Service does have a goal (Goal 5) that encourages the cooperation of landowners and partners in addressing watershed needs.

**6-77. Public Concern: The Forest Service should look for opportunities to acquire property that would benefit the environment.**

Sumter NF has an active land acquisition program. Availability of funds has an impact on the ability to acquire land by direct purchase. The goal of land acquisition is to improve management effectiveness, support specific resource management objectives

**6-78. Public Concern: The Forest Service should ensure that land exchanges will not lead to degradation or coal mining.**

Land exchange cases must comply with agency policy and direction, forest land management plans and applicable laws including the National Environmental Policy Act.

The land exchange decision is a determination by the authorized officer if the public interest is well served by exchanging federal and private interests in land, not to approve or disallow specific activities following completion of the exchange.

Although reasonably foreseeable actions and cumulative effects are considered in the analysis to come to a reasoned decision on public interest, once the exchange is completed, the federal lands are managed under private ownership in accordance with their highest and best use and in accordance with local zoning, municipal code and state and federal regulations. Private lands are managed in accordance with forest land management plans. Coal mining is an acceptable form of energy extraction in all states and its methods and impacts are highly regulated by multiple state and federal agencies both on federal lands and on private lands. Forest Service policies, practice and procedure is to avoid regulating private property use through the use of reservations except where clearly shown to be in the public interest or required under federal law. Outstanding mineral rights on federal lands are fully recognized in the conveyance deed to the private exchange party and are beyond the control of the federal agency.

## **CHAPTER 7 – NATURAL RESOURCE MANAGEMENT**

### **7-1. Public Concern: The Forest Service should manage lands for environmental preservation, protection, and restoration.**

See response to PC 3-82.

### **7-2. Public Concern: The Forest Service should manage forests for recreation.**

The Multiple Use Sustained Yield Act gives the Forest Service the mandate to provide a variety of goods and services for the American People, including wood products and recreation. The Sumter National Forest does provide a large variety of recreational opportunities and will continue to with the Revised Sumter Forest Plan.

### **7-4. Public Concern: The Forest Service should manage eastern national forests primarily for watershed protection.**

Watershed protection is a primary element that the USFS considers as directed in the Weeks Law and other legislation. Since the National Forests were established, direction for their management has been supplemented by, and in most respects superceded by direction in the Multiple Use Sustained Yield Act, the Forest and Rangeland Renewable Resources Planning Act, and the National Forest Management Act. This direction is now codified within 36 CFR Part 200-299. These regulations define the constraints and the focus of management. In addition, Congress directs activities to some degree with their allocations for various forest management programs.

### **7-5. Public Concern: The Forest Service should manage forests for forest health, recreation, and timber production.**

Comments noted. The Proposed Revised LRMP strives to balance the various multiple uses of the Sumter National Forest.

### **7-6. Public Concern: The Forest Service should manage the Sumter National Forest for preservation and to restore natural processes.**

See response to PC 3-82.

### **7-7. Public Concern: The Forest Service should actively manage National Forest System lands in a manner that provides multiple use benefits for all Americans.**

Under existing laws such as the Multiple Use Sustained Yield Act and the National Forest Management Act the Forest is obligated to manage lands to provide multiple use benefits. Also see response to PC 7-122.

**7-8. Public Concern: The Forest Service should adopt a true ecosystem management philosophy.**

See response to PC 3-79.

**7-9. Public Concern: The Forest Service should acknowledge that high quality scenery is a by-product of true ecosystem management.**

High-quality scenery is acknowledged to be important to the Sumter National Forest (Goal 30). The new Scenery Management System (See Glossary) assesses the importance of each road, trail, recreation area and other viewsheds to manage the scenery in concert with public values.

**7-10. Public Concern: The Forest Service should acknowledge that the principles of ecosystem management are undermined in the plan by an overemphasis on timber production and early successional habitat.**

The goal of healthy forests and sustainable ecosystems imbedded in the Sumter Plan is the result of an emphasis on restoring more of the components to native forest communities, maintaining healthy forest conditions, and the need for a mosaic of forested habitat conditions, which includes some early successional habitats. Timber production is an additional consideration only in management prescription 10.B.

**7-11. Public Concern: The Forest Service should increase its pursuit and use of adaptive management.**

Comment noted.

**7-12. Public Concern: The Forest Service should clarify the monitoring and evaluation of rare communities.**

See response to PC's 3-145 and 3-148. Additional details on monitoring of rare communities are included on the associated Monitoring Task sheet, which is available on request. Additional details will need to be worked out during implementation.

**7-13. Public Concern: The Forest Service should ensure adequate monitoring and evaluation.**

Many public comments reflect an interest in rigorously exploring cause and effect relationships as they may relate to planned practices, much as would be done in research studies. Forest plan

monitoring is distinguishable from rigorous research studies in that it builds information to be used through the more routine observations that are part of the programs and actions required during implementation. Measurements and observations are planned, but from a more strategic and with less rigor basis than would be required for research studies. It is agency policy to use the management review system as the primary process to ensure evaluation and documentation of the results of forest plan monitoring are accomplished. Plan implementation will be accomplished through projects, which must comply with the plan. Project planning and monitoring is done to assure that work is accomplished in compliance with the plan. Periodic reviews of projects assure that these requirements are being met.

**7-14. Public Concern: The Forest Service should seek additional funding to conduct monitoring.**

Funding is clearly a limiting factor for monitoring as well as any other activity of forest management. Funding needs for the monitoring of this plan will be assessed and planned on the Forest in the initial year of implementation and for each subsequent year. Funding needs will be reported to the President for agency budget formulation. Funding levels ultimately are the purview of Congress and the President.

Additional actions that are being taken and continually explored to stretch available funds and provide for monitoring needs include:

- Application of remote sensing, geographic information systems and expanded data analysis capacity
- Utilization of information provided by other agencies
- Partnerships with agencies, universities and professional organizations
- Utilizing qualified volunteers to supplement the agency workforce

Monitoring Task Sheets will be developed to utilize these resources to extend the agency capacity to monitor the effectiveness of the plan. Annual review and adjustment to the Monitoring Task Sheets will provide for changes needed due to technological advances, shifts in funding and priorities, workforce changes, and new opportunities for cooperation. Research needs will be identified and updated each year for additional effectiveness and validation needs that exceed the monitoring program itself. See also response to PC 1-24.

**7-15. Public Concern: The Forest Service should require appropriate monitoring and record maintenance.**

Agency information systems will be utilized for tracking monitoring data. Most monitoring records will be available for public review. Locations of heritage resources and data obtained from other organizations may be protected from release.

**7-16. Public Concern: The Forest Service should better develop the Monitoring and Evaluation Plan in Chapter 5 of the PRLMP.**

The Sumter recognized substantial shortcomings in Chapter 5 after completion of the draft plan. Accordingly, the Monitoring and Evaluation Plan in Chapter 5 has been modified extensively from the version in the draft.

Chapter 5 of the Forest Plan provides for monitoring of the plan, identifying the basic questions to be addressed in monitoring the effectiveness of the plan. Guidelines in Chapter 5 are detailed further in the Monitoring Summary Table in Appendix E. The Monitoring Summary Table identifies specific, measurable elements of each monitoring question and ties them back to the goals, objectives and standards of the plan. Specific methods for monitoring are not required as part of the plan but will be provided in Task Sheets maintained outside the plan to provide for dynamics of implementing the monitoring plan. Each task sheet is tied back to a monitoring element in the Monitoring Summary Table.

36 CFR 219.12 (k) details the regulatory requirements for monitoring and evaluation of forest plans. Additional policy and guidance is provided in Forest Service Manual 1920 and Forest Service Handbook 1909.12, Chapter 6.

The overall objective of monitoring and evaluating forest plans is to determine whether programs and projects are meeting forest plan direction. Within this broad objective, specific goals are to:

1. Ensure that forest plan goals and objectives are being achieved and management prescriptions are being implemented as directed.
2. Determine if the costs of implementing the plan and the management effects are occurring as predicted.

In response to these requirements, the matrix reflected in the Monitoring Summary Table reflects the relationships between each of the forest plan goals and objectives and the monitoring questions and elements. Due to the integrated nature of plans and management of resources, there is often a combination of actions and effects that must be evaluated together to be meaningful. The Monitoring Plan in this way represents a strategic approach that reflects these relationships rather than the development of monitoring for each goal and objective independently. Annual monitoring of costs for implementing the plan is provided.

NFMA regulations specify that monitoring requirements identified in the forest plan shall provide for:

- (1) A quantitative estimate of performance comparing outputs and services with those projected by the forest plan;
- (2) Documentation of the measured prescriptions and effects, including significant changes in productivity of the land; and
- (3) Documentation of costs associated with carrying out the planned management prescriptions as compared with costs estimated in the forest plan.
- (4) A description of the following monitoring activities:

- (i) The actions, effects, or resources to be measured, and the frequency of measurements;
  - (ii) Expected precision and reliability of the monitoring process; and
  - (iii) The time when evaluation will be reported.
- (5) A determination of compliance with the following standards:
  - (i) Lands are adequately restocked as specified in the forest plan;
  - (ii) Lands identified as not suited for timber production are examined at least every 10 years to determine if they have become suited; and that, if determined suited, such lands are returned to timber production

Public concern expressed seems to focus on the adequacy of the Monitoring Plan in meeting provisions 2 and 4 above. The Monitoring Summary Table provides a matrix that relates the measured goals and objectives described in detail in earlier chapters of the plan to the monitoring activities described as monitoring questions, elements, general methods, duration/frequency, reporting intervals, precision, reliability and responsibility. More specific protocols, methods, sampling intensities and locations to be applied in completing the described monitoring activities, which are frequently questioned in public comments, are covered in Monitoring Task Sheets outside the plan.

Plan implementation will be accomplished through projects, which must comply with the plan. Project planning and monitoring is done to assure that work is accomplished in compliance with the plan. Periodic reviews of projects assure that these requirements are being met.

**7-17. Public Concern: The Forest Service should end commercial resource development activities.**

This plan makes strategic decisions, consistent with NFMA that “....provide for multiple use and sustained yield of goods and services from the National Forest System.....” (36 CFR 219.1(a)). Strategic decisions include Desired Future Conditions (DFCs) and Goals and Objectives to achieve DFCs. Some of the uses of national forest lands set forth in 36 CFR 219 are commercial uses.

**7-18. Public Concern: The Forest Service should ensure that all management actions are conducted in an environmentally sensitive way.**

The agency is required under the National Environmental Policy Act (NEPA) to disclose environmental impacts. Anticipated effects are shown in Chapter 3 of the FEIS.

**7-19. Public Concern: The Forest Service should clarify how the agency will evaluate and achieve a balance between the value of ecosystem services and the production of timber on the Sumter National Forest.**

Alternative I attempts to achieve a balance between the value of ecosystem services and the productions of timber. Also see response to PC 2-19.



**7-20. Public Concern: The Forest Service should clearly disclose actual changes in management.**

Goals, objectives, standards, management prescriptions and management area direction are on display in the Sumter Plan, as are areas suitable for timber production and allowable sale quantity. The acreage suitable for timber production and allowable sale quantity are substantially less than in the 1985 plan.

**7-21. Public Concern: The Forest Service should prohibit road building and timber harvesting.**

We agree with your recommendation of making Scenic Highway 107 and 413 unsuitable for timber production within the 7A Scenic Byway prescription. This change has been made.

**7-22. Public Concern: The Forest Service should restore natural processes and native forest communities.**

Comment noted.

**7-23. Public Concern: The Forest Service should more clearly define what is meant by “restoration.”**

In general terms, we are managing composition of forest stands to increase vegetative components of native species, reduce monocultures (pine plantations) and the component of off-site species (sweet gum on ridges, white pine on dry south facing slopes, etc.). In some cases we are restoring habitat conditions that are reduced to relic stands, or have been obliterated by past land use practices; such as wetlands, open woodlands, grassland/savannas or canebrakes.

**7-24. Public Concern: The Forest Service should provide clear standards regarding restoration.**

See response to PC 7-23.

**7-25. Public Concern: The Forest Service should not conduct timber harvest and bladework as part of restoration.**

Site specific analysis must be done for every project before implementation.

**7-26. Public Concern: The Forest Service should conduct timber harvest within watersheds only for ecological restoration.**

The forest ID team believes that there are other viable reasons for timber harvest beyond the use of timber harvesting for ecological restoration. Wood products are one of many uses of national forest lands as set forth in 36 CFR 219. Wood products are a valued forest resource. They contribute to the social and economic well being of the people living in the area. In most of the Sumter, logging is compatible with other resource management objectives. Commercial harvest is also valuable for moderating stand densities, for creating early successional forest habitat, for controlling expansion of southern pine beetle spots, and for some restoration activities. The flow of wood products from the Sumter NF will come as a result of managing for the desired conditions given in management prescriptions.

**7-27. Public Concern: The Forest Service should focus management efforts on restoration.**

Regarding commercial timber harvest, reference the response to concern 7-35. Regarding restoration, reference the response to concern 7-26.

Standard 9G2-2 and Mgt rx 9G2: Comments noted.

**7-28. Public Concern: The Forest Service should provide clear, concise, and unambiguous management objectives.**

See response to PC 7-29.

**7-29. Public Concern: The Forest Service should clarify several specific goals and standards.**

Goal 1: To repeat part of the introduction to chapter 2 of the plan, goals are broad statements. Objectives express more concise, measurable steps to achieve goals. Monitoring is discussed in chapter 5 of the plan. Objective 1.01: Site specific analysis must be done for every project before implementation. Goal 2: Comment noted. Goal 3: This goal is inclusive of all habitats for species that utilize riparian areas to satisfy some, to all of their life requirements. Examples of species with special habitat needs are listed as emphasized. Other species with special habitat needs are also covered by this broad goal statement.

Objective 3.01: Comment noted. Objective 3.02: Methods to accomplish this objective are evaluated in site-specific project analysis documents. Having a small portion (<5%) of the riparian corridor in this habitat condition adds to the diversity of habitats. The desired future condition of the riparian corridor would include this small amount of dense regeneration characterized by high stem densities and a proliferation of vines.

Goal 4: Again, goals are broad statements. Objectives express more concise, measurable steps to achieve goals.

Objective 4.01: This objective will generally be accomplished with fertilization of the poor pine dominated lands below site index of 70. Nutrient assessments of soils and needles are conducted

to verify fertilization needs. Positive responses including increased growth, health and understory densities have been recorded in past research. McKee, W. H. and D. L. Law, 1985. Response to Fertilization on the Francis Marion and Sumter National Forests. Progress and Final Report No. FS-SE-1103-157(2). Southern Experiment Station, Charleston, SC. 16 pp. Goal 5: Comment noted. Standards FW-1,2 and 3: Comments noted. Channeled Ephemeral Stream Zone width: Comment noted. Standard FW-4: Comment noted. Standard FW-5: Comment noted. Cable logging is generally used on slopes considered too steep for ground based skidding. This logging method creates less soil disturbance than ground based skidding. Need for harvest is determined by management prescription direction and site-specific conditions. Partial suspension means that one end of a log is off the ground when it is being pulled back to a yarder.

Standard FW-6: Following are a couple examples: Crossings are usually designated so that there are no more than necessary. Crossings are also often at right angles to the zone to minimize the area within the zone that is disturbed. Standard FW-7: Such language is not included because fire lines may need to cross-channeled ephemeral stream zones to stop wildfires. Standard FW-8: While we do try to avoid channeled ephemeral stream zones, they cover enough of the landscape that they must sometimes be crossed to get from one point to another, or to have trails that are not limited to short stretches of main ridges. The plan does not have such a standard as mentioned for this same reason, and because we can stabilize trails so that they do not contribute significant sediment to streams. Standard FW-9: Channeled ephemeral stream zones finger out across much of the landscape. At times, they must be crossed. Designated crossings for skid trails associated with harvest will probably be the most common disturbance.

Standard FW-10, 11, and 12: Comments noted. Trails, campsites, recreation developments: Site specific conditions can not all be foreseen, and there are often exceptions to the norm. That is the difficulty with standards. Site specific analysis is done for project level activities. Minimum basal areas: Channeled ephemeral streams are by definition very small and..ephemeral. Standard FW-12 should adequately protect these channels. Trees leaning into channeled ephemerals are also typically left on site to minimize channel disturbance. Note the discussion in South Carolina BMPs on ephemeral streams. Per standard FW-1, state BMPs will be followed. BMPs have been shown effective in protecting water quality.

Aerial herbicide application: Such application to intermittent and perennial streams is addressed in standard FW-51. Channeled ephemerals can cover enough of the landscape that aerial application would be effectively unavailable as a tool if such a standard were in place. Because of this concern, aerial application is rarely used for operational forest vegetation management projects. It is typically reserved for right-of-way applications, and then typically with low toxicity herbicides. Ground herbicide application: When applying herbicides around channeled ephemeral streams, the primary concern is to avoid getting herbicide in the stream channel. Because manually applied directed sprays have very limited drift, herbicides may be applied fairly close to a channeled ephemeral. Standard FW-15: Comment noted. Standard FW-16: This standard has been deleted. It was poorly defined and poorly understood. More important, standard FW-15 should address the only significant factor originating on the Sumter National Forest that might negatively affect air quality.

**7-30. Public Concern: The Forest Service should revise goal # 7 to place a higher emphasis on unique agency efforts.**

Comment noted.

**7-31. Public Concern: The Forest Service should revise specific management prescriptions, standards, and objectives to utilize ecological forest restoration and ecosystem management.**

Mgt rx 8A1: Comments noted. Before considering intermingled riparian corridors, 4-10% desired early successional forest translates to 100-250 year rotations. The prescription does not reference 40 year old stands, but forests that are a minimum of 40 years old (mid to late successional). Regarding successional forests, refer to response to concern 7-100. Regarding the rationale for percentage of early successional habitat, see response to concern 7-94. In 8.A.1 areas there will exist the greatest variety of conditions found on the Forest, from woodland/savanna/grassland to old growth, that in turn will provide suitable habitats for the greatest variety of wildlife, from black bear to grasshopper sparrow. The forests we are blessed with today are the result of hundreds of years of land uses that may or may not have been related to forestry. Due to chestnut blight we lost the American chestnut, which was the dominant upland forest species in the mountains. American elm disease, dogwood anthracnose, beech canker, hemlock wooly adelgid, southern pine beetle, and other disease and insect outbreaks have changed the face of the forest. Managing a forest for diversity, resilience and longevity with the goal of sustainability requires some manipulation periodically throughout the growing cycle of trees.

Objective 17.01: This objective has been deleted. Management prescription 10B now has an objective for wood products. Wood products are one of many uses of national forest lands as set forth in 36 CFR 219. Regarding historic sell levels, the Sumter NF was in this range or even higher (8 times) almost every year through the 1960s, 1970s, and 1980s. 78.7 MMBF is indeed not over 16 MMBF more than has ever been sold in one year. The Sumter NF has sold  $\geq 63$  MMBF (the level this comment specifies) 18 separate years.

Mgt rx 10B: Comments noted. Mgt rx 9A3: Comment noted. The basis for this approach is that many areas with active erosion continue to erode and add sediment to stream systems without intervention. Standard 9G2-2 and Mgt rx 9G2: Comments noted.

**7-32. Public Concern: The Forest Service should revise the management direction for specific areas of concern.**

The application of the 10 B (High-Quality Timber Products) prescription is compatible with managing the Turkey/Stevens Creek Watershed. The Sumter National Forest Plan has additional standards (See Management Area 1) within this watershed to protect the federally endangered Carolina Heelsplitter. The Chattooga River itself is in wild and scenic river prescriptions which protects and enhances its outstandingly remarkable values. The Chattooga River Watershed does

not allow OHV use (See Forestwide standard # ) The prescription of 7E2 is an appropriate prescription for the Chattooga River because its primary focus is on recreation. Secondly, there are areas within that prescription that can be managed for other resources such as timber management. Boating is not allowed above Highway 28 in the Revised Sumter Forest Plan. In Management Areas 3 and 4, additional desired conditions statements have been added. Prescription 8A1 is an appropriate prescription for the Blue Ridge Mountains and Foothills however its intent was never restore the entire area to natural communities and processes. All ground disturbing activities will has site specific analysis which will ensure the location, identifiaction and protection of resources, including cultural resources, threatened and endanged plants, and old growth.

**7-33. Public Concern: The Forest Service should harvest timber from National Forest System lands.**

Indeed, the selected alternative for the Southern Appalachian plans does contain goals and objectives that will be accomplished by the activity of timber harvesting.

**7-34. Public Concern: The Forest Service should manage the Sumter National Forest for pine timber, pulpwood, and revenue.**

Alternatives A and D have such an emphasis and were evaluated in the EIS.

**7-35. Public Concern: The Forest Service should not harvest timber from National Forest System lands for various reasons.**

The selected alternative for the Southern Appalachian plans does contain goals and objectives that will be accomplished by the activity of timber harvesting (including clearcutting, where silviculturally correct). These plans make strategic decisions, consistent with NFMA that "...provide for multiple use and sustained yield of goods and services from the National Forest System....." (36 CFR 219.1(a)). Strategic decisions include Desired Future Conditions (DFCs), and Goals and Objectives to achieve DFCs. A minimum management (custodial) alternative was developed, but was not studied in detail due to its failure to meet the mandates of NFMA and the MUSYA. Wood products are one of many uses of national forest lands as set forth in 36 CFR 219. Wood products are a valued forest resource. They contribute to the social and economic well being of the people living in the area. In most of the Sumter, logging is compatible with other resource management objectives. Commercial harvest is also valuable for moderating stand densities, for creating early successional forest habitat, for controlling expansion of southern pine beetle spots, and for some restoration activities.

**7-36. Public Concern: The Forest Service should not harvest timber from National Forest System lands in various locations.**

See response to PC 7-35.

**7-37. Public Concern: The Forest Service should not conduct commercial timber harvest on National Forest System lands.**

See response to PC 7-35.

**7-38. Public Concern: The Forest Service should not manage National Forest System lands as tree plantations and tree farms.**

The planning process for the Southern Appalachian National Forests recognized the issue of ‘tree farms’ in their development of management prescriptions. Desired conditions in the Sumter Plan reflect the consideration of many resources, and do not focus on maximum wood production as one would see on forest industry lands. Little acreage has been planted on the Sumter in recent years, and almost all of this has come after southern pine beetle damage.

**7-39. Public Concern: The Forest Service should not increase timber harvest.**

The planning process for the Southern Appalachians included analysis of a range of alternative management themes. Within these alternatives was a range of levels of timber harvest volumes, and acres of ‘suitable for timber production’. The selected alternative does not have the highest level of timber harvest, or suitable acres, but addresses the spectrum of significant issues best in its combination of resource activities and emphases. Long term sustained yield capacity under the revised plan is 139 MCF compared to 211 MCF under the 1985 plan. This is a decrease, not an increase.

**7-40. Public Concern: The Forest Service should analyze alternatives to timber harvest and wood products.**

The Southern Appalachian plans were created using the process mandated by the NFMA and NEPA regulations. The plan revision process for each Forest included a look at a broad range of alternatives, each having a different intensity and management theme. One alternative initially considered was an alternative that called for minimal (custodial) management of the National Forest’s resources. Also see response to PC 7-35.

**7-41. Public Concern: The Forest Service should promote timber production in the coastal plain instead of national forests.**

This concern is somewhat outside the scope of consideration since this LRMP is for lands in the Sumter National Forest. Alternative C addressed this concern. It was considered, but eliminated from detailed study.

**7-42. Public Concern: The Forest Service should clarify the timber management program.**

DEIS, chapter 3: Comments noted. Site specific analysis is done at the project level.

Objective 7.06: Appropriate native plant communities will be identified following site specific analysis.

Objectives 7.07 through 7.10: These objectives were derived from fire frequency and forest fuel condition classes. They have been eliminated and replaced by Objective 20.01.

Standard FW-20: The only forest that the Sumter NF has converted to pine in recent years is a project on the Andrew Pickens district to restore table mountain pine. This standard was used by many Southern Appalachian national forests and is appropriate for the Sumter. As a practical matter it is perhaps not necessary given management prescription direction, but we intend to retain the standard. The standard addresses only mesic sites, not xeric sites.

**7-43. Public Concern: The Forest Service should provide appropriate standards and guidelines for uneven-aged management.**

Comment noted. Project level effects are evaluated with site specific analysis. Forest-wide standards apply to uneven-aged harvest as well as even-aged harvest, as do South Carolina BMPs.

**7-44. Public Concern: The Forest Service should better define and analyze allowable silvicultural techniques.**

Comment noted. As stated in Appendix H: "The combinations of forest types, stand structures, component species, site characteristics, and other conditions that could exist throughout the Sumter are extremely variable." There are usually exceptions (often unforeseen) to rules or standards that might be made. This poses a problem with standards, because they may not be violated. Therefore, site specific treatment choices are made at the project level. Typical applications of silvicultural systems are displayed in Appendix H.

**7-45. Public Concern: The Forest Service should focus on restoration and less intensive silviculture methods.**

Comment noted.

**7-46. Public Concern: The Forest Service should evaluate isolated parcels where private land use is dominant differently than larger contiguous parcels in determining amount of harvest.**

Landscape considerations and cumulative effects are taken into account in project level analysis. However, this plan is for Sumter National Forest lands and must remain mainly in that context.

**7-47. Public Concern: The Forest Service should lengthen timber harvest rotations.**

For management prescriptions 7E2, 8A1, 9A3 and 9G2 (totalling 37% of the Sumter), the desired condition is 4-10% early successional habitat. Before considering intermingled riparian corridors, this equates to 100-250 year rotations. No prescriptions reference 40 year old stands, but forests that are a minimum of 40 years old (mid to late successional). In areas unsuitable for timber production (29% of the forest) natural mortality will be the main factor limiting tree age.

**7-48. Public Concern: The Forest Service should clarify how silvicultural activities intended for ecological management can provide a stable supply of wood products.**

Wood products are one of many uses of national forest lands set forth in 36 CFR 219. The flow of wood products from the Sumter NF will come as a result of managing for the desired conditions given in management prescriptions. Not every goal in the plan addresses every concern. The Sumter ASQ reflects a number of factors. Most of the Sumter is productive piedmont land. Much of this will remain in productive loblolly pine for some time. Approximately 1/3 of the forest (prescriptions 8B2, 10B and the portion of 4G1 not in the natural area) would have moderate rotations compared to the longer ones for almost all of the acreage suitable for timber production on other Southern Appalachian NFs. In addition, the Conecuh, Talladega and Oconee National Forests are managing large acreages for red-cockaded woodpeckers. The Sumter does not have this species. The response to concern 7-127 addresses ASQ concerns.

**7-49. Public Concern: The Forest Service should manage forests to create a diversity of successional stages, stand structures, and species.**

Management of these Forests as ecosystems is a major theme under which the management prescriptions were developed. The emphasis and desired future condition for each management prescription took into consideration the successional and structural diversity needs of the landscape.

**7-50. Public Concern: The Forest Service should focus on restoration of oak-hickory shortleaf as a priority.**

Oak-hickory shortleaf communities are one of several plant communities we will be looking to restore under the Sumter Forest Plan.

**7-51. Public Concern: The Forest Service should discontinue harvesting hardwoods.**

Basic hardwood communities are protected under the rare community prescription, and hardwood communities occurring along riparian corridors are generally protected as well. A forestwide objective in the Forest Plan encourages an increase in conditions to restore hardwood communities on 20,000 acres currently in pine on the piedmont.

**7-52. Public Concern: The Forest Service should, after timber harvest, plant diverse native hardwoods.**



Basic hardwood communities are protected and may be restored under the rare community prescription, and hardwood communities occurring along riparian corridors are generally protected and may be restored as well. A forestwide objective in the Forest Plan encourages an increase in conditions to restore hardwood communities on 20,000 acres currently in pine on the piedmont. The effects of the alternatives on relative amounts of hardwood cover are shown in chapter 3 of the FEIS.

**7-53. Public Concern: The Forest Service should define ‘restoration’ of native species and take action to remove loblolly pines.**

Restoration, as a management issue, was developed as several management prescriptions (depending on which ecosystem attribute needed restoration) that were allocated to Forest areas where the need was of high potential. Each restoration prescription does define desired future condition in terms of native species composition. There are some restoration needs that will involve the removal of loblolly pine, where it is growing off site, and restoring the site to more native species. This is the case for all of the loblolly pine stands on the Andrew Pickens Ranger District.

**7-54. Public Concern: The Forest Service should acknowledge that there is no historical justification for managing for even aged stands of planted loblolly pine dominating large sections of the piedmont landscape.**

The assumption regarding clearcutting is incorrect. The characterization of plantation timberland is also inaccurate. Clearcutting is a harvest tool that has been used very seldom in recent years. Under this plan, as described in Appendix H, it will most likely be applied where a forest type conversion is desired, and the seed source for an existing species, such as loblolly pine or Virginia pine needs to be removed. Likewise, little acreage has been planted in recent years, and almost all of this has come after southern pine beetle damage.

The Sumter desires to keep relatively frequent fire in many areas of the Forest. However, logistics, funding, personnel, soil conditions and smoke management requirements limit the amount of the landscape on which we can keep prescribed fire.

Site preparation with herbicide would not select against advance oak and hickory regeneration, but can in fact be a very valuable tool in favoring these species.

Herbaceous diversity does indeed typically decrease in any young forest as tree crowns close and begin to form a canopy. That is the normal process of succession. Having a forest predominantly the same age and in similar condition is not conducive to sustaining a healthy forest. Periodic disturbances and a diversity in composition promotes resilience that can be maintained. The forest we have now is largely the result of planting abandoned farmland, or replacing diseased shortleaf pine with loblolly pine. Under this Plan, the forest will be trending towards a mixed pine hardwood forest and more open forests through periodic silvicultural

treatments. In 10.B areas wildlife that use landscapes with a variety of forest structural conditions will thrive.

Demand for pine pulpwood has been weaker in the last few years. Prices for pine sawtimber, however, remain strong. Prices for hardwood pulpwood and hardwood sawtimber are near all time highs.

**7-55. Public Concern: The Forest Service should define the terms “early” and “late successional” to better reflect ecological goals rather than forestry practices.**

Comments noted. Successional stages, including early and late successional seral stages are defined in the glossary. The comment is correct in that strict ecological definitions may be somewhat different from those used in the forest plan and EIS. However, biologists from the Southern Appalachian national forests agreed to the usage found in the plan some years ago.

Stand ages are generally a good surrogate for the structures described in the glossary. They are the best measure readily available for strategic level land management planning. As noted in the plan, the percentages found in the chapter 3 desired conditions for early successional *forest* are defined as regenerating forest age 0-10.

**7-56. Public Concern: The Forest Service should actively manage old growth forests.**

The regional guidance for conserving and restoring old growth forest communities outlines different approaches for managing old growth, which includes options from “doing nothing” to active management regimes of extended forest rotations designed to sustain a flow of replacement old growth stands over time. These options are reflected in Management Prescriptions 6.A. through 6.E. The forest management teams and interdisciplinary teams considered these options in determining which approaches would best address the old growth management issue. In addition to those areas allocated to a Management Prescription 6 Category, other areas allocated to other Management Prescriptions will also provide future old growth stands. These acreages are displayed in Chapter 3 of the FEIS within the Old Growth section.

**7-57. Public Concern: The Forest Service should protect old growth forests.**

The Southern Appalachian plan revisions do reflect the mandate presented in the “Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region” (June 1997). Each Forest’s Plan provides for present and future representation of old growth community types, their distribution, and variety of patch size.

**7-58. Public Concern: The Forest Service should manage and return all areas to old growth.**

The Southern Appalachian plan revisions reflect the mandate presented in the “Guidance for Conserving and Restoring Old-Growth Forest Communities on National Forests in the Southern Region” (June 1997). Each Forest’s Plan provides for present and future representation of old growth community types, their distribution, and variety of patch size. The selected alternative addresses many significant issues that preclude allocating the entirety of each Forest to old growth.

**7-59. Public Concern: The Forest Service should specify how existing old growth will be identified.**

Your comments were considered and the background information for old growth in Chapter 2 of the Revised Plan was rewritten. This Forest Plan follows direction for identifying existing old growth contained within the "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region", as noted in Chapter 2, but does not repeat it.

**7-60. Public Concern: The Forest Service should clarify the inconsistencies in text and numbers regarding old growth, and specify how these areas will be protected.**

We reviewed your comments and felt that you may be confusing the numbers for possible, existing, and for future old growth across alternatives. Based on information in the draft documents, 1,714 acres of old growth will be allocated through prescription, but future old growth on the forest will be provided on 85,573 acres including old growth compatible prescriptions which are unsuitable for timber production (such as wilderness, botanical/zoological areas, rare communities, wild and scenic rivers, and old growth). The 17,520 acre figure for future old growth in the summary, was listed for Alternative F, current management, not Alternative I. Maps showing future old growth under the new plan were incorporated into the final.

**7-61. Public Concern: The Forest Service should intersperse meadows with thinned mature stands of trees.**

The habitat conditions described in this comment are similar to woodland and savanna habitats described in the Plan. In some management prescriptions; 7.E.2, 8.A.1, 9.G.2, and 10.B, these conditions are likely to occur on appropriate sites. In 8.B.2 areas, these habitat conditions will dominate the landscape.

**7-62. Public Concern: The Forest Service should follow regional guidance regarding old growth.**

The regional old growth guidance provides information on how to identify existing old growth areas, different options for managing old growth, and an overall approach for addressing old growth during forest planning. The Forests have followed this guidance by conducting an

inventory of possible old growth and using this as a guide in the development of the different alternatives. The Forest Plans include a standard that any stands identified as “existing old growth” will be protected, and the Plans provide a network of old growth areas across the forest. This “network” does not have to consist only of areas allocated to a Management Prescription 6. There are many management prescriptions that will allow stands to eventually provide old growth conditions and these areas are a part of the overall “network”. Chapter 3 of the FEIS within the Old Growth section shows the acres of existing and future old growth for all the alternatives.

**7-63. Public Concern: The Forest Service should monitor old growth.**

Direction for monitoring old growth on the Forest was incorporated into the monitoring and evaluation section of the Forest Plan.

**7-64. Public Concern: The Forest Service should not manage for future old growth.**

This Forest Plan addresses social and biological needs for old growth and is committed to following the "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region".

**7-65. Public Concern: The Forest Service should accurately describe the historic dynamics of the Southern Appalachian forests as naturally uneven-aged.**

See response to PC 3-144.

**7-66. Public Concern: The Forest Service should inventory and map old growth.**

Direction for monitoring old growth on the Forest was incorporated into the monitoring and evaluation section of the Forest Plan. This Forest Plan follows direction for identifying existing old growth contained within the "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region", as noted in Chapter 2, but does not repeat it.

**7-67. Public Concern: The Forest Service should adequately map and display the networks of large, medium, and small old growth patches.**

Maps showing future old growth under the new plan were incorporated into the FEIS. Additional maps displaying future old growth by old growth community type are available on the FS web site.

**7-68. Public Concern: The Forest Service should inventory and map potential old growth areas on the Sumter National Forest.**

Your comments were considered. A possible old growth inventory was conducted on the Forest, in 1997, and again in 2002 as described in the DEIS and also mapped in the FEIS. This Forest Plan follows direction for identifying existing old growth contained within the "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region", as noted in Chapter 2, but does not repeat it. Old growth meeting the criteria for existing old growth as described in the Guidance, will be conserved in conjunction with site-specific inventories, based on a forestwide standard. Additional direction for monitoring and tracking old growth was incorporated into the monitoring and evaluation section of the Forest Plan. Maps showing possible and future old growth were incorporated into the FEIS.

**7-69. Public Concern: The Forest Service should better explain the amount of old growth present on the Sumter National Forest.**

A possible old growth inventory was conducted on the Forest, in 1997, and again in 2002 as described in the DEIS and also mapped in the FEIS. An explanation of known inventories for old growth on the Forest was incorporated into the background section for old growth in Chapter 2 of the Forest Plan and is included in the FEIS.

**7-70. Public Concern: The Forest Service should not include any old growth areas in Management Area 10.B.**

Old growth meeting the criteria for existing old growth as described in the Guidance, will be conserved based on a forestwide standard, regardless of where it occurs.

**7-71. Public Concern: The Forest Service should better address the monitoring of old growth.**

Direction for monitoring old growth on the Forest was incorporated into the monitoring and evaluation section of the Forest Plan.

**7-72. Public Concern: The Forest Service should provide additional guidance on old growth issues on the Sumter National Forest.**

Development of the possible old growth inventory for the Forest, developed in 1997 and again in 2002, was disclosed in the DEIS and FEIS, along with information sources used including selected stands identified by Gaddy (1998). Additional old growth patches identified by Gaddy will be conserved based on a forestwide standard if they meet the criteria for existing old growth. Maps of both possible old growth and future old growth were incorporated into the FEIS, and desired condition statements for old growth were incorporated into the management area descriptions in the Revised Plan. Page 18 of the Guidance states that in a forest matrix dominated by mid- and late- successional forests, there will be no need to physically interconnect old-growth areas by the use of old growth corridors. We fail to see in the Guidance where small patches of old growth are meant to function for "connectivity".

**7-73. Public Concern: The Forest Service should explain why only the Jefferson National Forest documents “existing old growth.”**

The Forests in the Southern Appalachians are in different situations in terms of their old growth inventories of “existing old growth”, with some further along than others. Inventories from other groups/organizations can be presented to the Forests, but they still need to be verified that they meet the criteria for old growth as spelled out in the regional old growth guidance. Since these inventories are generally at the stand level, they are not allocated to specific management prescriptions in the Forest Plan. Instead it is recognized that these stands could occur in any management prescription allocation, and in order to protect those stands of existing old growth, a forestwide standard is included in the Forest Plan to provide that protection. This standard applies to both those stands currently identified as existing old growth, as well as any stands that may be identified in the future as meeting the criteria for “existing old growth”. So even though a Forest may not have a completed inventory now, any project level evaluation will have to see if any of the stands proposed for management activities meet the old growth definition.

**7-74. Public Concern: The Forest Service should document “management options related to possible old growth” and that areas have been identified on the Sumter National Forest.**

The Guidance states that National Forest managers will develop a network of old-growth areas of various sizes and develop management prescriptions for these areas (p.15). This has been done.

**7-75. Public Concern: The Forest Service should better explain the basis for old growth management on the Sumter National Forest.**

The strategy for providing for a network of small, medium, and large future patches of old growth are described in Chapter 2 in the Revised Plan and effects are disclosed in the FEIS. Specific direction for the inventory of existing old growth on the Forest is included in the "Guidance for Conserving and Restoring Old Growth Forest Communities on National Forests in the Southern Region". Direction for monitoring old growth on the Forest was incorporated into the monitoring and evaluation section of the Forest Plan.

**7-76. Public Concern: The Forest Service should describe the desired future conditions for old growth on the forest.**

Desired future condition statements for old growth were incorporated into the management area descriptions in the Revised Plan.

**7-77. Public Concern: The Forest Service should specify and display acreage allocations for large old-growth patches.**

There are a number of ways to meet the regional old growth guidance for having a “network” of large, medium and small old growth patches. These “patches” do not need to be specifically allocated to a Management Prescription 6. Old growth management can be met in other

management prescriptions as well. When all the compatible prescriptions were mapped out, along with the forestwide standard to protect any stand that meets the criteria for “existing old growth” (which can include either stands currently inventoried or stands identified sometime in the future), a determination was made as to whether or not this “old growth network” was adequate, or if other specific old growth allocations were needed to fill in any “gaps” in the “network”. In most cases, it was determined that the combination of the allocations of all the old growth compatible management prescriptions, along with the forestwide standard on “existing old growth”, that the resultant “old growth network” was sufficient to address the old growth issue.

**7-78. Public Concern: The Forest Service should better develop a network of old growth areas of various sizes and develop management prescriptions for these areas.**

The strategy for providing for a network of small, medium, and large future patches of old growth in the Forest Plan are described in Chapter 2 of the Revised Plan and effects are disclosed in the FEIS. Small patches of existing old growth will be conserved based on a forestwide standard, including stands identified by Paul Carlson in the Chattooga watershed. Management prescriptions are assigned to each of the areas included as future old growth in the FEIS.

**7-79. Public Concern: The Forest Service should better explain the old growth network on the Southern Appalachian forests.**

See response to PC 7-77.

**7-80. Public Concern: The Forest Service should not expand old growth area designations.**

Developing a management plan for a national forest involves having to address a multitude of trade-offs. For the Southern Appalachian National Forests this includes trying to address 12 common issues, which are not necessarily compatible. An effort is made to find the mix of management activities that will best address all the issues. This means having a mix of areas where active management activities will be used to meet such issues as early-successional wildlife habitat needs, providing forest products, addressing forest health, etc.; while other areas will be managed to provide late-successional wildlife habitat needs, and to meet social demands for things such as old growth areas, areas for backcountry recreation, scenic areas, wilderness areas, etc. However, in many of these areas in the later category, certain activities to meet forest health needs may still be allowed to occur.

**7-81. Public Concern: The Forest Service should protect old growth near the Lower Chauga River.**

Existing old growth will be conserved based on a forestwide standard, including stands identified by Chick Gaddy in the Lower Chauga watershed.

**7-82. Public Concern: The Forest Service should clarify information on old growth areas and better explain how these areas will be protected.**

Although only 1,714 acres of old growth will be allocated through prescription, future old growth on the forest will be provided in prescriptions which are unsuitable for timber production (such as wilderness, botanical/zoological areas, rare communities, wild and scenic rivers), as well as in the old growth prescription. The 17,520 acre figure for future old growth in the summary, was listed for Alternative F, current management, not Alternative I. The 35,680 figure in the DEIS was for possible old growth, not future old growth. Maps showing future old growth under the new plan were incorporated into the final.

**7-83. Public Concern: The Forest Service should provide a connection between existing old growth, possible old growth, and future old growth.**

“Possible Old Growth” is simply an initial inventory, to give planners an indication of where “existing old growth” stands might be found; and to give planners some information on where it would make sense to allocate management prescriptions for the purposes of managing/maintaining old growth. This initial inventory is essentially nothing more than a query of the CISC data base to find stands older than a certain age. “Existing Old Growth”, however, are those stands that meet all the criteria for being classified as “existing old growth” as determined by the Regional “Guidance for Conserving and Restoring Old Growth Forest Communities”. This regional guidance identifies up to eight criteria for making that determination. Whether or not a stand will meet these criteria is usually only determined by a field inventory. “Future Old Growth” includes acres in management prescription allocations where stands will likely meet the definition for “old growth” at some point in the future. “Existing old growth” stands may be found in old growth compatible management prescriptions (“future old growth”) and relatively isolated stands of “existing old growth” may also be found in other management prescription allocations. The “old growth network” is provided for through a combination of the lands allocated to the old growth compatible management prescriptions, and a forestwide standard that protects the “existing old growth” found in the other management prescriptions.

**7-84. Public Concern: The Forest Service should better address the overall old growth strategy.**

The relationship between future old growth, possible old growth, and existing old growth, and their relationship with the old growth network, is disclosed in the FEIS.

**7-85. Public Concern: The Forest Service should protect old growth sites on the Sumter National Forest.**

Existing old growth will be conserved based on a forestwide standard.



**7-86. Public Concern: The Forest Service should provide adequate monitoring of old growth at both the plan and project level.**

The regional old growth guidance identifies three aspects of monitoring old growth. The first involves monitoring at the project level to determine if stands meet the criteria for being classified as “existing old growth”. The second involves plan implementation monitoring and making sure the projects are being implemented according to the Forest Plan. This is identified in the Forest Plan Monitoring Chapter 5. The third involves using research to validate the old growth definitions, and the management strategies needed to maintain old growth conditions/characteristics.

**7-87. Public Concern: The Forest Service should recognize that the plans are inconsistent both across forests and within forests in the prescriptions that are considered old growth compatible.**

The lists of management prescriptions that are considered “old growth compatible” varies between Forests because of two reasons. One is that different Forests use different subsets of the total list of possible management prescriptions. For instance, one Forest may have some lands allocated to a Management Prescription 12.C., while another Forest may have no lands allocated to that particular prescription. Another reason is that while there is a regional set of “generic” Management Prescriptions, the Forest could “localize” these prescriptions to meet their local needs. As a part of this “localization”, some aspects of the prescription could be changed so that it would no longer be considered “old growth compatible”. For instance in some cases, it was a Forest determination as to if a particular management prescription could contain lands “suited for timber production”. In these situations, if that particular prescription had “suited” acres, then it could be viewed as not being “old growth compatible”. But if another Forest made the determination the same management prescription would be “not suited for timber production”, then it could be viewed as being “old growth compatible”.

**7-88. Public Concern: The Forest Service should specify adequate old growth goals, objectives, and management prescriptions for the Southern Appalachian forests.**

Many of the comments on this topic relate to questions about following the regional guidance for old growth. There are a number of ways to meet the regional old growth guidance for having a “network” of large, medium and small old growth patches. These “patches” do not need to be specifically allocated to a Management Prescription 6. Old growth management can be met in other management prescriptions as well. When all the compatible prescriptions were mapped out, along with the forestwide standard to protect any stand that meets the criteria for “existing old growth” (which can include either stands currently inventoried or stands identified sometime in the future), a determination was made as to whether or not this “old growth network” was adequate, or if other specific old growth allocations were needed to fill in any “gaps” in the “network”. In most cases, it was determined that the combination of the allocations of all the old growth compatible management prescriptions, along with the forestwide standard on “existing old growth”, that the resultant “old growth network” was sufficient to address the old growth

issue.

**7-89. Public Concern: The Forest Service should not create and expand early successional objectives.**

Early-successional habitat was one of the topics most frequently raised by commenters. However, some commenters did not appear to recognize distinctions among types of early-successional habitat that we have made in the Revised Plan and EIS. Understanding these distinctions is important because early-successional habitats are not all the same in their value to wildlife and in strategies for their management. Types of early-successional habitat that we have addressed include early-successional forests, open woodlands, improved pastures, permanent wildlife openings, canebrakes, savannas, wet meadows, old fields, maintained rights-of-way, and balds.

Percentage objectives within prescriptions, which were the focus of many comments, are for *early-successional forest* only, and are calculated on the basis of the amount of forested land within a prescription block, as described in Chapter 5 of the Forest Plan. Other types of early-successional habitat within the block are treated as non-forest and, therefore, are not included in percentage calculations. Presence of these other types complements early-successional forest objectives in evaluating overall abundance of early-successional habitats. Objectives for some of the other early-successional types have been set in the plan (see Objectives and Goals 4 & 8 in Chapter 2 of the Forest Plan). Other types are acknowledged as present and described in the desired future condition for appropriate management prescriptions: 2A3, 4F, 4G1, 7A, 7D, 7E1, 7E2, 8A1, 8B2, 9A3, 9G2, 10B, 11, 12A.

Comments calling for both higher and lower objectives for early-successional forest were common. Commenters in favor of higher objectives included state wildlife management agencies, wildlife professional organizations, hunting and game species conservation organizations, and bird conservationists. In some cases, these commenters suggested specific objective levels, generally ranging from 5 to 15 percent forest-wide. Commenters in favor of lower objectives included environmental organizations and those interested in low intensity management strategies and undisturbed mature forest conditions. These commenters frequently pointed to openings created by natural disturbances and canopy gaps from natural treefall, along with private lands, as habitat sources that reduce the need for creation of early-successional forest on national forest lands.

In a recent review paper by disturbance ecologist Craig Lorimer (Historical and ecological roles of disturbance in eastern North American forests: 9,000 years of change. Wildlife Society Bulletin 2001, 29(2):425-439), Lorimer concludes: "Deciding on the optimal amount of early successional habitat on public lands is a complex ecological and social issue that can be guided only in part by scientific evidence." The diversity of perspectives expressed in comments reflects the complexity of this as a social issue. To provide for this diversity of views, as well as a for a diversity of habitats, we defined four mixes or "options" of successional forest conditions to be assigned to specific portions of the national forest landscape (see definitions of options in

the Successional Forests section of the EIS). These options were allocated to the landscape through prescription assignments after considering a variety of factors, including successional habitat abundance and distribution across the forest, settings for other multiple uses, and legal and logistical constraints on management opportunity. We have allocated successional forest options in the Revised Plan in a mix that we feel provides the best balance in meeting the wide range of public desires evident in the comments.

Option 1, which has no early-successional forest objective, was defined to recognize there are many portions of the national forest where creation of early-successional forest through management is not legal, feasible, or desirable. Such areas include Wilderness, areas of rugged terrain, and areas sensitive because of other resource uses and values. Forests in these areas will predominately move toward old growth conditions and provide optimal habitat for late-successional forest species. The selected alternative allocates 2% of the Sumter National Forest to this option.

Option 2, which also has no early-successional forest objective, but which may include up to 4 percent in early-successional forest, was defined to recognize there are portions of the forest where early-successional forest is not a priority, but may be desirable at low levels to increase habitat diversity and meet other multiple-use needs. Such areas may include recreational, aesthetic, or late-successional forest wildlife emphasis areas. As with Option 1, these areas will be dominated by late-successional and old growth forests. The selected alternative allocates 23% of the Sumter National Forest to this option.

Option 3 has an early-successional forest objective of 4 to 10 percent of forested acreage. It was defined to provide an intermediate mix of successional forest habitats, as well as to allow diversification of forest age classes for forest health, conversion of forest types for ecological restoration, and provision for other related multiple uses. If implemented in a fully regulated way, this objective would result in forests growing to 100 to 250 years before being regenerated (however, in reality some may be regenerated earlier and some may be maintained as old growth). This mix still provides for a general increase of older forests relative to current conditions. Both early- and late-successional forest species would find habitat in these areas. The selected alternative allocates 20% of the Sumter National Forest to this option.

Option 4 has an early-successional forest objective of 10 to 17 percent of forested acreage. It was defined to provide areas that are optimal for early-successional forest dependent wildlife based on recommendations in the scientific literature. It also will allow accelerated diversification of forest age classes and restoration of desired forest types, and may be appropriate where timber production is emphasized. If implemented in a fully regulated way, this objective would result in forests growing to 60 to 100 years before being regenerated (however, in reality some may be regenerated earlier and some may be maintained as old growth). The selected alternative allocates 54% of the Sumter National Forest to this option.

#### **7-90. Public Concern: The Forest Service should account for naturally occurring canopy**

**openings in the analysis of early successional habitat, and implement management based on natural processes.**

Some commenters expressed dissatisfaction with our approach of not counting early-successional forest patches of less than two acres towards early-successional forest objectives. This approach was adopted for two primary reasons. First, some species, such as prairie warblers and golden-winged warblers, are restricted to, or prefer, larger habitat patches. Meeting early-successional forest objectives through provision of many small patches would not meet their habitat requirements. Second, there is a limit to the size of patches that can be efficiently tracked in inventories and analyzed for habitat availability. Two acres was the smallest unit deemed practical to try to map and track in inventories, and is considerably smaller than current inventories typically track. It is also typically the largest size of opening created during group selection treatments; larger openings are generally considered even-aged or two-aged patches. We fully recognize that openings and canopy gaps that are less than two acres, whether created by management or of natural origin, provide a habitat condition with some early-successional characteristics that are important to some species (see further response related to “gap-phase dynamics” below). Our recognition of the need for these conditions is reflected in both canopy gap objectives (see Goal 8 in Chapter 2 of the Forest Plan) and old growth objectives (see Goal 12 in Chapter 2 of the Forest Plan). To provide for all species, however, it is necessary to provide the full spectrum of successional forest habitats: larger patches of early-successional forest, late-successional mature forest with canopy gaps, and mid- and late-successional forest with relatively closed canopies.

Some commenters feel that analysis of need for early-successional forest habitat was deficient because we didn’t make more effort to predict or account for the amount of early-successional forest created by natural disturbance. Natural disturbances that create early-successional forest patches of desired structure and size will be counted toward objectives for this habitat. Where natural disturbances create enough habitat by themselves, management efforts to create these conditions will not be needed.

In the review paper cited above, Lorimer states that predicting frequency of more severe natural disturbances (the kind that would create desired early-successional forest patches) is difficult because they are highly episodic and spatially heterogeneous. Lorimer goes on to state: “...the episodic nature of large natural disturbances creates a sort of ‘feast or famine’ environment that may subject early successional animal populations to erratic fluctuations...” Such feasts and famines may be especially extreme when looking at the smaller natural landscapes represented by national forests, surrounded by private lands that may be converted to nonforest. Successional forest objectives are designed to reduce the feast and famine swings for early-successional forest species, while providing ample habitat for mature forest species.

Some commenters suggested that early-successional forest on private lands be used to meet objectives for such habitat. Presence of quality early-successional habitat on surrounding private land should be part of project-level analysis, and in some instances may lead to decisions to provide lower levels of this habitat on national forest lands. However, at this strategic planning

level, private lands cannot be counted upon with certainty to provide comparable habitat conditions, nor can it be stated that they would be available to support the full spectrum resources or multiple uses associated with these conditions. Regulations require that habitat be provided to support viable populations on lands covered by the plan, which does not include private lands. The Revised Plan focuses some recognition on the importance of early-successional forest habitat in the desired future condition of management prescription 7E2, 8B1, 8B2, 9G2, and 10B. The Sumter National Forest is expected to continue to provide a successional forest mix dominated by late-successional forests (see Direct and Indirect Effects for Major Forest Communities in Chapter 3 of the EIS), especially when compared to the mix found on private lands (see Mix of Early and Late Successional Habitats in Chapter 3 of the EIS).

**7-91. Public Concern: The Forest Service should provide sufficient early successional habitat.**

See response to PC 7-89.

**7-92. Public Concern: The Forest Service should specify that 4 - 10 percent of acreage will be maintained as early successional forest.**

See response to PC 7-89.

**7-93. Public Concern: The Forest Service should not create 4 - 5 percent of early successional habitat within forests.**

See response to PC 7-89.

**7-94. Public Concern: The Forest Service should specify how the amounts of early successional habitat were determined and the reasoning used.**

See response to PC 7-89.

**7-95. Public Concern: The Forest Service should emphasize early successional habitats in association with the northern bobwhite quail.**

Northern bobwhite quail is a management indicator species for the Forest. Objectives for habitats preferred by bobwhite quail (woodland, grassland and savanna) and other species are imbedded in Forestwide objectives for Goal 8 in chapter 2 of the Plan.

**7-96. Public Concern: The Forest Service should increase early succession goals in less restrictive prescriptions.**

See response to PC 7-89.

**7-97. Public Concern: The Forest Service should increase early successional habitat in riparian corridors.**

Comments were split on the desirability of using active vegetation management within riparian areas for the benefit of wildlife. Some commenters want more specific direction for managing these highly productive areas for oak mast production and early- successional habitats. Others feel these areas should be used to emphasize old growth restoration and protection of aquatic species and water quality. The revised plan attempts to accomplish both. We have recognized the importance and value of riparian areas by creating a separate prescription for riparian corridors. Desired conditions within this prescription emphasize late-successional forests, and many standards are included to ensure maintenance of water quality. These qualities are of primary importance. However, this prescription does not rule out active management, when it can be conducted in ways compatible with maintaining or enhancing riparian resources. The riparian corridor prescription incorporates the need for early successional habitat conditions for riparian species, migratory species, reptiles and amphibians. Vegetation management projects that enhance mast production or create early successional habitat may be proposed for riparian areas during plan implementation. Monitoring will track the acreage and condition of riparian corridors, including levels of vegetation management activities implemented. The amount and distribution of these habitat conditions however will be a project level decision.

**7-98. Public Concern: The Forest Service should not create early successional habitat for the benefit of grouse.**

Grouse are only one species that benefits from periodic forest disturbances that produce early successional habitats. Current habitat conditions preferred by ruffed grouse and other species are limited in distribution and virtually nonexistent on the Andrew Pickens Ranger District. The Sumter Plan allows for these conditions to be created and maintained over time.

**7-99. Public Concern: The Forest Service should complete an analysis of relative resource values in allocating lands suitable for timber production.**

Comments from these parties relate to allegations of “ecosystem services” of standing timber and externalities of resource extraction programs that were not assessed for allocating lands suitable for timber production in the DEIS. The contention is that the DEIS failed to include these benefits and costs in the economic efficiency analysis for the understanding of the maximization on net public benefits. Because these items were omitted the Forest Service had not complied with the guidelines of 36 CFR 219.

Response: 36 CFR 219.12(g)(1) instructs forest plan development by requiring an analysis of expected outputs during the planning period. It suggests use of outputs which include marketable goods and services as well as non-market items, such as recreation and wilderness use, wildlife and fish, protection and enhancement of soil, water, and air, and preservation of aesthetic and cultural resource values. These are the resources the forest DEIS has undertaken to show a present net value as required by 36 CFR 219.

The Sumter National Forest has presented a present net value of resources which are suggested in 36 CFR 219.12(g)(1). The forest has discussed only foreseen consequences of our land management alternatives on the environment in a narrative fashion. For those resources that can be reasonably valued via market data (e.g. timber, minerals, range) and for those non-market resources that have Forest Service estimated values from Forest Service Research, we have presented values in the present net value calculation. For resources that have no values estimated by generally accepted methods, we have chosen to discuss them in a narrative fashion as part of the assessment of net public benefits.

Many of the “ecosystem services” provided by forested land, such as flood control, purification of water, recycling of nutrients and wastes, production of soils, carbon sequestering, pollination, and natural control of pests; and externalized costs of resource extraction, such as increased rates of death, injury and property damage resulting from accidents involving heavy equipment, log trucks, ORVs and other dangers related to intensive resource use and development, are considered to be effects remote from resource management on the Sumter National Forest. Their speculative and unforeseen nature does not warrant a consideration in the efficiency analysis required by 36 CFR 219.

Contrary to what the commenter claims, logging does not necessarily cause most ecosystem services to be significantly diminished or entirely eliminated. Logging is only conducted on a portion of all national forest lands, and the interval between repeat entries onto the same area is often measured in decades. When logging is undertaken, it is conducted in accordance with forest plan standards and guidelines designed to protect other resource values. Logged areas are regenerated to a new forest, so any disruption of services is only temporary. Finally, it is important to recognize that some ecosystem services – e.g., wildlife habitat – may actually benefit from logging. This last point is indicative of a larger problem. The commenter focuses exclusively on the potential negative effects of logging; they ignore the fact that national forest logging can have external benefits as well as costs.

Lastly, the Forest Service does not use its socio-economic analysis quantified measures and indexes as the sole means of displaying alternative inputs (FSM 1970.8(5)). Such a value is one piece of information for the decision maker to use in making selections among alternatives. Other resources that are impacted are discussed qualitatively. Their consequences in forest management are decided along with the monetized resource in arriving at an alternative that maximizes net public benefits. After reviewing the planning documentation and comments from the public participation, the determination of the best alternative which maximizes public net benefits is left to the judgment of the decision maker.

U.S. Forest Service activities on the forest are governed by a large number of rules and regulations designed to mitigate negative impacts or otherwise protect forest resources. In the planning process these benefits associated with regulations are seldom quantified in dollar terms. The costs for achieving these benefits are in the form of increased operating costs and reduced timber revenues.

Therefore, it is the U.S. Forest Service's policy to fully enumerate the dollar values of all market and non-market benefits and costs in the planning process that can *reasonably* be expected to occur in an attempt to provide as much relevant information as possible to aid in making good planning decisions.

**7-100. Public Concern: The Forest Service should not base management decisions on a successional forest model.**

See the response to PC 3-144 and PC 7-149.

**7-101. Public Concern: The Forest Service should use data that are sufficient to answer the questions posed.**

Stand ages were current as of 2002. As stated in Appendix B of the DEIS, "On examination, plots from private and National Forest lands usually had very similar diameter and volume characteristics for the same forest type, age and site index range." Whenever sufficient plots were available from national forest ownership, they were used. Plots on National Forest lands were used for 20 of the 70 combinations of community type, site index range, and successional class. The concern regarding the FEAST model is not specified. There was no combination of CISC and FIA plots. Only FIA plot data was used. There was no withdrawal of support from personnel in Fort Collins. They have been and continue to be a valuable resource.

**7-102. Public Concern: The Forest Service analyses in Appendix F should better reflect natural processes, operability standards, and budget constraints.**

The suitable acres, sale program, silvicultural selections shown in Plan Appendix F are estimates of the actions/activities needed to meet the desired conditions established in the Forest Plan.

**7-103. Public Concern: The Forest Service should conduct timber harvest for environmental reasons.**

See response to PC 7-104.

**7-104. Public Concern: The Forest Service should create repeated disturbances at the same sites.**

Methods of restoring habitats or managing vegetative composition are project level decisions. It may be possible that with a combination of periodic treatments over time on the same site could perpetuate desired habitat conditions.

**7-105. Public Concern: The Forest Service should allow timber production only when it restores native forest conditions and processes.**



Designation of lands as suitable for timber production means that planned periodic harvest of wood products is appropriate and sustainable.

**7-106. Public Concern: The Forest Service should not harvest timber.**

See response to PC 7-35.

**7-107. Public Concern: The Forest Service should not conduct timber harvest in mixed mesophytic habitats.**

Basic mesic hardwood forests will be conserved through the rare community prescription and bottomland hardwood sites will be conserved through the riparian prescription. Effects of harvesting to mixed mesophytic habitats will be analyzed, if proposed, in a project-level environmental assessment.

**7-108. Public Concern: The Forest Service should not conduct commercial timber harvest because of environmental impacts.**

Refer to chapter 2 of the LRMP, the sections on: 1) Riparian Area Management, Water Quality, Aquatic Habitats, Soil, and Air (including standards for channeled ephemeral stream zones) 2) Wildlife Habitat and Forest Vegetation 3) Proposed, Endangered, Threatened, Sensitive (PETS), and Locally Rare Species 4) Special Areas, Rare Communities, and Old Growth and 5) Wood Products and Special Forest Products. Wood products are a valued forest resource. They contribute to the social and economic well being of the people living in the area. They are one of many uses of the National Forest. In most of the Sumter, logging is compatible with other resource management objectives. Commercial harvest is also valuable for moderating stand densities, for creating early successional forest habitat, and for some restoration activities. Regarding water quality, use of Best Management Practices alone has been shown to provide excellent water quality. The LRMP has additional standards to protect water quality, and includes riparian corridors that are generally wider than the primary streamside zones under SC Best Management Practices. They will also typically have more trees remaining than required by BMPs.

**7-109. Public Concern: The Forest Service should focus forest management on recreation and environmental protection resource activities.**

Alternative E in the FEIS places an emphasis on hiking, fishing and other recreational activities.

**7-110. Public Concern: The Forest Service should not harvest timber.**

See response to PC 7-35

**7-111. Public Concern: The Forest Service should harvest timber.**

Alternatives A, D, and F are such alternatives, and are evaluated in the EIS. Alternative selection is displayed in the Record of Decision.

**7-112. Public Concern: The Forest Service should manage forests to provide low-impact recreation, wildlife habitat, and scenic beauty.**

Comment noted.

**7-113. Public Concern: The Forest Service should restrict the use of timber harvest and prescribed burns for creating wildlife openings in the Chattooga Wild and Scenic River corridor.**

The maintenance of existing wildlife openings is not a violation of the Wild and Scenic Rivers Act nor is the use of prescribed fire in the corridor. The exclusion of natural fire patterns within the corridor has led to native communities being overrun by Rhododendron and laurel. The Wild and Scenic Rivers Act was not intended to stop all activities within the corridors, activities range from fewest in the wild sections to more in the recreational sections as long as those activities protect and enhance the outstandingly remarkable values of the river.

**7-114. Public Concern: The Forest Service should harvest timber for economic benefits.**

Revenues from harvesting timber on Forest Service lands do provide for each county with forest service ownership dollars for schools and roads under the Secure Rural Schools and Community Self-Determination Act. Under this act all of the Forest Area counties elected to receive their share of the average of the three highest 25 percent payments during the period of 1986 through 1999.

**7-115. Public Concern: The Forest Service should implement an alternative that yields larger timber harvest quantities.**

Alternative F is one of the alternatives evaluated in the EIS. Alternative selection is displayed in the Record of Decision.

**7-116. Public Concern: The Forest Service should not harvest timber for economic reasons.**

See response to PC 8-9 and PC 7-35.

**7-117. Public Concern: The Forest Service should not allow commercial timber harvest for economic benefits.**

See response to PC 8-9 and PC 7-35.

**7-118. Public Concern: The Forest Service should not sacrifice the long-term benefits of tourism for short-term benefits of clearcutting.**

The Multiple Use Sustained Yield Act gives the Forest Service the mandate to provide a variety of goods and services for the American people, including wood products as well as visuals and recreation. The Sumter National Forest does provide a large variety of recreational opportunities and will continue to with the Revised Sumter Forest Plan. However we know that tourism also has impacts on the forest and with increased numbers of people that come with increased impacts.

**7-119. Public Concern: The Forest Service should evaluate the impacts of national forest timber on local markets and pricing.**

Local timber market conditions are analyzed in the Forest's Timber Supply and Demand Analysis which is done during the Analysis of the Management Situation (AMS). This document is part of the Process Record and gives the Forest a background for their role in the local market and possible effects on pricing. Such characteristics as growing stock, the Forest's relative share of the total market area of all ownerships, growth-drain ratios to understand if growth exceeds harvest, and Forest Service dependent mills are some of the things this analysis discusses. The Forest has been requested to furnish a summary of their timber analysis in Appendix B for the FEIS.

**7-120. Public Concern: The Forest Service should utilize the best available science in determining to what extent monetary values can be assigned to non-market goods and services.**

The Sumter National Forest used both market and non-market prices in its economic efficiency analysis. This Forest used values for resource programs suggested in 36 CFR 219.12(g)(1). These values are presented in tables of Appendix B (p. B-59, Sumter NF; p. B-89, Chattahoochee-Oconee NF; p. 83, Cherokee NF; p. B-34, Jefferson NF; p. B-18, NF in Alabama). These tables have been revised for the FEIS to better reflect the sources of the valuations. These priced market and non-market values along with program costs are used in a present net value analysis. But this economic analysis of quantified measures is not used as the sole means of displaying alternative outputs (FSM 1970.8(5)). Such a present value analysis is one piece of information for the decision maker to use in making selections among alternatives. Other resources that are non-priced may be discussed qualitatively. Both the priced and non-priced resources in forest management are considered in arriving at an alternative that maximizes net public benefits. After reviewing the planning documentation and comments from the public participation, the determination of the best alternative which maximizes net public benefits is left to the judgment of the decision maker.

**7-121. Public Concern: The Forest Service should disclose the instructions and rationale for the data collection direction given to address timber production and management costs.**

“Purchaser road credits” and the “interest and penalties paid by the purchaser through the life of a sale” were not included in the estimates of the timber revenues used in the SPECTRUM model or the present net value calculations.

The environmental effects of timber harvesting are described in Chapter 3 of the EIS.

The Forest Service no longer uses purchaser road credits and therefore they were not a part of the analysis. The total costs of constructing and re-constructing timber roads were included as a cost in the SPECTRUM analysis.

In order to derive an “average value” per MCF for the different appraisal groups, stumpage prices were converted to 2000 dollars by the Gross Domestic Price Deflator Index. The SPECTRUM model used these 2000 prices to provide a constant 2000 dollar value estimate in the future. We did not trend future prices in Spectrum.

When we started the process to determine average timber values, the years 1985 to 1996 were simply the years where we had some historical data available to analyze. Again, we did not trend future prices in Spectrum.

TSPIRS data was used for timber production and management costs.

**7-122. Public Concern: The Forest Service should manage forest lands based on multiple use for economic benefits.**

Wood products are one of many uses of national forest lands. Refer to the discussion of wood products in chapter 2 of the LRMP. Given the location of this respondent, refer also to management prescriptions 7E2 and 8A1.

**7-123. Public Concern: The Forest Service should require the timber industry to pay fair market value for all timber and roads.**

Fair market value is received because virtually all sales are sold to the highest bidder. Road construction and reconstruction associated with timber sales are part of those sale packages.

**7-124. Public Concern: The Forest Service should ensure that forests are financially sustainable.**

At the Programmatic level, estimated costs and benefits for the timber program are analyzed in a present net value fashion. Results of the preferred alternative can be viewed in Chapter 3 of the EIS under “Present Net Value of Alternatives” ( 3-357- 359). Individual timber sales are analyzed before a project is undertaken. Discounted costs and benefits are considered to see if the project will be economically efficient. Sale analyses include costs for roads. If a proposed sale alternative does show a negative return, the decision maker will justify the reason for

commencing with the project. Because there are often positive effects on other resource values such as habitat and access for recreation opportunities, there is no mandate for projects to be profitable.

Timber sale projects are put out for competitive bid of what the market will bear for a given quality of timber. Bidders must bid above a “floor” appraised price before a contract will be awarded.

**7-125. Public Concern: The Forest Service should not use tax dollars to subsidize timber harvesting.**

The premise of the commenter’s statement is flawed. There is an assumption of the future timber programs on this forest will incorporate a subsidy across all alternatives. For the Sumter National Forest, the present net value analysis found in Chapter 3 of the DEIS estimates that across all alternatives the Timber program is expected to meet its hurdle rate of 4 percent real return to the federal treasury. Discounted revenues are expected to cover discounted costs over the planning period. Individual timber sales are analyzed before a project is undertaken. Discounted costs and benefits are considered to see if the project will be economically efficient. Sale analyses include costs for roads. If a proposed sale alternative does show a negative return, the decision maker will justify the reason for commencing with the project. Because there are often positive effects on other resource values such as habitat and access for recreation opportunities, there is no mandate for projects to be profitable. Timber sale projects are put out for competitive bid of what the market will bear for a given quality of timber. Bidders must bid above a “floor” appraised price before a contract will be awarded. Therefore, construction of roads and timber sales on national forests do not necessarily amount to a “subsidy”.

**7-126. Public Concern: The Forest Service should conduct NEPA analysis on a range of alternative to providing subsidies to industry.**

The premise of the commenter’s statement is flawed. There is an assumption of the future timber program on this forest incorporates a subsidy across all alternatives. For the Sumter NF, the Present Net Value analysis found on in Chapter 3 of the DEIS estimates that across all alternatives the Timber program is expected to meet its hurdle rate of 4 percent real return to the federal treasury. Clearly, discounted revenues are expected to cover discounted costs over the planning period. When individual projects are planned, a discounted cash flow analysis of that proposed sale is also conducted in an Environmental Analysis to show the efficiency of that sale.

**7-127. Public Concern: The Forest Service should establish a more realistic allowable sale quantity.**

Allowable sale quantity will not drive timber harvest activity on the Sumter. The flow of wood products from the Sumter NF will come as a result of managing for the desired conditions given in management prescriptions. Harvest levels are also limited by budgets, personnel, and the

environmental analysis process. Allowable sale quantity is just that...allowable. It is a level that may not be exceeded. The Sumter ASQ reflects many factors. Principal among these is that much of the Sumter is productive piedmont land in very productive forest types. Regarding historic sell levels, the comment is incorrect. The Sumter NF has sold > 62.5 MMBF 18 separate years.

Because of this public concern and other concerns regarding allowable sale quantity, assumptions that affect ASQ have been reexamined. In response, a number of changes have been made.

1. Prescriptions 2A3 and 7A have been changed from suitable for timber production to unsuitable.
2. The Spectrum model now assumes zero yields for piedmont lands showing as severely eroded in the GIS database.
3. The Spectrum model now assumes zero yields for piedmont lands that had land class 821, steep slopes.
4. The Spectrum model now also assumes zero yields for lands on the Andrew Pickens Ranger District with slopes over 40% as identified by the OVER40 identifier in GIS file SLOPE40.PAT.

**7-128. Public Concern: The Forest Service should revise the allowable sale quantity to fully implement ecosystem management.**

Ecosystems management is defined differently by different people. We consider plan standards, along with existing policies and guidelines as satisfactory for protecting environmental values. Reference response to concern 7-127 regarding ASQ. Suitability of lands for timber production is in the context of 36 CFR 219. Biological effects, soil/water effects, habitat effects, effects on non-native species and cumulative effects are addressed in the EIS.

**7-129. Public Concern: The Forest Service should apply Section 219.14(c) to specific areas and not include those areas in the allowable sale quantity calculation.**

We believe that we have done this as well as can reasonably be expected for Forest level, strategic planning. Site specific analysis generally goes beyond the scope of Forest level planning. Not all of the considerations listed make lands unsuitable for timber production.

**7-130. Public Concern: The Forest Service should ensure that the cumulative effects of accelerated timber harvests do not prevent achievement of the preferred alternative's goals.**

Reference responses to concerns 7-127 and 7-48. The flow of wood products from the Sumter NF will come as a result of managing for the desired conditions given in management prescriptions. The characterization of accelerated timber harvests is inaccurate. Long term sustained yield capacity under the revised plan is 139 MCF compared to 211 MCF under the

1985 plan.

**7-131. Public Concern: The Forest Service should increase the annual timber harvest volume.**

The planning process for the Southern Appalachians included analysis of a range of alternative management themes. Within these alternatives was a range of levels of timber harvest volumes. The selected alternative does not have the highest level of timber harvest, but addresses the spectrum of significant issues best in its combination of resource activities and emphases.

**7-132. Public Concern: The Forest Service should lower the allowable sale quantity of timber.**

Same as response to PC 7-127.

**7-133. Public Concern: The Forest Service should recognize that the arbitrary allowable sale quantity listings reveal the agency's bias for timber harvest.**

Refer to responses to concerns 7-127, 7-48, and 7-130.

**7-134. Public Concern: The Forest Service should reduce the amount of forest designated as "suitable" for timber production.**

Same as response to PC 7-127.

**7-135. Public Concern: The Forest Service should explain how skid trail disturbance will be minimized.**

Following are a couple examples: Crossings are usually designated so that there are no more than necessary. Crossings are also often at right angles to the zone to minimize the area within the zone that is disturbed.

**7-136. Public Concern: The Forest Service should clarify what is meant by "partial suspension" cable logging.**

Cable logging is generally used on slopes considered too steep for ground based skidding. This logging method creates less soil disturbance than ground based skidding. Need for harvest is determined by management prescription direction and site specific conditions. Partial suspension means that one end of a log is off the ground when it is being pulled back to a yarder.

**7-137. Public Concern: The Forest Service should limit timber harvest to small diameter trees.**

The type of harvest, and diameter of trees harvested will be dependent on the goal or objective for any given acre of National Forest land.

**7-138. Public Concern: The Forest Service should develop alternative timber harvest methods.**

Comment noted.

**7-139. Public Concern: The Forest Service should restore hardwoods and discontinue the use of chemical and mechanical site preparation methods.**

The emphasis of management prescription 9G2 is to restore and maintain upland oak-hickory and mixed oak-hickory-pine forest. In management prescription 10B, where opportunities exist, the oak and hickory component is expanded. Herbicides can be a valuable to favor desired hardwoods. Forest ecosystems are generally resilient. Plan standards, along with existing policies, guidelines and other direction should protect species and communities of concern well.

**7-140. Public Concern: The Forest Service should explain how harvest levels will be increased without increasing clearcutting or the use of other even-aged management methods.**

This plan does not have "higher timber quotas". Long term sustained yield capacity under the revised plan is 139 MCF compared to 211 MCF under the 1985 plan. Clearcutting is a harvest tool that has been used very seldom in recent years. This should continue to be the case. Under this plan, as described in Appendix H, it will most likely be applied where a forest type conversion is desired, and the seed source for an existing species, such as loblolly pine or Virginia needs to be removed. Even-aged systems will probably be widely applied. As discussed in Appendix H, uneven-aged management presents number of challenges to consider.

**7-141. Public Concern: The Forest Service should educate the public on the negative effects of clearcutting.**

Comment noted.

**7-142. Public Concern: The Forest Service should not clearcut National Forest System lands.**

See response to PC 7-35.

**7-143. Public Concern: The Forest Service should not suggest that even-aged management of oak forests is consistent with natural conditions.**

See response to PC 7-100.



**7-144. Public Concern: The Forest Service should recognize that current even-aged management perpetuates an even-aged successional forest rather than restoring the natural composition and dynamics of the Southern Appalachian forest ecosystem.**

Regarding successional forests, refer to response to concern 7-100.

**7-145. Public Concern: The Forest Service should reference appropriate guidelines regarding handheld shocking devices.**

The Sumter National Forest does not have any domestic livestock.

**7-146. Public Concern: The Forest Service should accurately describe basic fire ecology in specific forest wide standards.**

What the concern states in general terms regarding fire intensity and severity is true. Forest wide standard statements by their nature are broad guides. Fire ecology and the effects of fire are addressed in the site specific decision, prescription and fire plan. By doing this, site specific methods, objectives and baseline are established for monitoring.

**7-147. Public Concern: The Forest Service should clarify goal, objectives, standards, and guidelines related to fire management.**

Standard FW-63 -- The direction for prescribed fire in FSM 5140 covers, in detail, requirements and guidelines for planning and conducting prescribed burns. Among items covered include responsibilities, qualifications, contingencies, fuel and weather parameters, smoke management, notifications and monitoring requirements, etc. For specifics see: [www.fs.fed.us/im/directives/field/r8/fsm/5100/5140.rtf](http://www.fs.fed.us/im/directives/field/r8/fsm/5100/5140.rtf). Standard FW-64 -- Litter and duff consumption are controlled by fuel moisture content, timing of burn and firing method and technique. Standard FW-65 -- Same as for FW-64. Goal 19 -- Logging has not been a specific fuels treatment method on the Sumter National Forest. Salvage of Southern Pine Beetle infestations has occurred, with the primary objective of stopping the advance of the insect by logging the trees. A secondary benefit of doing this is removal of dead heavy fuels which are a fire hazard. Not all infested spots can be salvaged; many dead trees remain contributing to the fire hazard. The mechanical fuels treatment proposed are chipping and mulching understory and mid-story woody fuels. The residual material typically remains on site.

**7-148. Public Concern: The Forest Service should create fire plans that are appropriate for Southern Appalachian forests.**

Fire is a natural part of most lands in the United States, including the Sumter National Forest. Differences in fire regimes and condition classes vary across the country. The Francis Marion and Sumter National Forests are currently in the draft stages of a Fire Management Plan, which addresses these differences and covers fire management activities from the Coastal Plain to the Appalachian forests. The Fire Management Plan implements appropriate Land and Resource

Management Plans and is the guiding implementation document for the Francis Marion and Sumter Forests' fire management program.

**7-149. Public Concern: The Forest Service should reintroduce fire as a management tool.**

Fire played an important role in shaping the species rich landscape of the southeastern U.S. Fires of both natural and cultural origin were common on the landscape when the present arborescent flora migrated into the region after the last ice age, 8,000 to 10,000 years ago (Delcourt and Delcourt, 1996). Fire has been a part of the southern Appalachian landscape for longer than its current vegetation has been (Delcourt and Delcourt, 1996)\*.

Land and Resource Management Plans provide direction for desired future conditions of ecosystems. In many cases, fire is a necessary tool to meet those desired conditions. Objectives in Forest Service Manual 5140 are to use fire from either management ignitions or natural ignitions in a safe, carefully planned, and cost effective manner to benefit, protect, maintain, and enhance National Forest System resources; to reduce future fire suppression costs; and, to the extent possible, to restore natural ecological processes and achieve management objectives adopted in approved forest land and resource management plans.

Several comments appear to be associated with the Healthy Forests Initiative. Forests used local research that discussed how in the southern Appalachian Mountains, the upland pine and oak communities evolved under a short return interval, low intensity fire regime. Key points to the Healthy Forests Initiative are:

- Improving procedures for developing and implementing fuels treatment and forest restoration projects in priority forests and rangelands, in collaboration with local governments.
- Reducing the number of overlapping environmental reviews by combining project analysis and establishing a process for concurrent project clearance by federal agencies.
- Developing guidance for weighing the short-term risks against the long-term benefits of fuels treatment and restoration projects.
- Developing guidance to ensure consistent NEPA procedures for fuels treatment activities and restoration activities, including development of a model Environmental Assessment for these types of projects.

Several commenters questioned the appropriateness of the even-aged successional model inherent in the Successional Forest Options incorporated in the Revised Plan. They frequently cited materials raised by Quentin Bass, Cherokee National Forest Archaeologist, in a whistleblower complaint that contend that Southern Appalachian forests are naturally uneven-aged, and regenerate predominately through “gap-phase dynamics” rather than by larger, more severe disturbances. Some commenters fault the Forest Service for not considering this information.

Contrary to assertions made by some commenters, information compiled by Bass was considered during planning. It was distributed to staffs of all Southern Appalachian forests undergoing revision, and was reviewed by planners at the forest and regional levels. Points of agreement and

disagreement were discussed at varying levels across these forests. There are many points of agreement, which are corroborated by a predominance of mainstream scientific literature. We agree that *some* major forest types in the Southern Appalachians are low disturbance systems that commonly regenerate through natural development of relatively small canopy gaps, and that frequent fire in these systems is not desirable. These areas of agreement are incorporated in the Revised Plan and EIS through direction and analysis for mesic deciduous forests, which include cove, riparian, mixed mesophytic and northern hardwood forests. This direction and analysis considers the amount of these forests allocated to Forest Successional Options 1 and 2 (which should be dominated by gap-phase processes), the need for canopy gaps within these forests, and the limited role of fire (cite Mesic Deciduous Forest Section of EIS, and appropriate objectives and standards from the plan). There are, however, some of Bass' conclusions with which we disagree, as do some members of the academic and research communities with whom we have consulted.

Bass' presentation of forest conditions in the late 1800s and early 1900s depends heavily upon the Ashe and Ayers Report and descriptions contained in the field notes and maps of the tracts of land that were acquired for inclusion in the National Forests. Bass also has provided substantive literature (bibliography) to support his views. However, he rejects or ignores the substantial body of scientific literature (much of it published in the last 10 years) that contradicts his conclusions regarding the role of fire and other disturbance in maintaining upland oak and pine forest types.

Unlike the scientific literature used and cited during planning, Bass' analysis has not been through the rigorous process of peer review, critique, and publication in mainstream scientific journals. Prior to filing of the whistleblower complaint, the Forest Service contracted review of Bass' analysis by Paul and Hazel Delcourt of the University of Tennessee, who have published widely on historical disturbance ecology. Their written review indicates areas of agreement and disagreement similar to those identified by forest planning teams. It also is important to note that Bass is an archaeologist and not an ecologist or forester, professions that are educated and trained to make ecological interpretations of forest condition data. In his paper, use of terms, lack of reference to the most current scientific literature, and resulting conclusions often do not reflect the best available science. Based on these considerations, we believe Bass' analysis was given an appropriate level of consideration during planning.

Although understanding historical and pre-European settlement conditions provides an important context for conservation planning, restoring such conditions is not an overriding objective or legal requirement. In most cases, too much has changed for this restoration to be feasible, let alone desirable. Plan direction represents a decision on multiple-use management informed by the best science on disturbance ecology, not an attempt to recreate historical conditions.

Although understanding historical and pre-European settlement conditions provides an important context for conservation planning, restoring such conditions is not an overriding objective or legal requirement for plan revision. In most cases, ecological conditions have changed too much for this to be feasible, let alone desirable. Plan direction represents a decision on multiple-use

management informed by the best science on disturbance ecology, not an attempt to recreate historical conditions.

Based on synthesis of the scientific literature, our understanding is that Southern Appalachian forests historically have been subject to highly variable disturbance regimes across the landscape. This variation resulted from the interaction of fire, wind, and other disturbance factors with the highly variable topography and edaphic conditions of the mountains. We disagree with Bass, and follow most current scientific literature, in recognizing that fire, primarily of Native American origin, played an important role in maintenance of upland pine and oak forests, and open woodlands, savannas, and grasslands. Compared to today, forest structure was likely more open on upland sites, due to the influence of fire, and more heterogeneous on lower slopes and coves, due to gap-phase dynamics of older forests. Overall, within-stand structures were likely variable due to the variable effects of natural disturbance factors. Many areas would not easily be categorized as either even-aged or uneven-aged, but some level and pattern of older residual overstory trees would almost always be present, even in areas providing important early-successional habitat. This variable structure can be approximated with uneven-aged, two-aged, and even traditional even-aged management systems, all of which involve retention of varying levels of overstory structure. A patchwork of uniform even-aged stands established by clean clearcuts is clearly outside the historical range of variation of forest structure and is also clearly not the desired condition for any portion of the national forest.

Although the Revised Plan includes objectives for restoration of native fire-maintained habitats, we recognize that we will not be able to restore the influence of fire to the landscape to historical levels due to a variety of logistical and social reasons. Creation of early-successional forests can compensate for the loss of open fire-maintained habitats for some species. So, although we recognize that the mix of types of early-successional habitats maintained under the Revised Plan cannot reflect historical conditions, we have considered the overall abundance of these habitats within an historical ecological context to arrive at objective levels. As some of these fire-maintained habitats are restored, need for early-successional forest as habitat for some species will decline. However, need will not disappear; other species, such as ruffed grouse, depend upon the dense woody growth found in early-successional forests. In addition, other multiple-use considerations, such as need for habitat to support game species for recreation, ecological restoration of native forests, forest health considerations, and in some cases timber production, will continue to make creation of some level of early-successional forest desirable.

\*Delcourt, P.A. and H.R.Delcourt. 1996. Holocene vegetation history of the northern Chattooga Basin, North Carolina. *Conserv. Biol.* 11:1010-1014

**7-150. Public Concern: The Forest Service should not use prescribed fire in Southern Appalachian forests.**

See response to PC 7-149.

**7-151. Public Concern: The Forest Service should reduce the use of prescribed fire.**

See response to PC 7-149.

**7-152. Public Concern: The Forest Service should conduct spring and summer burns.**

We agree.

**7-153. Public Concern: The Forest Service should conduct thinning.**

Objective 16.01 in the draft plan addresses this concern. More important, maintaining moderate (or even low in 8B2) stand densities in pine forests is addressed in the desired condition of all of the management prescriptions that are suitable for timber production.

**7-154. Public Concern: The Forest Service should provide a wildfire policy that protects homes and keeps people safe.**

Our job in the Land Management Planning process is not to create Forest Service policy, but to implement existing policy. However, the Forest Service has developed policy that addresses this issue; it is called the Federal Wildland Fire Management Policy 2001. Priority is given to one guiding principal which states "firefighter and public safety is the first priority in every fire management activity". Number 7, in the 2001 Wildland Fire Management Policy states, "The operational role of federal agencies as partners in the Wildland Urban Interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance. Firewise is a program designed to increase public awareness of the risks of building and living in the Wildland Urban Interface, and to educate the public in protecting themselves and their homes from the catastrophic effects of wildland fire. Federal agencies have no legal authority on private land. Therefore, coordination through state and local governments and with individual homeowners is key to protecting the public from catastrophic wildland fires. For more information on FIREWISE see: [www.firewise.org](http://www.firewise.org).

**7-155. Public Concern: The Forest Service should discuss the quantitative differences in risk levels for fire across alternatives.**

We have addressed the qualitative differences in chapter 3 of the Draft Environmental Impact Statement for the Revised Land and Resource Management Plan, Sumter National Forest. But the difficulty exists in making a quantitative determination of risk level for each alternative, due to the fact that different changes among the alternatives have differentiating risk of cause and effect on wildland fires. In other words, a single change in conditions can potentially have both a positive and negative result. For example, while creating roads can increase the risk of human caused fires, it can also decrease the response time to a wildland fire for firefighting resources, and even serve as a control line. Another example would be the opposite affect from decommissioning roads, where the risk of human caused fires are reduced, but response time to a wildland fire is increased, in return most likely increasing the size of a wildland fire. Incidents such as draughts, ice storms, tornados, and insect and disease attacks are continually change

conditions within all alternatives making comparisons without this knowledge an unuseful exercise. The Francis Marion and Sumter National Forests Fire Management Plan will annually address changes in fire management situation. This short-term attention allows for unexpected changes to be accommodated to a Fire environment that is dynamic not static.

**7-156. Public Concern: The Forest Service should adequately address the treatment of wildfire in wilderness.**

The Forest Service does address Fire Management in Wilderness Policy (FSM 2324.2). The LRMP and the Fire Management Plan further address the treatment of wildland fire in the wilderness for specific areas on the forest (Proposed Revised Land and Resource Management Plan, Sumter National Forest, chapter 3-1). Standards 1.A.-10 and -11 further dictate wildland fire suppression activities in the wilderness.

**7-157. Public Concern: The Forest Service should use prescribed fire in wilderness areas.**

Forest Service policy exists for the management of Wilderness (FSM Ch 2320). Specific objectives and policy are related to the Management of Fire (FSM 2324.2). Direction is contained within the policy when and when not to use management ignited fire (FSM 2324.22). In the Proposed Revised Land and Resource Management Plan, Sumter National Forest, chapter 3-1, it states "prescribed fire may be used to mimic natural disturbances, to maintain and restore rare communities, threatened or endangered species habitat, or to reduce unnatural buildup of fuels that threaten wilderness values or areas outside wilderness". [For complete Forest Service Manual (FSM) Wilderness Management policy, go to: [www.wilderness.net](http://www.wilderness.net), legislation/policy, Forest Service Policy for Wilderness Management.]

**7-158. Public Concern: The Forest Service should not use prescribed fire in wilderness areas.**

See response to PC 7-157.

**7-159. Public Concern: The Forest Service should limit timber harvest to areas where fire may threaten homes and communities.**

Fire can be a risk to homes and communities with or without timber harvest. Controlling the fuels hazard, with or without timber harvest, reduces the risk to homes and communities. Keeping the forest healthy through silviculture and fuels treatment practices are the best methods for controlling the hazard.

**7-160. Public Concern: The Forest Service should not use timber harvest and road building for fire prevention.**

The Forest Service does not use road building or timber harvests for fire prevention. Neither of

these activities reduces the chance of a fire starting. Quite the opposite occurs, by increasing human activity in an area, the risk of human caused fire is increased. Both activities can help in suppression and/or hazardous fuels reduction efforts. Road building can decrease firefighter response times and be used as a fire break. But building roads does not prevent fires. The Forest Service has and will continue to thin tree stands for reducing the effects of a fire once present or as a pretreatment to allow the reintroduction of prescribed fire in fire dependant ecosystems. Again, timber harvests do not prevent fires, but can and do reduce the catastrophic effects of fire, by reducing hazardous fuels present during a wildland fire, if activity fuels are treated according to prescription.

**7-161. Public Concern: The Forest Service should conduct cooperative management of urban-wildland interface areas with landowners.**

Current policy exists in the Forest Service Manual 3130.37 - "Wildland/Urban Interface. Identify opportunities to improve or maintain efficient and effective rural cooperative fire prevention and control programs with particular emphasis on resolving wildland/urban interface issues where they exist. Encourage property owners to redeem their responsibility to provide for their own safety in the wildland/urban interface." The Federal Wildland Fire Management Plan further addresses this issue. It defines the role of federal agencies in the wildland/urban interface as: "wildland firefighting, hazard fuels reduction, cooperative prevention and education, and technical assistance. Primary responsibility rests at the state and local levels. These relationships focus on activities before a fire occurs, which render structures and communities safer and better able to survive a fire occurrence." In addition, please see response to PC 7-154.

**7-162. Public Concern: The Forest Service should actively manage forests for forest health.**

The forest health effects of the alternatives are displayed in chapter 3 of the EIS. These effects are considered along with other effects of each alternative. Alternative selection is displayed in the Record of Decision.

**7-163. Public Concern: The Forest Service should not conduct timber harvest or prescribed burns in Southern Appalachian forests.**

See response to PC 7-149.

**7-164. Public Concern: The Forest Service should limit invasive treatments to solve forest health problems.**

Fire regimes (fire return intervals) are discussed in the EIS in the section on prescribed and wildland fire. Similar background information regarding fire and forest health may be found beginning on page 139 of the Southern Appalachian Assessment, Terrestrial Technical Report. Slope, aspect, elevation, and soil factors are often reflected in the community types. The challenges referred to in the background are that tree vigor typically declines with advanced age, making trees more vulnerable to insects and disease. For oak decline, a native disease complex,

this basis is cited in the forest health section of the EIS (Oak, et al 1991, and Oak and Croll 1995). For gypsy moth, a non-native insect, the same basis, association with tree vigor, is given in Forest Insect and Disease Leaflet 162, USDA 1989, McManus et al. The relationship of thinned or regenerated stands to susceptibility is that of tree vigor associated with more open crowns (thinning) and with age (regeneration).

**7-165. Public Concern: The Forest Service should provide adequate guidelines for implementing forest health activities.**

Standard FW-88 in the draft plan addresses temporary roads. Because standards allow for no exceptions, and site specific conditions vary widely, most direction for temporary roads is in the form of guidelines. Two main sources of these are:

- 1) FSH 2409.15, Timber Sale Administration Handbook, sections 51.46, 51.7, 61.4, 61.41, 61.42, and 61.42b
- 2) The R8 Soil and Water Conservation Practices Guide, sections 2.20, 2.21, 2.24, 2.25, 2.26, 2.27, 2.28, 2.29, and 2.30

Forest health is not easily defined. Forest health concerns are displayed and discussed in chapter 2 of the Sumter Plan in the desired conditions of the management prescriptions (most specifically regarding desired stand densities), and in the EIS. Improvement of forest health is determined in this context and in the context of site specific conditions.

Standards FW- 17, FW-21, and FW-22 in the draft plan address retention of den trees and snags.

Desired conditions in management prescription 7E2, 8A1, 9A3, and 10B all address soft mast species. This is not addressed in prescription 8B2 since frequent prescribed fire will make these species difficult to retain here. It is not addressed in prescription 9G2 because that prescription is focused more on restoration of oak and hickory.

Standard FW-23 in the draft plan addresses the collection of plants. A permit is required for the collection of any plants from National Forest land. Regeneration methods to establish native communities are determined on a site specific basis at the project level.

Salvage of dead and down trees for fuel wood is very minor in scope on the Sumter. Additional standards to control such salvage are not needed.

Cut and remove treatment to control southern pine beetle is generally applied when the affected trees and buffer strip(s) are readily accessible and present a viable sale. Cut and leave treatments for southern pine beetle are generally applied to spots which are not easily sold commercially, in poorly accessible areas, to small scattered spots, in areas where the disturbance from logging is unacceptable, or when control action is especially urgent.

Standard FW-41: Comment noted.



Standard FW-43: As stated in the standard, unfavorable weather conditions are specified in the accompanying table.

Standard FW-44: Nozzles producing large droplets or streams are used whenever a method other than hand treatment is implemented. Implications are that drift will be minimized.

Standard FW-45 through Standard FW-49: Comments noted.

**7-166. Public Concern: The Forest Service should allow salvage timber harvest.**

The selected alternative for the Southern Appalachian plans does contain goals and objectives that will be accomplished by the activity of timber harvesting, and this includes salvage timber harvesting where compatible with those goals and objectives.

**7-167. Public Concern: The Forest Service should analyze both the effects of insects and disease and the effects of suppression activities.**

Insect and disease infestation projections were not factored into the growth and yield estimates. We acknowledge this shortcoming. Such projections were not included because modeled predictions for insect and disease effects are by nature speculative, especially over the long time periods modeled in forest planning. A couple factors tend to compensate for these effects however. Even during the last SPB outbreak, with extremely high southern pine beetle populations, less than 2% of the Sumter NF is estimated to have been affected. Also, many bug spots are salvaged and growth begins again. FIA plots were used because they were the best data available. As stated in Appendix B of the DEIS, "On examination, plots from private and National Forest lands usually had very similar diameter and volume characteristics for the same forest type, age and site index range." Whenever sufficient plots were available from national forest ownership, they were used. Plots on National Forest lands were used for 20 of the 70 combinations of community type, site index range, and successional class.

**7-168. Public Concern: The Forest Service should form a team to address the problem of exotic pests.**

The Forest Health Protection group of the Forest Service fulfills this function. These entomologists and pathologists coordinate monitoring and control plans. They also disseminate information on forest pests. They work closely with a number of agencies, especially South Carolina Forestry Commission personnel in this state.

**7-169. Public Concern: The Forest Service should work develop goals and objectives to combat the hemlock wooly adelgid, and work with counterparts.**

Sumter goal 14 in the draft plan states: "Minimize adverse effects from non-native invasive species."

**7-170. Public Concern: The Forest Service should control the pine beetle.**

Goals 13, 14, and 16, and Objective 16.01 in the draft plan respond to this concern.

**7-171. Public Concern: The Forest Service should cut enough timber annually to get the forest back to a good growing condition.**

Goal 16 and Objective 16.01 in the draft plan address this concern. The EIS displays estimated effects of southern pine beetle by alternative in the Forest Health section of chapter 3. These effects are also summarized Forest Health portion of the comparison of alternatives in chapter 2. Alternative selection is displayed in the Record of Decision.

**7-172. Public Concern: The Forest Service should control persistent non-native species as a high priority.**

The control of non-native invasive species is allowed in this forest plan and encouraged through the addition of a forestwide objective to control at minimum 1000 acres during the next 10 years.

**7-173. Public Concern: The Forest Service should promote large deer herds to control invasive species and benefit native species.**

Our FS personnel have observed heavy deer browsing on the federally threatened Florida gooseberry. We feel that integrated pest management techniques are necessary for the control of non-native invasive species.

**7-174. Public Concern: The Forest Service should work on strategies to eliminate invasive species that have been planted in wildlife openings such as autumn olive.**

Goal 15 and Objective 15.01 have been added to the Final Forest Plan to address the concern regarding invasive species. Chapter 3 of the EIS includes discussion of non-native species. Much of the direction on invasive plants is covered under regional policy, which will be followed during plan implementation. This policy includes a list of invasive non-native species.

**7-175. Public Concern: The Forest Service should limit the use of pesticides to control insect outbreaks.**

Comment noted. Effects on non-target insects are an agency concern with insecticide use. Site specific project analysis is done before insecticides are applied at any significant scale.

**7-176. Public Concern: The Forest Service should provide standards for the use of herbicides, pesticides, and insecticides.**

Channeled ephemerals can cover enough of the landscape that aerial application would be effectively unavailable as a tool if such a standard were in place. Because of this concern, aerial application is rarely used for operational forest vegetation management projects. It is typically reserved for right-of-way applications, and then typically with low toxicity herbicides. When applying herbicides around channeled ephemeral streams, the primary concern is to avoid getting herbicide in the stream channel. Because manually applied directed sprays have very limited drift, herbicides may be applied fairly close to a channeled ephemeral.

**7-177. Public Concern: The Forest Service should clarify how the agency will conduct mining activities.**

An appendix has been added to the Plan detailing how the Forest goes through the evaluation process for a prospecting permit, Preference Right Lease, and Plan of Operations.

**7-178. Public Concern: The Forest Service should adequately address mineral rights.**

The Forest Service considers mineral exploration and development to be important parts of its management program. It cooperates with the Department of the Interior (USDI) in administering lawful exploration and development of leasable minerals. While the Forest Service is mainly involved with surface resource management and protection, it recognizes that mineral exploration and development are ordinarily in the public interest and can be compatible in the long term, if not immediately, with the purposes for which the National Forest System lands are managed (FSM 2822.03).

**7-179. Public Concern: The Forest Service should expand the amount of land available for mineral development.**

97% of the acreage on the forest will be available for lease with standard lease stipulations or some type of restriction.

**7-180. Public Concern: The Forest Service should not allow mineral development.**

The Forest Service has both a responsibility and an obligation to manage mineral resources in ways that meet the intent and direction of specific mineral laws (i.e. Mineral Leasing Act of 1920; Mineral Leasing Act for Acquired Lands of 1947; Mining and Minerals Policy Act of 1970; Federal Onshore Oil and Gas Leasing Reform Act of 1987; etc.) and a multitude of other laws affecting management of the Nation's forests and grasslands. Some of those laws provide for protecting specific components of the environment (i.e. Endangered Species Act, Clean Water Act, etc.). Others, specifically the National Environmental Policy Act (NEPA), provide a framework for a process in which certain types of decisions are made with consideration of environmental effects on a variety of resources. Environmental protection becomes an important component of mineral development under these laws. Ongoing mineral development on some NFS lands are clear examples of the ability of the Forest Service and its mineral industry partners

to comply with the legal mandate and policy to “foster and encourage” mineral development while following direction to protect other uses and environmental values.

A history of statutory direction for mineral resource management on NFS lands attests to mineral resources being a significant component of the resources that the Forest Service manages. Many of the key laws cited above, in addition to Executive Orders and Regulations (i.e. 36 CFR 228E) governing use of Forest Service lands indicate that in most cases, minerals need to be a primary consideration in multiple use management of NFS lands. The legal mandates for forest planning provide for how mineral resource development will be managed.

**7-181. Public Concern: The Forest Service should adequately address the effects of mining.**

The effects of mining are addressed on a case by case basis. When a mining proposal is submitted to the Forest an in depth and detailed analysis is conducted. See Appendix in the Forest Plan for what is involved in the analysis.

**7-182. Public Concern: The Forest Service should establish stringent standards for the review of and implementation of all mining proposals.**

See response to PC 7-181.

**7-183. Public Concern: The Forest Service should adequately consider the direct, indirect, and cumulative effects of mineral development activities.**

Through the NEPA process the Forest Service adequately considers the direct and indirect effect of the specific mineral development activity. The cumulative effects effects cannot be determined due to the uncertain nature of mineral exploration and development.

**7-184. Public Concern: The Forest Service should develop standards to protect natural resources from the effects of mining and mining-related activities.**

See response to PC 7-181.

**7-185. Public Concern: The Forest Service should define ‘surface use’ and ‘controlled surface occupancy’ and explain how prescriptions will be applied and enforced.**

These terms have been defined and are found in the glossary.

**7-186. Public Concern: The Forest Service should develop a minerals management plan and monitoring program that requires a site-specific environmental impact statement.**

An appendix has been added to the Plan detailing how the Forest goes through the evaluation process for a prospecting permit, Preference Right Lease, and Plan of Operations. If the impact

to the surface resource is significant then this evaluation process may result in the preparation of an Environmental Impact Statement. Mitigation measures, which include monitoring requirements as well as other requirements, are added to the Plan of Operations. The Forest Service will not approve the Plan of Operations unless the lessee accepts the mitigation measures.

**7-187. Public Concern: The Forest Service should not allow mining or prospecting without careful planning and safeguards.**

An appendix has been added to the Plan detailing how the Forest goes through the evaluation process for a prospecting permit, Preference Right Lease, and Plan of Operations. The Plan of Operations will not be approved without adequate safeguards and planning. Mitigation measures, to insure adequate surface protection, are developed as a result of the detailed and comprehensive analysis of the mining proposal.

**7-188. Public Concern: The Forest Service should not allow gold mining.**

See response to PC 7-180.

**7-189. Public Concern: The Forest Service should not allow the removal of minerals or gems unless removal benefits the welfare of all.**

The Forest Service recognizes that mineral exploration and development of minerals or gems are ordinarily in the public interest (FSM2822.03).

**7-190. Public Concern: The Forest Service should specify height restrictions and masking requirements, and should require a plan amendment for any telecommunication tower or powerline.**

Height and masking requirements should be analyzed in detail in a project level environmental analysis. New communication uses not in designated sites or power transmission lines with corridors greater than 50 feet wide not in designated corridors will require a plan amendment.

**7-191. Public Concern: The Forest Service should better explain Standards 5.B-1 and 5.C-1 in the scenery management prescriptions for communication sites and utility corridors.**

The scenery management system has been more fully explained in both the Plan and EIS.

**7-192. Public Concern: The Forest Service should require a plan amendment and full environmental impact statement for utility corridors.**

A plan amendment will be required for new utility corridors 50 feet wide or greater.

**7-193. Public Concern: The Forest Service should not approve any new utility corridors in specified management prescription areas, or any prescriptions that would be incompatible.**

New utility corridors will meet prescription area standards.

**7-194. Public Concern: The Forest Service should specify provisions regarding the placement of communication towers and windmills, and conduct research on migratory bird interactions with cell towers and wind turbines.**

The Forest Service is required by the National Environmental Policy Act (NEPA) to evaluate the effects of proposed tower sitings and/or impacts on migratory birds in coordination with the Fish and Wildlife Service. The Fish and Wildlife Service has been charged with regulation of migratory species in the Migratory Bird Treaty Act (16 U.S.C. 703-712). A Communication Tower Working Group (lead by the Fish and Wildlife Service) composed of government agencies, industry, and academic researchers was formed to develop and implement a research protocol to determine the best ways to construct and operate towers to prevent bird strikes. From this working group, voluntary guidelines were established. These guidelines are to be used in conjunction with Federal Aviation Administration requirements and local community concerns where necessary. In addition, the Fish and Wildlife Service is required by the Endangered Species Act to assist other Federal agencies, such as the Forest Service, in ensuring that any action they authorize thru concurrence of NEPA will not jeopardize the continued existence of any Federally endangered or threatened species.

## **CHAPTER 8 – SOCIAL AND ECONOMIC VALUES**

### **8-1. Public Concern: The Forest Service should preserve National Forest System lands.**

See response to PC 3-1.

### **8-2. Public Concern: The Forest Service should provide more law enforcement.**

The decision of whether to provide more law enforcement is not one which is made in a Land and Resource Management Plan. The Plan deals with natural resource questions as they are brought forward by the issues. The law enforcement program is outside that decision.

### **8-3. Public Concern: The Forest Service should manage the forests for the common good of the people.**

See response to PC 8-9.

### **8-4. Public Concern: The Forest Service should implement a program that will improve the economy.**

See response to PC 3-68.

### **8-5. Public Concern: The Forest Service should train unemployed and young people in forest restoration work.**

While we are sympathetic to the comment, this is largely outside the scope of the decisions made in the Forest Plan.

### **8-6. Public Concern: The Forest Service should emphasize production of goods and services beneficial to local economies and communities.**

The impacts on forests local economies of all alternatives considered are found in Chapter 3 of the DEIS pages 3-352 – 3-357 Sumter NF. The last table in this series of tables is particularly relevant in that it shows the relative share of the Forest Service's programs and expenditures and their effect on the local economy. In both instances the overall effect on the local economies in terms of employment and total income is very small. The Forest Service tries to select an alternative that presents a balanced supply of the many resources available to the public.

### **8-7. Public Concern: The Forest Service should better explain the use of the IMPLAN model and the employment and income impacts of the separate alternatives.**

Regional economics models dealing with input-output analysis are very complex. Their use involves a number of assumptions and judgment factors that may make the findings by two different analysts somewhat different. The IMPLAN model takes a considerable amount of time

to learn and to become proficient. Forest Service users have invested considerable amounts of time in training in model building. Therefore, replication and validation by another source may not be likely for a novice user. Important assumptions have been documented in the FEAST spreadsheet which is part of the Process Records. Data sources have been described in Appendix B of the EIS.

Appendix B gives a general overview of how the impact results were generated for each resource or activity on the Sumter NF. Because it is not expected that someone who is unfamiliar with IMPLAN could readily perform input-output analysis, a detailed explanation of every step in building the model and constructing individual resource and activity impact files was not made a part of Appendix B. If the commenter wants to know the procedural process for running IMPLAN, we refer them to “IMPLAN Professional User’s, Analysis Guide and Data Guide”, Minnesota IMPLAN Group, Inc., 1997, which is part of the Process Records of each forest. The Minnesota IMPLAN Group also offers training classes for model usage.

The various Forest Service resources and activities are discussed in Appendix B. Resource and budget impacts from the IMPLAN model and FEAST spreadsheet are presented and discussed on pages 3-352-356 of the DEIS. We feel this is an adequate description.

#### **8-8. Public Concern: The Forest Service should identify and consider economic issues and impacts.**

The DEIS analysis of the economics of the forest analysis area was constructed to comply with 36 CFR 219.12 and the Forest Service Manual and Handbooks, FSM 1970 and FSH 1909.17, respectively. These directives suggest that the Forest conduct an impact analysis showing expected jobs and income associated with the consumption of resources and expenditures from a forest (an equity analysis that shows how a dollar of expected demand for a resource is divided among the various sectors of an economy). The impact tables presented in Chapter 3 of the DEIS satisfies this requirement. Secondly, the directives provide for a present net valuation (an efficiency analysis to show how well expected revenues cover expected costs) of the resource programs showing a discounted value for the estimates of benefits and the costs for conducting these programs over the planning horizon. The present net value tables are likewise shown in Chapter 3 of the DEIS.

Any economic issues that develop in our dialog with the public will also be addressed. For these forests no additional issues specific to a given forest were raised from the public.

The DEIS presents a mix of goods and service outputs from its SPECTRUM model which has been fully documented in Appendix B.

Output valuations are given in tables of Appendix B (p. B-59, Sumter NF; p. B-89, Chattahoochee-Oconee NF; p. 83, Cherokee NF; p. B-34, Jefferson NF; p. B-18, NF in Alabama). These tables have been revised to better reflect the sources of the valuations.



Demand-Supply analyses are presented as part of the “Analysis of the Management Situation (AMS), which is not automatically made part of the DEIS. Attention to the supply and demand for Wildlife is a part of the AMS and should be found in the forests’ “Process Records”.

Because of the vast uncertainty of prices and inflation in future years, most prices used in these forests analyses were in constant 2000 prices. When estimates of real price increases were available for historical data before 2000, real price adjustments were made to year 2000. Future prices were not increased. This is theoretically acceptable when a present net value analysis is discounted in real terms as was done in this analysis.

Timber and some recreation impacts in these analyses are qualified with the term that the resulting jobs are “associated” with the resource consumption rather than the jobs are caused by the consumption because there may be other landowners who would satisfy local timber demand if the Forest Service did not offer timber for sale; or local Forest Service recreation users may spend their recreation dollars on other non-wild-land recreation events if they did not visit a local forest. Therefore, impacts would be similar for both these resources even if they were not consumed on national forest lands. Impact estimates are given to show the decision maker the relative importance of the Forests’ resource consumption in the local community and have no other purpose, as you seem to intimate with your comment that a “social efficient” policy would be to log no government timber.

All resources whether valued or not are considered in “maximizing net public benefits” to the public. The decision maker has a quantification of those resources that can be priced whether market based or non-market based of an assigned value. The “weight” of resources is the result of SPECTRUM analyses. Some non-market, non-priced resources such as visual or water quality may be a subjective factor in the maximization of net public benefits. Ultimately, the choice of the preferred alternative is up to that the forest and the Regional Forester. When the Record of Decision is released, the rationale for choosing a given alternative will be addressed.

The efficiency analysis requirements explained in FSH 1909.17 combines market and non-market resources. The Forest Service defines and economic efficiency analysis as containing these two components. A financial analysis required for project timber sales is solely a market commodity resource analysis.

The various expected effects of these Forests’ programs are presented in Chapter 3. Where adverse circumstances are found, mitigation measures are discussed. The expenses for these measures are incorporated into the program expense which is accounted for in the Forest budget. We therefore believe that we have accounted for what is expected for an economic analysis that is explained in our Handbook.

**8-9. Public Concern: The Forest Service should better determine the combination of forest resources that will maximize net public benefit.**

The Forest Service does not use its socio-economic analysis quantified measures and indexes as the sole means of displaying alternative outputs (FSM 1970.8(5)). Such a value is one piece of information for the decision maker to use in making selections among alternatives. Other resources that are impacted are discussed qualitatively. Their consequences in forest management are decided along with the monetized resource in arriving at an alternative that maximizes net public benefits. After reviewing the planning documentation and comments from the public participation, the determination of the best alternative which maximizes public net benefits is left to the judgment of the decision maker. Rationale for the selected alternative is given in the Record of Decision.

**8-10. Public Concern: The Forest Service should use mathematical modeling techniques to identify the most economically efficient solution to meet the goals and objectives of any alternative.**

- Where were the resource dollar values obtained? Please provide references. Why were these values deemed appropriate for the Forest? Do the values represent measures of consumer willingness-to-pay? If not, why not?

See the table presenting the Economic Benefits and Financial Revenue Values of the DEIS for these Southern Appalachian forests. The values presented in this table represent market values for Timber and Minerals and assigned values from benefit transfer studies of willingness to pay used by NFS Research for Recreation and Wildlife.

- Where was the resource physical output units used for the cost benefit analysis obtained? We can find no reference to them in the DEIS, appendices or draft plan.

The timber product estimates were taken from the SPECTRUM model and the recreation/wildlife/fish estimates were derived from NVUM (National Visitor Use Monitoring) results. The full procedure for estimating the recreation/wildlife/fish estimates can be found in the process records.

- Did the cost benefit analysis include the amount and value of the environmental impacts (e.g. the value of social losses) due to forest harvesting? If not, please provide an explanation for this oversight.

These Southern Appalachian forests have presented a present net value of resources which are suggested in 36 CFR 219.12(g)(1). The forests have discussed only foreseen consequences of our land management alternatives on the environment in a narrative fashion. For those resources that can be reasonably valued via market data (e.g. timber, minerals) and for those non-market resources that have Forest Service estimated values from Forest Service Research, we have presented values in the present net value calculation. For resources that have no values estimated by generally accepted methods, we have chosen to discuss them in a narrative fashion as part of the assessment of net public benefits. Such an economic efficiency analysis is prescribed in the

Forest Service Handbook FSH 1009.17, Chapter 10. The discussion of how the selected alternative maximizes net public benefits can be found in the Record of Decision.

Many of the “ecosystem services” or “social losses” that you refer to are considered to be effects remote from resource management of these forests. Their speculative and unforeseen nature does not warrant a consideration in the efficiency analysis required by 36 CFR 219. Resource effects on other resources are discussed in Chapter 3 of the EIS.

- Why was a 4% discount rate used when everything is in real terms? The rate probably should be closer to 2%.

Agency policy makes provision for using a 4 percent real discount rate for long term resource program analyses in the FSH 1909.17, 15.42.

- Why wasn't a more recent price for an RVD used? How does this value compare to travel cost and contingent valuation study values?

The most recent information available at the time of our analysis are prices expressed in 1989 dollars and estimated from 1989 to 2040, which are found in the FS publication “Resource Pricing and Valuation Procedures for the Recommended 1990 RPA Program”. We estimated the real price growth to year 2000 and adjusted the values to reflect 2000 prices. Forest Service non-market valuations for forest planning are provided by Forest Service Research and Forest Service Strategic Planning and Resource Assessment in the Washington Office, and they are working on updating these values, but that information is not yet available. The values used are found in Appendix B in the table presenting the Economic Benefits and Financial Revenue Values of the DEIS.

- Are recreation and wildlife/fish really a constant throughout all alternatives? This seems very odd, particularly given that the nature of these experiences will vary substantially between alternatives. Disaggregation of visitor days/expenditures by recreation type, and disaggregation of visitor days by recreation type for each alternative appears called for. This type of analysis certainly isn't visible in the employment and labor income tables.

The recreation and wildlife/fish estimates are not constant by alternative. A disaggregation of visitor days by recreation type was developed. This was needed to determine the present net value of the alternatives and the economic impact of the alternatives since different recreation activities have different values, and different recreation activities have different expenditures in the local economy. These estimates can be found in the process records.

- Without disaggregated data one cannot infer changes in size either of outflows or inflows from changes in the net flow. Just because tourism is a larger net importer in 1996 than 1985 does not imply that "travelers were not coming into the analysis area at a greater rate in 1996 than 1985." More could be coming in (more exports), but were swamped by a greater increase in imports, making the net imports larger. Overall there seems to be confusion

between demand and supply in the analysis. Just because recreation facilities are developed doesn't mean they will be used. Nor does current usage imply that there might not be a supply constraint so that actual demand exceeds current usage.

The comment is apparently referring to tables B-139 in the Cherokee NF DEIS appendix B and B-16 in the NF in Alabama DEIS. The implication of the trade flows for the NF in Alabama is that more tourism dollars have left the economy since 1985 (that is, people are leaving their impact areas and traveling outside for tourism experiences than in 1985; this is a net import of tourism because trade dollars are leaving the local analysis areas). For the Cherokee NF 1996 shows tourism to be a net exporter of dollars to the local economy over 1985 (that is, more people are coming into the local analysis area to recreate and visit than are going outside the area). Your statement of more tourists coming into the analysis area (exports), being swamped by a greater increase in imports (people and dollars leaving the area) making net imports larger is a true statement for the National Forests in Alabama, but that is not the case for the Cherokee NF. It is uncertain what you are referring to by stating the need for "disaggregated data" to infer how trade flows are occurring. Our trade flows are simply estimates of industry shares that comprise tourism. Table B-16 of Appendix B (for NF in Alabama) and Table B-139 (for the Cherokee NF) shows the disaggregated industry make-up of tourism. We stand by the analysis in our DEIS.

There is some uncertainty as to what part of the DEIS the commenter is referring to concerning supply-demand. The NF in Alabama and the Cherokee NF have performed a supply and demand of their recreation resource and have determined that they have the ability to supply expected demand and have determined there will be no supply constraints during the analysis period.

- The DEIS states, "For each decade, an average annual resource value was estimated, multiplied by 10 years, and discounted from the mid-point of each decade." The Forest uses 2000 timber and resource prices, and all values are stated in 2000 prices. Are estimated changes in real prices over time accounted for? Are effects of technology accounted for? Is income growth accounted for?

All resources were assumed to be priced in 2000 constant dollars in order to be conservative with the analysis, hence technology and income growth are not accounted for in price estimations. Having a conservative Present Net Value analysis that is still positive indicates a good certainty in your program objectives of achieving the Forest Service hurdle rate of 4 percent. Predicting income growth and technology changes for the Forest Service planning horizon (50 years) would be pure speculation.

- There is a reasonably good discussion of prices used (except for timber), but too little discussion of the assumptions in the analysis and the issues raised by it. For instance, trends in real prices should be taken into account. There is every reason to believe that the value of various natural experiences will rise over time as population and income rise while less and less natural areas are available to the public either through development or posting. This

should be accounted for. Water production increasingly is an issue in the southeast as clean water becomes relatively scarcer. That price per unit should be rising in real terms also.

Because of the vast uncertainty of prices and inflation in future years, most prices used in these forests' analyses were in constant 2000 prices. When estimates of real price increases were available for historical data before 2000, real price adjustments were made to year 2000. Future prices were not increased. This is theoretically acceptable when a present net value analysis is discounted in real terms as was done in this analysis. Forest Service planning horizons are 50 years. Trying to estimate expected real price increase over this time period is pure speculation. A more conservative method is to use constant 2000 prices and costs to see if expected program benefits will satisfactorily cover expected program costs.

- Note that, since timber is coming off of NF land, where the public prefers environmental values to commodity production (see above), there is a cost to the public of timbering on NF lands that does not exist when the timbering occurs on private lands. i.e., NF timbering and NIPF timbering are not perfect substitutes from a public perspective. As a result, net benefits from timber production are overstated in the present net value of the alternatives. What about non-consumptive values, such as existence and option values (the willingness of the public to pay for knowing that something exists, even though they never intend to see or use it, and the willingness to pay to have the option of sometime using the resource)?

The U.S. Forest Service's does not attempt to fully enumerate the dollar values of all non-market, non-priced benefits and costs in the planning process that may be of a speculative nature. The agency does, however, attempt to provide as much **relevant** information as possible to aid in making good planning decisions, and this information may sometimes take the form of monetary estimates of non-commodity values as presented in the Present Net Value tables. U.S. Forest Service activities on the forest are governed by a large number of rules and regulations designed to mitigate negative impacts or otherwise protect forest resources. In the planning process these benefits associated with regulations are seldom quantified in dollar terms. The costs for achieving these benefits are in the form of increased operating costs and reduced timber revenues.

36 CFR 219.12(g) (1) instructs forest plan development by requiring an analysis of expected outputs during various planning periods. It suggests use of outputs which include marketable goods and services as well as non-market items, such as recreation and wilderness use, and wildlife and fish. These are the resources the forests' DEIS has undertaken to show a present net value as required by 36 CFR 219.

All the Southern Appalachian forests have presented a present net value of resources which are suggested in 36 CFR 219.12(g)(1). These forests have discussed only foreseen consequences of our land management alternatives on the environment in a narrative fashion. For those resources that can be reasonably valued via market data (e.g. timber, minerals) and for those non-market resources that have Forest Service estimated values from Forest Service Research, we have presented values in the present net value calculation. For resources that have no values estimated

by generally accepted methods and have a significant part in the selected alternative, we will discuss them in a narrative fashion in the Record of Decision as part of the consideration for maximizing net public benefits.

Many of the “environmental values” that you allude to that are provided by forested land, such as flood control, purification of water, recycling of nutrients and wastes, production of soils, carbon sequestering, pollination, and natural control of pests; and externalized costs of resource extraction, such as increased rates of death, injury and property damage resulting from accidents involving heavy equipment, log trucks, ORVs and other dangers related to intensive resource use and development, are considered to be either effects remote from resource management or mitigation measures have been discussed in Chapter 3 of the DEIS to prevent many adverse consequences of logging on these forests. For those items we consider speculative and unforeseen, their consideration in the efficiency analysis required by 36 CFR 219 is not warranted.

Option values and existence values are not items required to be discussed under 36 CFR 219. These are highly controversial methodologies which can be of a contentious nature with many publics. The Forest Service has chosen not to use values based on questionable and controversial methodologies and values not specifically required by Forest Service directives.

The consequences of the forests’ programs on the water and wildlife resources are discussed in Chapter 3 of the DEIS. These discussions have offered mitigation measures where the resource may be affected by the timber program. Therefore, adverse effects are believed to be minimal.

- Finally, the analysis fails to discuss the weights placed on non-priced goods and services produced by the Forest and, as such, fails to inform the reader how Alternative I came to be the preferred alternative. Please provide an explanation as to how this was determined.

The rationale for the selected alternative is documented in the Record of Decision. This rationale explains how the selected alternative maximizes “net public benefits” which is not to be confused with “present net value”. “Net public benefits” includes considering those “benefits” and “costs” that cannot be quantified.

#### **8-11. Public Concern: The Forest Service should clarify the meaning of the SPECTRUM linear programming solution.**

- What are the linear programming (LP) decision variables used in the SPECTRUM model formulations?

The SPECTRUM model is comprised of analysis units (areas of land) and different silvicultural management options are available to each analysis unit, including the option of “doing nothing”. These silvicultural options include different combinations of thinnings, final harvest methods (e.g., clearcutting, shelterwoods, group selection), and different rotation ages. These different options comprise the “decision variables” in the model.

- What is the LP solution algorithm? Does SPECTRUM use the Simplex method, an integer programming solution or a heuristic solution algorithm?

SPECTRUM actually uses a linear program software program called C-WHIZ, which in turn uses the Simplex method.

- In the SPECTRUM LP solutions, will any specific forest analysis unit drop out of the timber harvest solution if it has a negative NPV? In other words, does the LP solution retain analysis units in the harvest solution that are themselves unprofitable to harvest?

This depends on the objective function and the set of constraints being used. In determining suited acres, lands can have a negative NPV and still be a part of the suited land base. There are three “stages” to determining suitability, and a part of that analysis is based on meeting plan objectives. If some lands with a negative NPV are needed to meet a particular objective (which would be entered into the SPECTRUM model as a constraint), then they could become a part of the suited land base.

- In the SPECTRUM model how are costs and benefits (revenues) determined / derived?

The different costs and benefits are derived from different sources. These are documented in Appendix B of the EIS and in the process records.

- Appendix B discloses that it uses timber values derived from SPECTRUM for lands suited for timber. But values for timber from unsuited lands are also included. It’s unclear how these values are derived. What factors cause the values to be different? Do greater harvesting costs play a role?

The SPECTRUM model was used to estimate timber volumes and value from the “suited acres”, where entries would be on a “scheduled” basis. On “unsuited” lands, since entries would be made on an “as needed” basis and are not “planned” or “scheduled”, a different methodology was used to make an estimate of what these volumes might be in the future. On the suited acres, the timber value is dependent upon the mix of species for a particular site. Different species are in different “appraisal groups”, with each “appraisal group” having a different value. So each timber yield table would have different volumes in the different appraisal groups, and therefore different values. From these suited land calculations, an average value per MCF was calculated by dividing total timber value by total volume. This average value per MCF was then applied to the estimated volume that would come from the “unsuited acres”.

- In SPECTRUM, what is the difference between long-term sustained yield and perpetual timber harvest constraints? Davis and Johnson in *Forest Management* (McGraw-Hill, p. 542) describe long-term sustained yield and perpetual timber harvest as the same concept.

In terms of a definition, these two terms basically mean the same thing. But different modeling constraints are needed to accomplish the concept. The long-term sustained-yield (LTSY) constraint is used to make sure the harvest in any particular decade does not exceed the LTSY. The perpetual timber harvest constraint is used to make sure there is enough inventory at the end of the planning horizon in the model to continue producing the LTSY into the future.

- In SPECTRUM, what is meant when Appendix B says land allocated to timber harvesting is “hardwired”?

In developing the alternatives, management prescriptions were allocated to different parts of the Forests. These management prescriptions determined the desired conditions to be achieved. Also, for some management prescriptions all the lands are classified as “not suited for timber production”, while other management prescriptions could have lands classified as “suited for timber production” (depending on further analysis). It is these “desired conditions” and “suitability” classifications that were “hardwired” into the SPECTRUM model. The SPECTRUM model was not used to make the allocation decisions, only to make an estimate of what would happen within an alternative with its particular mix of management prescription allocations.

- Do the costs in SPECTRUM include both the fixed and variable costs of Forest Service timber management and harvesting? It appears from reading the documentation provided that fixed costs were left out of the equation due to their effects on the per unit cost. How many miles of improved roads and acres of steep slope were found in determining the cumulative effect to forested acres in setting Spectrum analysis units? What criteria were used to determine that this reduction in timber yields was an accurate method of dealing with the problem? How much were yields reduced as a result of roads? Steep slopes? What statistical criteria were used to determine the reduction percentages or amounts?

The costs in SPECTRUM only included variable costs, because the fixed costs are essentially a “given”. Fixed costs continue regardless of the alternative level of output. They constitute Forest Service overhead costs that would not vary by alternative. SPECTRUM is used to compare the estimated costs and benefits associated with implementing various activities in order to determine the best mix to meet to objectives and constraints. 36 CFR 219.14 also specifies that “direct” benefits be compared with “direct” costs. The fixed costs are included in the calculations of the present net value of each alternative.

Distances from roads and slope categories were used in determining the analysis units in SPECTRUM. This way different roading costs could be assigned to the different analysis units, and differences in operating costs could be assigned to acres in different slope categories. The timber yields in SPECTRUM are on a per acre basis and these per acre yields were not reduced simply because of the distance from a road or the slope they were located on.

- In alternatives B and I, where timber production is a byproduct of management to restore and maintain resources, forest structure, processes, habitats, etc., it is unclear how the SPECTRUM model can spit out a given output per decade. More specifically, in alternative



I, how can silvicultural activities intended for ecological management necessarily provide a “stable supply of wood products”? Why would “some of the best sites that are currently accessible” need to be managed to provide high-quality sawtimber if this isn’t the purpose of the alternative? In addition, it seems odd that given the substantial difference in emphases between the alternatives, that land classified as suitable for timber production would vary so little between alternatives. Please explain how this came to be.

SPECTRUM was used to estimate what kind of outputs would result from meeting the desired conditions of the management prescription allocations. Some of these desired conditions specified that certain percentages be maintained in certain age classes or “structural” conditions. In order to maintain these conditions, silvicultural activity would need to occur on a regular basis, and this is what would provide a “stable supply” of products.

In terms of the differences between alternatives, each alternative had an overall “theme”. This “theme” was then used as a “guide” to determining the allocations of the management prescriptions. However, land managed under, say, Management Prescription 4.F. in Alternative A, is the same as land managed under Management Prescription 4.F. in Alternative G. It is the land allocation of the management prescriptions that makes up the differences between the alternatives, not the management activities within a particular management prescription.

- What percentage of total regional forested land is made up of national forest timber-producing acres? What percentage of total forested land in the state do national forest system acres represent?

Government agencies hold 20.8 percent of the 4.9 million timberland acres in the Southern Appalachian region (“Southern Appalachian Assessment; Social, Cultural, Economic Technical Report”, p. 86, July 1996).

- Gross receipts for the purchase of National Forest timber are broken down into four categories: 1) the money paid to the Forest Service for trees standing in the woods (stumpage); 2) the value determined by the Forest Service for “purchaser credit” roads accepted as a payment in kind; 3) “associated charges” (primarily road maintenance) which the purchaser is required to pay in addition to stumpage; and 4) interest and penalties paid by the purchaser through the life of a sale. What are the dollar values associated with each category over the timber price time series (especially category 4 - interest and penalties)?

“Purchaser road credits” and the “interest and penalties paid by the purchaser through the life of a sale” were not included in the estimates of the timber revenues used in the SPECTRUM model or the present net value calculations.

- When and where are the environmental effects of timber harvesting included in the analysis?

The environmental effects of timber harvesting are described in Chapter 3 of the EIS.

- It is not clear in the DEIS how purchaser road credits were dealt with. Were they treated as a cost or revenue? Why?

The Forest Service no longer uses purchaser road credits and therefore they were not a part of the analysis. The total costs of constructing and re-constructing timber roads were included as a cost in the SPECTRUM analysis.

- What statistical methods / software were used to “trend” the timber price time series? Why were these methods / software used?

In order to derive an “average value” per MCF for the different appraisal groups, stumpage prices were converted to 2000 dollars by the Gross Domestic Price Deflator Index. The SPECTRUM model used these 2000 prices to provide a constant 2000 dollar value estimate in the future.

- The timber price time series, 1985 to 1996, is a very short time series to use for a 200-year trend projection. Was this thought to be a typical timber price time series? Why?

When we started the process to determine “average” timber values, the years 1985 to 1996 were simply the years where we had some historical data available to analyze.

- Were National Finance Center records or TSPIRS data used as the basis for timber production and management costs? The documentation suggests both were used. How were they combined? It appears that an ad hoc procedure was used to determine timber production and management costs. Please disclose the instructions and rationale for the data collection direction given on the Forest to address this issue.

See the response to PC 7-121.

**8-12. Public Concern: The Forest Service should further develop an analysis of average annual cash flows and non-cash benefits.**

Table 03 of 1909.12, 4.13 has not been included in the DEIS. A similar table is part of the Process Records, showing undiscounted as well as discounted decade costs and revenues by alternative and by program.

**8-13. Public Concern: The Forest Service should include an analysis of externalities in the DEIS.**

The expected physical effects of resource program implementation of the Forest are discussed in Chapter 3 of the DEIS. Where adverse effects may occur, mitigation measures are prescribed to ameliorate those possibilities.

Your contention that timber harvests develop costs that occur to the environment (“externalities”) such as:

1. Costs take the form of lost jobs and lost revenues to businesses such as those engaged in wilderness recreation outfitting or the gathering of non-timber forest products.
2. Costs that take the form of increased expenditures for environmental quality. For instance, when water quality is degraded, municipalities, businesses, and residents downstream are forced to incur higher costs of filtering water.
3. Extractive activities on national forests create additional costs, as well, such as increased rates of death, injury and property damage resulting from accidents involving heavy equipment, log trucks, ORV’s and other dangers related to intensive resource use and development. Such uses also contribute to increased fire risk on national forests, not only due to adverse changes in vegetation structure and composition, but due to increased human access.

Many of the “externalized” costs that you enumerate are considered to be effects remote from resource management on the Sumter NF. Their speculative and unforeseen nature does not warrant a consideration in the efficiency analysis required by 36 CFR 219.

When logging is undertaken, it is conducted in accordance with forest plan standards and guidelines designed to protect other resource values. Logged areas are regenerated to a new forest, so any disruption is only temporary. The commenter focuses exclusively on the potential negative effects of logging; they ignore the fact that national forest logging can have external benefits as well as costs.

The Sumter NF believes it has analyzed the *expected* costs and benefits of its resource programs in accordance with 36 CFR 219.12.

**8-14. Public Concern: The Forest Service should develop quantified monetary values for ecosystem services and incorporate these values into the DEIS.**

See response to PC 7-99.

## **CHAPTER 9 – ENVIRONMENTAL PROTECTION AGENCY**

### **9-1. Public Concern: The Forest Service should provide sufficient information in the DEIS to allow the Environmental Protection Agency to assess the impacts of the preferred alternative.**

The EIS, in Chapter III, contains the assessment environmental consequences (impacts) of the alternatives, including the preferred alternative. While we feel that there is sufficient information provided to fully assess the impacts of the preferred alternative, we are interested in finding what, specifically, the EPA would like to see in a Forest Plan revision EIS to better assess impacts. A Forest Plan is a decision that does not have direct impacts due to its nature. Project level decisions, on the other hand, are where actual ground-disturbing activities are permitted.

### **9-2. Public Concern: The Forest Service should more effectively avoid or mitigate potential environmental impacts.**

NEPA does not require that all impacts be avoided or mitigated. The twin aims of NEPA are to consider alternatives to the proposed action and inform the public of the estimated effects of the alternatives and decision. The EIS adequately describes the entire NEPA process for developing the CNF revised LMP. The range of alternatives discussed in Chapter 2, along with the comparison of alternatives in Chapter 3 is the result of nine years of working openly to meet the requirements set forth in NEPA and NFMA. Public involvement is summarized in Appendix A of the EIS

### **9-3. Public Concern: The Forest Service should acknowledge that the preferred alternative appears to strike a balance between various multiple use activities.**

The Forest chose Alternative I because it best responds to the issues developed during the scoping process. Please refer to the ROD for specific reasons Alternative I is the selected alternative.

### **9-4. Public Concern: The Forest Service should place greater emphasis on ecosystem restoration/enhancement, watershed protection, and recreation.**

The ROD discloses the reason that Alternative I is the selected alternative. The alternatives considered in the EIS range from “minimal human intervention” theme to a high commodity production theme. Restoration is a theme mentioned in Alternatives A, B, G and I. Watershed protection and maintenance of water quality is emphasized in all alternatives, however, Alternative F, the no action alternative continues the watershed protection

currently provided. All other alternatives use a more extensive riparian prescription for water quality protection. Recreation remote, roadless, motorized or developed, is emphasized in all alternatives.

**9-6. Public Concern: The Forest Service should provide specific management strategies and measures to protect and restore watersheds and aquatic habitats.**

The watershed ranking is based on data for 5<sup>th</sup> level watersheds and builds upon the East-Wide Watershed Assessment Process (EWAP) completed during the draft planning period. The Watershed Condition Ranking was developed as a tool to estimate cumulative effects (using sediment yield estimates) for comparison of alternatives. The EWAP was developed to compare watershed health and condition on a broad 5<sup>th</sup> level watershed basis to provide information during planning to evaluate prescriptions, alternatives and prioritize future work. Since the 5<sup>th</sup> level watersheds often encompass a greater percentage of private lands, the results of the EWAP and Watershed Condition rankings will be used to further evaluate protection needs and watershed restoration opportunities at the project level. Furthermore, forest standards and prescription 11 (developed specifically for Riparian management) will provide the necessary protection for all future projects.

**9-7. Public Concern: The Forest Service should include additional standards, goals, and objectives for watershed management as recommended by the Environmental Protection Agency.**

Federal, State and local laws (i.e. NFMA, Clean Water Act) require that aquatic resources, streams and surface waters be protected. Forest plans protect aquatic resources by identifying streams, their beneficial uses and developing standards, which protect those resources during management activities. Standards are found in the Riparian Prescription and forest wide standards. Further protection will be provided as needed at the project level. In addition, the forest will be consistent with BMPs, TMDLs, laws, executive orders, and directives. We feel that the background information, goals and objectives indicate this. The standards added are intended to apply in all circumstances, and implementation guidelines such as those in the R8 Soil and Water Conservation Practices Guide (2002) will be developed that will contain more details relative to protection measures to deal with specific circumstances and conditions.

**9-8. Public Concern: The Forest Service should re-examine specific management prescriptions and redesignate certain specific areas for Watershed Restoration.**

Watersheds identified with streams on the 303D list included as a data layer in the Eastwide Watershed Assessment Process. This information, along with the results of the cumulative effects analysis, will be considered as the forest develops restoration projects during plan

implementation. The State, local agencies, and partners will be included in the development of watershed restoration projects as appropriate. The Sumter National Forest intends to be consistent with any TMDLs developed, share resources and cooperate with others as able. However due to the mixed ownership pattern in many areas, the forest was uncomfortable with redesignating specific areas for Watershed Restoration beyond those identified. In addition, the forest intends to continue to identify and treat individual problem areas when they are actively contributing pollutants, affecting beneficial uses of streams or lowering the productivity of the land.

**9-9. Public Concern: The Forest Service should provide specific measures to address water quality problems in the Chattooga River watersheds and redesignate specific areas for Watershed Restoration.**

The primary avenues of water quality improvement within the Chattooga River watershed will be directed at excessive sedimentation and fecal coliform in 303(d) streams. Since water quality data show that Stekoa Creek in Georgia is the major source of fecal and sediment pollutants within the watershed. Even with the dilution of the Chattooga River, fecal contamination frequently exceeds levels set for water based sports, so this is certainly one area that will be a focus. The Forest Service will also assist in analyzing and treating problems associated with any 305(b) streams where biological impairments or imbalances have been noted. Stream temperature, pH and other factors will be addressed when they are identified as specifically impacting beneficial uses.

The Sumter National Forest intends to be consistent with current and any additional TMDLs developed, improve water quality limited waters on the National Forests, and share resources and cooperate with other interests and landowners as able. Other than those drainage areas with watershed restoration prescriptions and stream segments already identified within the 303(d) and 305(b) lists, the Forest Service does not intend to designate other areas or identify specific measures or treatments. Measures cannot be specified as they would vary with the conditions and circumstances. Treatments may include improving road drainage and surfacing to limit erosion and sedimentation, reducing impacts at stream crossings, limiting cattle access to streams, addressing faulty community sewage and animal waste treatment facilities, and encouraging low till, no-till and limited surface disturbance for agriculture and development activities. Along with other federal and state agencies, the Forest Service will share expertise and cooperate in a variety of ways to address water quality problems within the watershed with willing landowners and interest groups.

**9-11. Public Concern: The Forest Service should provide a table that includes actual acreages of Forest Service System lands contained in each of the 5<sup>th</sup> level HUCs.**

The specific listing of actual acreage of Forest Service System lands was not considered an important data layer in development of the plan. Appendix M includes a summary of some of

the watershed based data used for this analysis. It includes the watershed size and percent of the watershed managed as part of the Sumter National Forest. The Chattooga River watershed contains about 70 percent National Forest among the Sumter, Chattahoochee and Nantahala NFs.

**9-12. Public Concern: The Forest Service should include additional standards for ephemeral streams as recommended by the Environmental Protection Agency.**

Minimizing disturbance within a 25 foot wide streamside management zone along both sides of scoured ephemeral streams will provide water quality protection. The 15 to 20 basal area leave requirement does not include smaller understory trees and shrubs that would also provide bank and soil support, shade, and erosion reduction from raindrop impact and concentrated flow.

**9-14. Public Concern: The Forest Service should include a discussion of what additional protections are afforded by riparian corridors as opposed to Streamside Management Zones (SMZs).**

Added protections afforded by riparian corridors are primarily soils and habitat based rather than water quality based as BMPs such as SMZs are. The intent will be to accomplish both in providing for water quality, soils and riparian/aquatic habitats. The details of what each does will be brought out in implementation guidance that will have to be developed for field use. The BMPs in South Carolina include reference to expanding the protections for habitats and this was done with the riparian corridor prescription.

**9-15. Public Concern: The Forest Service should set minimum riparian corridor widths.**

Minimum corridor widths are listed in the Riparian Prescription. However, these minimum values can be adjusted wider or narrower upon site-specific evaluation to protect and maintain the health of the riparian and aquatic resources. In the Turkey/Upper Stevens watersheds, the corridor widths were expanded to be consistent with the Carolina Heelsplitter Recovery efforts. A distinction is made between the Riparian Corridor and Streamside Management Zones. Streamside Management Zones will be used to protect streams beyond the Riparian Corridor where necessary due to unstable land, soil erosion concerns or steep slopes. The forest will meet all State Best Management Practice SMZ requirements.

**9-16. Public Concern: The Forest Service should include additional standards that will establish the importance of riparian corridors as buffers for protection of water bodies.**

Riparian areas are determined on the basis of physical and biological characteristics (vegetation, soils, and hydrology). Riparian corridors (fixed buffers) are established to encompass the Riparian area. Where fixed widths do not capture the Riparian area, distances are adjusted. SMZs in forest wide standards are employed as needed at the project level where additional protection is necessary.

Specific road and timber harvest standards are specified in the riparian corridor prescription, forest wide standards and referenced in State BMP requirements. Standards are also stipulated in contract clauses for road construction and timber harvest. The need for additional standards, road stabilization techniques, and use restrictions will be determined at the project level.

**9-17. Public Concern: The Forest Service should coordinate with the State to update its list of impaired waterbodies in order to develop appropriate land management prescriptions.**

The Forest coordinates with the State on the list of impaired water bodies as well as on the application and monitoring of Best Management Practices and nonpoint source pollution control.

**9-18. Public Concern: The Forest Service should include in its tables a list of specific impaired waterbodies.**

The lists of impaired waterbodies are published by the state on their website. They are periodically updated and some of the stream sections identified in 1999 have probably been removed, while others may be added. The intent of the mileage reported in Appendix M or the percent of stream miles in Table 3-1 are to be indicators of watershed based problem areas. Many of these are located on and are a result of actions on private lands. We would rather focus in on the need to cooperate to improve watershed based problems. However, in the desired future conditions for Management Area 2, Chattooga River, we indicated that we desired that there are no longer any water quality or watch list streams within the watershed, and included those that were listed a few years ago on the 303(d) and 305(b) lists.

**9-19. Public Concern: The Forest Service should prepare a list to identify miles of streams not supporting beneficial uses.**

The miles of streams not supporting beneficial uses is listed on the current 303D list. As aquatic monitoring data is collected on the forest more detailed information concerning supporting beneficial uses will be evaluated and used in the development of improvement projects.



**9-20. Public Concern: The Forest Service should identify critical water supply watersheds and designate them for water supply management prescriptions.**

The Sumter Forest Plan lists municipal water supply watersheds in the management area descriptions in Chapter 4, but did not specifically identify any of them to be managed primarily as a water supply watershed prescription. In mixed ownership watersheds, it would be difficult to single out the National Forests for special management criteria, while activities on private lands are unaffected. In most instances, private lands dominate these areas. The Chauga River watershed is an exception. There is enough direction among the various limits including BMPs, Outstanding Resource Waters, the prescriptions for Riparian Corridor, Old Growth, Scenic, Botanical/Zoologic Special Area Prescriptions and maintaining the Outstandingly Remarkable Resources including water quality for Eligible Wild and Scenic Rivers will be carefully considered in management decision. However, if the community of Westminster, S.C. has a concern that we need to designate and manage this watershed primarily for this use, we would consider this request. Regardless, added measures relative to municipal supply watersheds are found in the 2542 section of the Forest Service Manual.

**9-23. Public Concern: The Forest Service should comply with the State of South Carolina's Best Management Practices for protecting water quality and institute riparian corridors as a management prescription.**

Yes, that is what we intend to do.

**9-26. Public Concern: The Forest Service should provide water quality monitoring data for use in watershed assessments.**

The Forest Service is implementing agency wide the National Resources Inventory System (NRIS) which will become the repository of water quality, stream, soil, vegetation and other types of data that will be used in watershed assessments. However, in general, we are not an agency that collects a lot of water monitoring data without specific reason. More often we use USGS, SC DHEC and other collectors of data to provide background information, and then we might conduct short term monitoring or administrative studies to address specific problem areas. We often use stream geomorphic, biologic, channel substrate and other indicators on the past and present landscape that can be linked to historic and current conditions. We also make extensive use of the information published by hydrologic experiments and references by the Forest Service, universities and others to provide much of the basis for which to compare management practices to.

**9-31. Public Concern: The Forest Service should designate one or more aquatic species as management indicator species.**

Rationale for not selecting individual aquatic species as management indicators is documented in the Management Indicator Species Selection Process Record (available upon request). This rationale centers on the fact that monitoring data for individual species may be highly variable over space and time for reasons that may be difficult to tie to watershed health and management effects. Scientifically, it is much more meaningful to look at whole fish communities for trends in composition. This monitoring involves collecting data on all species in the community, but is not set up to make inferences based solely on the trends of one or a few species. This approach provides more power for assessing conditions, and reflects use of the best current science. The revised plan (Monitoring Summary Table, Appendix E) indicates our intent to monitor fish communities and aquatic macroinvertebrates as part of monitoring watershed condition. The revised plan also indicates our intent to monitor aquatic threatened and endangered species (Monitoring Summary Table, Appendix E).

**9-33. Public Concern: The Forest Service should provide more information and discussion of Proposed, Endangered, Threatened, or Sensitive aquatic species; and impacts and recovery plans for them.**

Effects to all proposed, endangered, threatened, and sensitive aquatic species have been analyzed and documented. All have been included in species viability analysis in Chapter 3 of the FEIS. In addition, all federally listed species have been addressed in a Biological Assessment that is being coordinated through the US Fish and Wildlife Service, which is responsible for coordinating species recovery. They will have concurred with final conclusions of this assessment prior to our signing a decision on the revised plan. Sensitive species have been the subject of additional analysis, which is documented in the Biological Evaluation. Additional analysis of specific impacts to these species will be conducted as part of site-specific project planning.

**9-37. Public Concern: The Forest Service should include an additional goal to require that prescribed fires and wildfire controls should be conducted to minimize pollution of surface waters.**

The forest has developed standards to insure that prescribed fires are conducted to minimize pollution of surface waters. Forest wide standards and the Riparian Prescription specifically include protection measures related to prescribed fires. The forest also complies with the vegetation management EIS for the Southern Appalachians. Wildfire control measures always consider effects to the resources, including surface waters and aquatic habitat. Wildfire burn rehabilitation measures are also developed to restore aquatic habitats where necessary.

**9-39. Public Concern: The Forest Service should rewrite Forestwide Standard 51 and include additional standards for herbicide use to protect non-target plants and water resources.**

This standard has been rewritten. The distance has been changed from 200' to 100' to be consistent with the VMEIS. The last portion of the standard has been deleted because standards should generally state either requirements or prohibitions and not dwell on exceptions. Further, non-aquatic label herbicides may be desired nearly to the boundary of an aquatic condition to control certain invasive plants.

The Sumter does not have any karst topography. Neither does it have many rock outcrops, and those would generally be a poor place to apply herbicide. Soil active herbicides may be useful on slopes over 45 percent, especially for invasive species. Some soil active herbicides are not necessarily very mobile in the soil, especially soils with much clay content. Herbicides may be a preferred tool on erodible soils, since they do not require soil disturbance. Definitions are also difficult, since every soil is erodible to some degree. Likewise, every place almost by definition feeds or recharges some aquifer.

The last standard recommended also presents a problem. It would prevent us from using a triclopyr/imazapyr mix to release pine, oak and hickory. They are non-target plants, the target vegetation is within 30 feet of them, and imazapyr is a soil-active herbicide. In fact, this standard would be a problem for any release project using imazapyr.

**9-41. Public Concern: The Forest Service should provide information on the ownership, location, and potential for development and any restrictions for a 358-acre Long Cane District tract.**

The mineral ownership and location information for Tract L 446.4 can be found in both the Supervisor's Office and the Long Cane Ranger District Office, as well as the Abbeville County courthouse, and is of public record. The Forest Service acquired this property on September 16, 1942 from Ella and Augustus Searles. This tract was originally made up of the Putnam, Lyon and Hunter parcels. The minerals were severed from the Putnam parcel on March 20, 1879, from the Lyon parcel on October 8, 1897 and from the Hunter parcel on March 24, 1879.

Mineral development potential information is beyond the scope of the Forest Plan.

Restrictions or mitigation measures placed on mineral development proposals on this tract would be established through an environmental analysis and subsequent negotiation process since the Federal government does not control the mineral estate.

**9-42. Public Concern: The Forest Service should provide a more thorough explanation of the operation and current or expected environmental impacts of several gold prospecting leases mentioned in the DEIS.**

There is only one Preference Right Lease Application (PRLA) that has been applied for and approved on the Sumter National Forest. This lease is identified as SCES04686 and contains 1107 acres. An environmental analysis was conducted on both the Plan of Operations and the PRLA. The thorough explanation of the operations and environmental impacts were disclosed in the document. A Prospecting Permit Application and Plan of Operations were submitted to the Forest by Bobby Revels (SCES 50415). This proposal was evaluated and a Decision Memo was issued on October 1, 2002. A second Prospecting Permit Application was submitted by a Mr. Huntley but was subsequently withdrawn.

Each analysis contains a detailed explanation of the proposed operation and what environmental impacts are likely to occur. This evaluation is done on for each proposal and is site specific.

Each management area has been evaluated for possible mineral mineral. For each management area a decision was made to not allow mineral operations, allow mineral operations with certain restrictions, or allow mineral operations with standard stipulations.

**9-45. Public Concern: The Forest Service should include an additional goal to require utility corridors and communication sites to minimize environmental, social, and visual impacts.**

This concern is addressed in several other Forest Plan goals (Goal 28, 36). Minimizing environmental impacts will be addressed with specific mitigations identified in project level environmental analysis.

**9-46. Public Concern: The Forest Service should include an additional standard to limit utility corridors and communication sites in certain management prescriptions.**

EPA appears to suggest that a FW standard be added that addresses basically what is already stated in several other individual prescriptions,"for ease of interpretaion". This is not a land management issue but rather a formatting suggestion. Since addressing utility corridors and communications sites in the various prescriptions is consistent with how other similar management issues have been address, then it should remain as written for that reason.

**9-48. Public Concern: The Forest Service should recommend more acreage for wilderness study areas because of the growth in demand.**

See response to PC 5-21.

**9-49. Public Concern: The Forest Service should designate all eligible rivers as wild, scenic, or recreational.**

See response to PC 6-58.

**9-53. Public Concern: The Forest Service should add an objective 27.01 to develop a management plan for each wild and scenic river by 2010.**

See response to PC 6-58.

**9-54. Public Concern: The Forest Service should include detailed discussions of why certain management prescriptions were developed, what were their goals, and why they were not included in the preferred alternative.**

Rationale for the determination of the selected alternative in the Final EIS is contained in the Record of Decision. Here is where the decision for the Revised Plan to be implemented is explained in terms that tell the reader why one alternative is favored over others. The Alternatives, early on in the process, were designed from the ground up. Working with the public, some thematic outlines were developed and then, the prescriptions built and applied in logical groupings that matched the alternative themes. The resulting alternatives are displayed in the EIS. The Preferred Alternative could not include all of the prescriptions, nor did we want it to. The Desired Condition; however, is to be created by application of the prescriptions chosen

**9-56. Public Concern: The Forest Service should provide additional information and analysis of the extent to which current and planned roads impact forest resources.**

The Forest has completed the required forest-wide roads analysis that is a programmatic level of analysis. Specific roads are not considered in the forest-wide analysis. Specific roads and their impacts on forest resources are considered in a subsequent watershed or project level roads analysis.

**9-57. Public Concern: The Forest Service should consider using Maryland Department of Transportation's floodplain culverts to create more stable stream crossings.**

Specific design criteria and alternative designs are developed at the project level. Protection of water quality will be emphasized in the all road design, construction and reconstruction projects.

**9-58. Public Concern: The Forest Service should include an additional objective to inventory for all roads and trails affecting aquatic habitat and plan what to do with them.**

The Forest has completed the required forest-wide roads analysis that is a programmatic level of analysis. Specific roads are not considered in the forest-wide analysis. Specific roads and their impacts on forest resources are considered in a subsequent watershed or project level roads

analysis. Protection of water quality is considered in all road design, construction and reconstruction projects. Trails that are clearly a source of water quality degradation are also a priority for mitigation.

**9-64. Public Concern: The Forest Service should work to repair OHV trails and control sedimentation from ground disturbing activities.**

The plan has provisions that call for trail maintenance and repair of designated OHV trails. Wherever there are ground disturbing activities, such as excessive OHV use, the forest plan requires that the Forest monitor, evaluate, and restore the ground and prevent sedimentation. Actual work is done based on priorities and on amount of available funding. The Plan contains forest-wide and riparian standards to control sediment related to ground-disturbing activities.

## APPENDIX M

### WATERSHED SUMMARY

*Table M-1. Some of the watershed based information accumulated for Broad Scale Analysis in 1999 for Forest Plan Revision (Hansen et al, 2002). Watershed ownership, land uses, population and other factors were considered, but sediment estimates were the primary estimator of watershed effects for plan revision (Clingenpeel, 2003).*

HUC11 number*	5th Level Watershed	Area (sq miles)	%NFS of WS	Forest (%)	Agric ulture (%)	Urban (%)	Riparian Forest (%)	dlgroads (miles)	# of Dams	# Mines	# NPDES permits	# RCRIS sites	96 total population	# Aquatic PETS	% Outstanding Resource Waters	Impaired streams (miles)
03050106010	Upper Broad River Composite	121	26.2	79	16	1	83	331	8	2	3	0	6,031	1	0.0	603
03050106020	Turkey Creek (Broad basin)	146	0.5	82	18	1	88	385	10	8	0	2	5,903	0	0.0	763
03050106030	Browns Creek	53	0.7	73	21	6	88	165	4	0	0	1	8,529	0	0.0	240
03050106040	Sandy River	163	1.1	82	14	3	91	422	15	0	1	15	17,135	0	0.0	910
03050106050	Lower Broad River Composite	325	5.1	71	18	2	82	837	10	2	3	4	17,286	1	0.0	1
03050106070	Little River (Broad basin)	243	0.0	88	10	2	92	554	13	4	0	11	11,995	0	0.0	0
03050107050	Middle Tyger River Composite	131	17.0	72	26	2	82	367	6	1	0	7	11,137	0	0.0	734
03050107060	Fairforest Creek	218	3.2	64	21	15	80	897	23	7	7	127	57,472	0	0.0	1150
03050107070	Lower Tyger River Composite	114	29.9	85	13	2	90	335	4	0	2	4	8,648	0	0.0	358
03050108020	Middle Enoree River Composite	130	23.1	79	19	3	86	382	8	14	1	4	7,801	0	0.0	666
03050108040	Duncan Creek	120	23.6	73	20	6	82	379	14	2	2	16	11,594	0	0.0	703
03050108050	Indian Creek	97	48.7	88	10	2	93	276	4	1	2	2	4,866	0	0.0	564

HUC11 number*	5th Level Watershed	Area (sq miles)	%NFS of WS	Forest (%)	Agriculture (%)	Urban (%)	Riparian Forest (%)	Highways (miles)	# of Dams	# Mines	# NPDES permits	# RCRIS sites	96 total population	# Aquatic PETS	% Outstanding Resource Waters	Impaired streams (miles)
03050108060	Lower Enoree River Composite	67	44.4	88	11	1	89	187	2	0	0	14	4,027	0	0.0	378
03050109150	Middle Saluda River Composite	285	0.1	56	38	5	69	859	28	9	2	21	32,132	2	0.0	0
03060101020	Whitewater River Composite	50	4.3	89	0	0	98	77	5	6	0	2	2,496	0	9.8	0
03060101050	Little River Composite (Seneca basin)	164	14.0	75	11	6	87	506	21	10	0	17	19,529	0	4.2	0
03060101080	Coneross Creek	75	3.3	52	38	10	61	328	14	4	3	18	15,120	0	0.0	933
03060102010	Chattooga River	279	13.2	93	3	3	91	539	16	16	2	2	15,363	2	12.8	913
03060102080	Tugaloo River Composite	130	10.3	88	6	4	85	348	11	5	0	2	11,172	0	0.0	0
03060102120	Chauga River	111	41.8	92	7	1	93	265	11	4	0	4	5,541	1	45.0	0
03060103100	Little River Savannah Composite	136	3.7	73	2	2	95	327	5	5	0	0	6,809	1	0.0	0
03060103140	Little River (Savannah basin)	340	5.9	61	37	2	72	820	21	2	1	3	18,952	0	0.0	0
03060103150	Long Cane Creek	228	26.7	75	21	4	85	504	11	5	2	10	19,306	0	0.0	0
03060106030	Lower Savannah River Composite	21	30.3	92	0	0	100	81	2	0	1	1	1,069	0	0.0	163
03060107010	Upper Stevens Creek	249	8.7	82	15	2	90	647	7	4	4	39	19,872	2	0.0	141
03060107020	Turkey Creek (Savannah basin)	285	15.3	84	13	3	87	702	11	6	1	11	16,112	2	0.0	179
03060107040	Lower Stevens Creek Composite	205	13.4	93	6	1	96	444	34	0	0	0	12,313	1	0.0	3

\* The 11 digit HUC number is being changed to 10 digit. The computer sometimes removes the first 0 of the number.



# **Final Environmental Impact Statement for the Revised Land and Resource Management Plan**

**Sumter National Forest**

# **Appendixes Final Environmental Impact Statement for the Revised Land and Resource Management Plan**

## **Sumter National Forest**

# **Revised Land and Resource Management Plan**

**Sumter National Forest**